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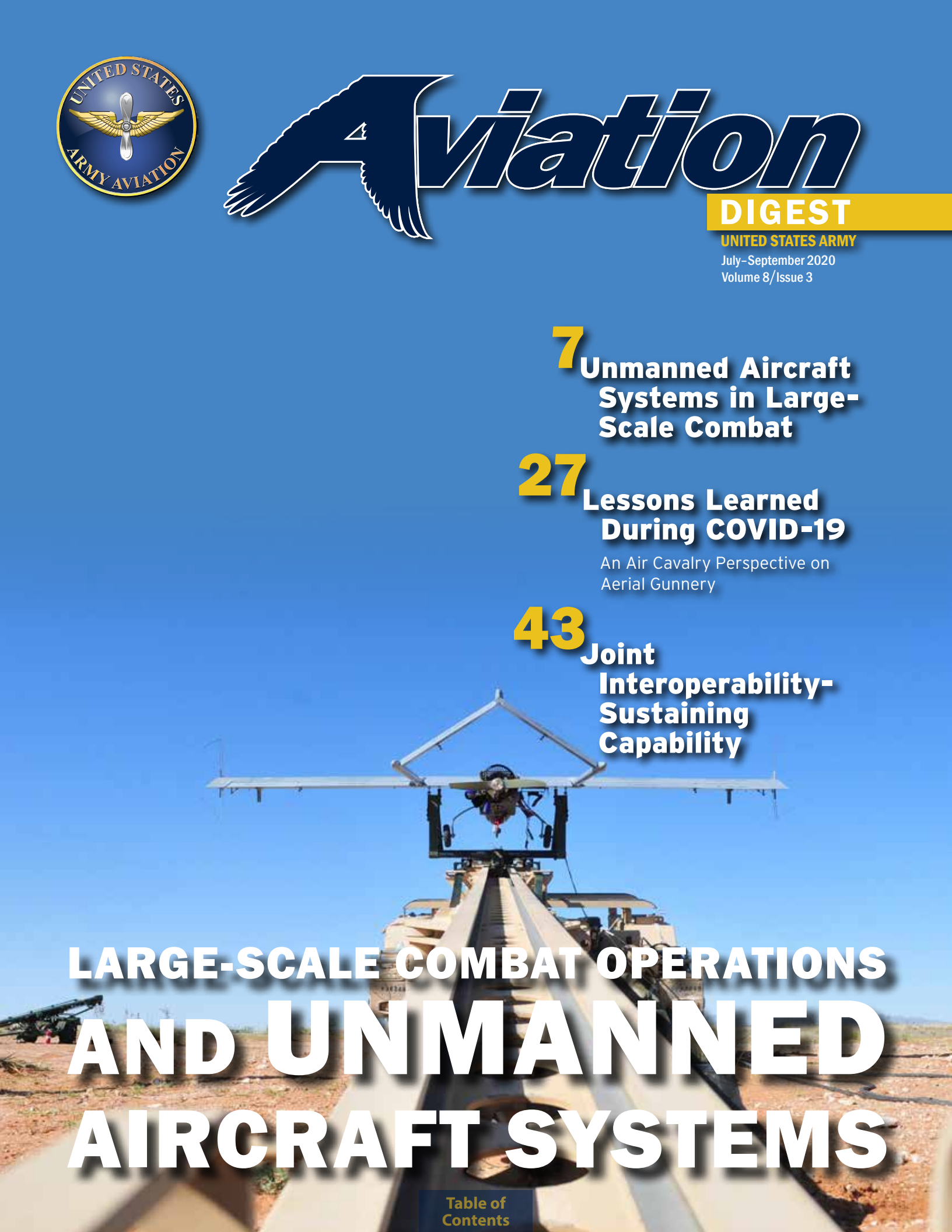

LARGE-SCALE COMBAT OPERATIONS AND UNMANNED AIRCRAFT SYSTEMS

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UNITED STATES ARMY Aviation DIGEST
The Professional Bulletin of the Army Aviation Branch, Headquarters, Department of the Army, PB 1-20-3
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About the Cover:

An RQ-7B version 2 Shadow unmanned aerial vehicle sits on a hydraulic launcher prior to a test flight by Soldiers of 3rd Squadron, 6th Cavalry Regiment, Combat Aviation Brigade, 1st Armored Division, at McGregor Range, New Mexico, April 15. U.S. Army photo by SGT Alexander Neely, Combat Aviation Brigade Public Affairs, 1st Armored Division

The Command Corner

Project Athena

Recognizing that one of the most critical factors in delivering Army readiness is the development of leaders, the Chief of Staff of the Army (CSA) directed the implementation of a life-long assessment process for every Soldier. The intent of this "People First" approach is to assess an individual's cognitive, personal, and leadership skills to better understand their potential and to prioritize their developmental efforts. To actualize the CSA's intent, the Combined Arms Center is implementing Project Athena.

Project Athena is an initiative that began in the Basic Officers Leader Course and the Command and General Officer Staff Officers Course in the summer of 2020. The Aviation Captains Career Course, Warrant Officer, and Noncommissioned Officers' assessments will begin next year. Project Athena's assessments measure an individual's warfighting competencies, physical fitness, leadership, cognitive abilities, communication skills, mental toughness, and interpersonal skills. The purpose of these career-long assessments is to support talent management, enable guided self-development, and inform operational force leader development programs.

As one of the Army's most professional and certified organizations, Army aviation has decades of experience with similar processes. Under regulatory guidelines and the standards established in the Commander's Aircrew Training Program, Army aviation routinely assesses and documents the proficiency of our aircrews. We maintain these progressive cognitive and performance-based assessments in our Individual Aircrew Training Folder (IATF). Aviators maintain these files throughout their career and they serve to document an aviator's progression, capabilities, and certifications.

The Army is currently looking at the IATF as a basis for a Leader Readiness Assessment Portfolio. Like the IATF, the leader portfolio will serve as a repository for Talent Assessment Batteries, Academic Evaluation Reports, individual and collective competencies, and Individual Development Plans. These records are maintained throughout the Soldier's entire career and are used as both a resume and a known starting point as Soldiers move from unit to unit. The concept for these portfolios is to establish professional self-awareness and provide a process for training and developing the knowledge, skills, and behaviors necessary at each phase of a leader's career.

Once fully implemented, Project Athena will serve to create a culture of assessments in the Army, contribute to better Soldier self-awareness, enhance unit leader development programs, and result in leaders who possess the character, competence, and commitment to serve in the Army profession.

By establishing the tools for career-long leader development, we provide our leaders with the ways and means to lead and fight aviation formations in large-scale combat operations/multi-domain operations.

As the Army and our branch lean forward to implement these new initiatives, I challenge the field to share their best practices and tell us how they effectively train and develop the next generation of aviation leaders.

Above The Best!

David J. Francis
Major General, USA
Commanding

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U.S. Army photo by SGT Mason Cutrer

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October–December 2020 issue articles due September 1, 2020 (magazine published on or about November 15, 2020)

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Authors are asked to observe posted deadlines to ensure the *Aviation Digest* staff has adequate time to receive, edit, and layout materials for publication.

Army Aviation The Wild West of Electronic Flight Bags

THE NEED FOR STANDARDIZATION OF ELECTRONIC FLIGHT BAGS

BY CPT ROBERT WRIGHT

CH-47 Pilot from B Co, 1-214th General Support Aviation Battalion uses iPad during high altitude training flight in the Bavarian Alps on May 4th, 2020 (Bavaria, Germany). U.S. Army photo by MAJ Robert Fellingham

Every pilot knows that the key to a successful flight is to stay ahead of the aircraft. Rapid technological advancements during the digital age have helped thousands of pilots do just that. In addition to advanced avionics, such as digital flight management and global positioning systems, electronic flight bags (EFBs) have become the standard in favor of bulky paper publications for nearly every pilot, thanks to the commercialization of portable electronic devices (PEDs) (National Aeronautics and Space Administration [NASA] Aviation Safety Reporting System, 2010). Electronic flight bags are electronic systems that are portable, mounted, or an actual aircraft component that provides a variety of aviation data to pilots operating on the aircraft flight deck. Compared to traditional paper publication and charts, EFBs have the distinct advantage of speed, portability, and convenience. Despite these benefits, EFBs also create human factor safety risks that have resulted in thousands of accidents and incidents. While commercial operators have continually refined and standardized their regulations and training programs to mitigate these risks over the last 20

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years, the Army has failed to provide timely and comprehensive EFB regulatory guidance. Electronic flight bag usage among aircrews in the Army is quite literally the Wild West when it comes to devices, applications, and training. The Army should update doctrinal guidance, establish training requirements, and set up equipment procurement procedures in order to implement a comprehensive EFB policy that eliminates unnecessary risk.

Although commercial aviation companies like Federal Express or Delta Airlines have used various forms of EFBs since as early as 1994, Army aviators, along with the vast majority of general aviation pilots, only recently began to adopt EFBs. This occurrence is solely due to the commercialization of PEDs, namely the iPad that was released in 2010. Prior to the widespread availability of PEDs, EFBs were manufactured by single hardware and software companies. In most cases, these EFBs were integrated into the cockpit permanently, rather than being portable. Pilots today can install a wide range of EFB software applications like ForeFlight (an integrated flight application for pilots) or the Garmin Pilot™ application on most off-the-shelf PEDs. Not only do EFBs manage your flight publications, most include additional features like flight filing, performance calculators, moving maps, and weather overlays that lead to greater situational awareness. With their widespread availability, Army aviators quickly adopted EFBs for their speed, portability, and convenience.

Army aviators have been using PEDs since 2011, although their approval for use in the cockpit did not occur until years later. Even after select PEDs were certified as airworthy, there remained no published regulatory guidance on the use and operation of EFB software. The aviation branch attempted to address this void during the most recent update to Army Regulation (AR) 95-1 "Flight Regulations" in April 2018 (Department of the Army, 2018).

CW2 Garrett Cartner uses an iPad during Night Flight from Grafewoehr Army Airfield on April 20th, 2020 (Grafenwoehr, Germany). U.S. Army photo by CPT Robert Wright

The update included the addition of a half page EFB section that provided broad program management requirements and effectively delegated all aspects of the program to unit commanders. In contrast to the Army's broad guidance, since 2003, the Federal Aviation Administration (FAA) has outlined detailed requirements for commercial operators to follow in order to obtain approval to transition to EFBs (U.S. Department of Transportation [DOT], Federal Aviation Administration [FAA], 2016). The Army, however, doesn't fall under the Code of Flight Regulations, and is therefore not subject to this process and oversight. This wasn't a major issue until Apple, Inc., introduced the iPad and inadvertently created a cost-effective portable EFB.

Army aviation regulatory EFB guidance has been long overdue, but the first policy didn't do much to address underlying safety risks that the commercial sector has experienced over the last 25 years. For example, at Southwest Airlines Company, all pilots have the same 9.7 inch iPad with the company's EFB program installed. Pilots are not allowed to have personal EFBs or PEDs on the flight deck at any time (DOT, FAA, Flight Standards Service, 2014, p. 8257). In Army aviation, EFB standardization is virtually nonexistent. An aviator's training and equipment experience doesn't just differ from post to post or battalion to battalion, it can differ from flight to flight. Many of you might remember flying the OH-58 Alpha and Charlie models during the basic warfighting skills portion of flight school. Each of these models featured a different instrument panel arrangement. In most cases, this constant change caused fascination inside the cockpit, as well as added environmental stressors (Department of the Army, 2009, p. 3-2). Nonstandardized EFBs currently present the same safety risks.

Following the original release of EFB guidance in FAA Advisory Circular (AC) 120-76 in 2002, which was cancelled March 17, 2003, extensive research has been conducted on associated EFB safety risks (FAA, 2002). The FAA commissioned a 2014 study to identify the main human factors related to EFB accidents and incidents. It found that the majority

of more than 5,000 accidents or incidents reported during a 20-year period were due to four main factors:

1. Use of electronic charts—Complications when using electronic charts consisted of view issues due to scrolling and zooming, the presence of inaccurate information, and the difference in presentation from paper charts.

2. Crewmember performance—Insufficient training, inexperience, distraction, or disorientation.

3. Hardware concerns—Examples include inadvertent errors or shutdowns, legibility, readability, and brightness.

4. Placement, mounting, or stowage of the EFB (Chase & Hiltunen, 2014, p. 55).

By default, the current Army policy allows up to three of the four previously mentioned factors (1, 2, and 4) to be present in the cockpit. This adds unnecessary and unacceptable risk to aviators and the Soldiers that we support.

In order to improve pilot and passenger safety, the FAA has continually revised its original, and now cancelled, EFB guidance in FAA Advisory Circular (AC) 120-76 based on research-backed evidence (FAA, 2002). Since original issuance, the circular has had five major revisions. As mentioned earlier, the Army has only recently issued initial regulatory EFB guidance. Previous airworthiness releases only verified the use of certain PEDs in flight. To minimize the safety risks and increase aircrew survivability, the Army should aggressively expand and revise its EFB policies based on the lessons learned by commercial operators over the last 20 years.

To effectively implement a comprehensive EFB policy comparable to commercial airlines, the Army will need to update doctrinal guidance, establish training requirements, and set up equipment procurement procedures. Doctrine improvements should include an update to section 5-7, *Electronic flight bag*, in AR 95-1 (Department of the Army, 2018). In the interim, regulatory guidance should be outlined by the Department of Evaluations and Standardization through standardized communication messages. Electronic flight bag application standardization is one critical element that must be addressed in the aforementioned doctrinal updates. Since AR 95-1 only states that "the same flight application" should be used between pilots, most units leave this decision to the pilot-in-command (Department of the Army, 2018, p. 42). Therefore, both the EFB application and type of PED used can vary from flight to flight for assigned copilots. In addition to updating AR 95-1, the Army aviation SOP will need to be amended to add EFB operations, as should a 1000-series task in the digital Aircrew Training Manual (dATM). Finally, the Army must develop a streamlined equipment procurement process for PEDs to facilitate standardization and modernization across all units.

Aviation is already inherently dangerous, but the risk increases significantly when you factor in the complexities associated with military aviation operations. It is estimated that 80% of all aircraft accidents are related to human factors (DOT, FAA, 2016, p. 2-2) and occur due to a chain of events (DOT, FAA, 2016, p. 2-12). In order to prevent accidents, we must break that chain. Standardizing Army EFB regulations, policies, equipment, and training through a comprehensive approach will reduce accident factors present in the cockpit and help aircrews break the chain.

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UNMANNED AIRCRAFT SYSTEMS

IN LARGE-SCALE COMBAT

By SSG Douglas R. Robillard

The recent publication of Field Manual (FM) 3-04, "Army Aviation," in April 2020 outlines the importance of UAS (unmanned aircraft systems) and the role that these systems will play in the future of LSCO (large-scale combat operations) with the following statement on manned-unmanned teaming, "MUM-T enables increased depth and breadth of aviation reconnaissance and maneuver, increased persistence over the reconnaissance objective, increased ability to gain and maintain enemy contact, increased survivability, and more options to develop the situation with enhanced maneuver, fires, and command and control (C2)" (Department of the Army, 2020, p. 1-3). This article will break down each aspect as mentioned earlier from the UAS viewpoint and will continue on to discuss the UAS of the future.

The role of UAS over the past 2 decades has been one of intelligence, surveillance, and reconnaissance//reconnaissance surveillance and target acquisition and has been conducted in the COIN (counterinsurgency) environment in the Afghanistan and Iraqi theater of operations. During this time, the U.S. military had established air superiority, which allowed UAS to fly and gather near-real time information relatively unhindered. However, the battlefield of the future possesses a plethora of new threats and obstacles to not only UAS flight, but the flight of all U.S. aviation assets. Without this freedom of aviation movement and mobility, the quote from FM 3-04 and the objectives it covers become much more difficult to facilitate and hinders the flow of information to commanders at every echelon.

Soldiers from Delta Company, 116th Brigade Engineer Battalion, prepare to conduct aerial flight operations during training Jan. 17, 2019, at the Orchard Combat Training Center. U.S. Army photo by SGT Mason Cutrer

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Soldiers from Delta Company, 116th Brigade Engineer Battalion, prepare to conduct aerial flight operations during training Jan. 17, 2019, at the Orchard Combat Training Center. U.S. Army photo by SGT Mason Cutrer

Reconnaissance and its generation of useable information is a critical part of military planning and has been a vital asset to armies around the world in every conflict. Without current information about adversarial composition and disposition in regard to position, strength, and configuration, military planners are left to "fill in the blanks" and will be unable to account for unknown variables when creating a successful plan. The military decisionmaking process relies on injected information from all sources available to allow planners at each echelon the ability to formulate accurate courses of action. With real-time information before, during, and after a mission, leaders can conduct an in-depth after-action review for future operations.

The UAS platform is best suited for this kind of intelligence-gathering mission due to its long dwell time on targets of interest and the use of onboard sensors. The UAS can provide commanders with full motion video and still photography of targets and their surroundings, enhanced with the ability to provide highly accurate coordinates for long-range fires, and in some cases, conduct kinetic attack themselves. When UAS are used in conjunction with manned aviation and ground forces, they become an even greater force multiplier. The ability of the UAS platform to be located far in front of the operational force gives early warning in regard to disposition changes at the target area and the route to the objective area. This early warning allows maneuver units, whether air or land based, to adjust on the fly with little to no disruption of movement. With early detection of changes passed to commanders, proper reinforcements or additional support can be massed accurately in the AO (area of operations).

We must remember that "every unit has an implied mission to report information about the terrain, civilian activities, and friendly and enemy dispositions" (Department of the Army, 2017, p. 5-10) across the entire AO. Information, and the methods by which it is gathered, will become even more essential when moving into LSCO with a peer or near-peer adversary where U.S. forces may find competition in all five domains (Air, Land, Sea, Space, and Cyberspace). During LSCO, the ability to find, fix, and fire on essential equipment or facilities becomes the main priority. As we now face an adversary with like capabilities, we must blind oppositional reconnaissance and cripple their ability to maneuver freely inside the battlespace to include space, cyberspace, and the electromagnetic spectrum.

Gathering information about an adversary in the event of LSCO will be the cornerstone when filling command critical information and assist developing the joint information preparation of the operational environment due to the adversary being a peer or near-peer capable formation. With capabilities in all five domains, U.S. forces must compete for use of assets. Gone are the days of just knowing where the enemy is and what it is equipped with; now, planners must find strategic components of their infrastructure and disrupt or destroy that capability to allow friendly forces to maneuver and to communicate across the battlespace.

CURRENT UAS CHALLENGES

The current fleet of UAS within the Joint Force faces tremendous challenges inside of the denied, degraded, and disrupted space operational environment (D3SOE). These challenges come from a dependency on space-enabled resources that are required to fulfill the process of information gathering and its subsequent dissemination to proper collection teams. This poses a problem for planners at all echelons and creates an informational gap in the current status of enemy/adversarial forces. History has shown us that

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information is a key to success and that the most current information is the best information, especially when fused with multiple intelligence sources. With that in mind, planners and operators need to enhance individual and operational knowledge to overcome system-limiting events that future forces can expect to encounter during LSCO with peer and near-peer adversaries.

A major threat to unmanned systems in large-scale combat with any adversary, especially with peer or near-peer adversaries, is the reliance on global-positioning system (GPS) navigation and other electromagnetic spectrum resources, which include communication nodes and their subsequent systems. Adversaries will use GPS spoofing or other techniques to provide false locational data to the reliant system; in this case, the UAS employed by allied forces. The spoofing of a signal is a low-cost, high-yield form of electronic warfare and can be used locally or in a specified geographic region to prevent observation for intelligence gathering and planning. Not only will spoofing affect the unmanned platform, but it will bleed over into the capabilities of satellite communications, thus rendering an army blind as well as mute in the communication realm.

While loss of GPS and communications is a real threat for adversary and allies alike, steps have been taken to harden the networks and related systems to ensure continued usage. Some of the techniques that can be used to help mitigate spoofing or jamming of signals are fairly cheap and easy to emplace. Duplicating the antenna array that would allow multiple receiving points is one method used to help combat local jamming and spoofing. Use of counter-jamming antennas around critical points of communication is another option available; this can be used in conjunction with antenna or array placement, having them shielded by terrain or other man-made features. Even with certain countermeasures in place, loss of signal is still a real possibility for all users and will be even more difficult to defend against if multiple spoofing and jamming systems are employed.

Knowledge and training in the D3SOE will help prepare the UAS reconnaissance operators for events that may occur in flight, and in some cases, before the aircraft is even airborne. This training must place a higher degree of proficiency in pilotage, dead reckoning, and map-to-video correlation along with knowing the warning signs that you are being interfered with inside of the spectrum. With increased proficiency in these critical skills, operators will be able to act accordingly and with less situational stress when, and if, a D3SOE event occurs. While these skills are taught during initial training and are part of the readiness level progression training at home station, they must be enforced and used in operational environments and evaluated more frequently. Unmanned aircraft system operators with additional reinforced training will be able to "stay in the fight" when disruption occurs and can continue to provide critical data to all elements involved in any operation.

The UAS in current use provide and satisfy many objectives listed in the FM 3-04 quote from the beginning of this article. The ability to reach far forward of previous reconnaissance assets at a greater elevation, with on board sensor arrays, joined with the ability to provide kinetic attack further diversifies their role. Once on station in the operational area, the UAS can loiter for extended periods of time, coupled with the added capability of relief on station that can provide long-term "unblinking" intelligence gathering coverage. This long-term coverage can help leaders understand specific patterns of life that may be crucial to an operational aspect, help adjust mission timelines, and lead to courses of action with greater accuracy and situational awareness.

Along with the D3SOE, aviation assets will face two additional challenges when planning to conduct operations during possible future large-scale combat. First, they will face anti-access/area denial (A2/AD) threats that will be employed by adversaries to restrict or deny freedom of movement and maneuver. This will come in many forms, and each condition should be planned for and anticipated when any type of movement will be conducted. The adversary will try to use diplomatic, information, military, and economic means to gain and maintain areas of key terrain and by doing so, slow movement or deny maneuver in these strategic areas. Simply said, "Establishing mobility over greater time and distance to decisive spaces

Det. 1, D Co., 177 BEB, 48th Infantry Brigade Combat Team flies the RQ-7B Shadow UAS in eastern Afghanistan. The unit conducts 24-hour operations to keep visibility over TAAC-East. U.S. Army photo by SGT Jordan Trent

requires future formations to obtain near complete and real-time understanding of the operating environment. Terrain, weather, and the adversary's use of domains along with the information to influence populations and lethality to create obstacles will deny US forces access to decisive spaces" (Savre, 2018, p. 214). This quote from MG Kent D. Savre solidifies the need for UAS on the battlefield of the future, showing that real-time information gathered in the operational environment provides critical and timely data to shape operations.

The second type of operation anticipated in large-scale combat will not be fought on the ground or air but in the electromagnetic spectrum, which merges the cyber and space domains. Adversaries will use technology in new and creative ways to gain the advantage in a domain that U.S. and coalition forces have enjoyed freedom of access to during COIN-centric operations. If the adversarial force is allowed access to cyberspace, they can conduct disinformation operations that have the potential to turn an ally into an adversary, thus denying an attacker the assistance of local governments and the subsequent populace. This type of action can keep armies at a greater distance from contested borders or key terrain needed for information gathering and in regard to UAS, the ability to see what lies ahead. Adversaries have learned from history and understand that armies around the world will begin massing forces and resources in advantageous locations to help facilitate and sustain combat operations. This type of attack extends far from the battlefield and up into the space domain, the domain that gives its user the highest vantage points and the ability to gather the most information.

If the adversarial force is unable to gain or maintain access to the cyber and space domains, there are several course of action they may take. A simple course of action would be for them to destroy equipment physically located on the battlefield, thus reducing or eliminating our ability. The next and most drastic, as well as the most expensive action, would be the use of an anti-satellite weapon to destroy the enemies' orbiting satellite. This capability is extremely effective but can have adverse side effects for the launching user, as well as the adversary in question. The destruction of a satellite in low earth orbit will scatter millions of pieces of debris and possibly cause damage or destruction of other orbiting equipment and render the entire network useless. The UAS and manned aviation can supplement some capabilities that could be lost in the event of satellite destruction; communication and intelligence-gathering can continue but at a slightly degraded level (Department of the Army, 2019).

Space-based capabilities are not new to the modern warfighter and can be found in use in every possible way right at the user's fingertips. From computers to cell phones, modern militaries can communicate in an instant, sending large amounts of data in the blink of an eye. They can contact elements separated by hundreds of miles, coordinate movement, and update current situations with little effort. There is also the use of force XXI battle command brigade and below, or as many of you might know it, blue force tracker. These systems give commanders the ability to track units and pass information about the operational area and changes that occur in near real time. But what if you couldn't send an email, a text, or make a simple phone call due to lack of connectivity? What happens when the space domain is compromised, and the cyber domain and its advantages are now out of reach? Compounding this situation is not knowing if the adversary still has use of such things; can he still communicate and coordinate his forces at will, or are they just as degraded as you? Military planners do have a solution for this by use of a Primary, Alternate, Contingency, and Emergency, or PACE plan. This is a list of alternate means of communication between broad ranges of elements in the AO. While communication can still be conducted, it is slowed and in some cases, laborious to complete.

There is another capability that lies between the cyber and space domains and crosses over fluidly when a skilled user employs it. This capability applies directly to

Soldiers of Bowling Green-based Detachment 1, Company B, 116th Brigade Special Troops Battalion, 116th Infantry Brigade Combat Team, Virginia Army National Guard prepare to launch RQ-7B Shadow unmanned aerial system on an airfield in Fort Drum, New York, June 11, 2015. National Guard photo by SGT JoAnna Greene/ Released

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the UAS and its beneficial resources that will need to be optimized during possible future large-scale combat. The electromagnetic spectrum is what is used to facilitate communications and the delivery of full motion and near real-time video sent from the UAS platform. As the UAS requires the use of these frequencies to maintain control, view the video feed from its sensor array, and communicate to commanders and planners, it is critical to UAS employment success. Use of this capability is critical in the D3SOE, for both friend and foe, helps strengthen A2/AD, and is the cornerstone for creating a protective Integrated Air Defense System (IADS). An IADS is a collection of personnel and equipment employed to deny an adversary the freedom to use aviation assets in order to either gather information or to launch an air-based offensive. With an effective IADS emplaced well within the borders of contested space, an adversary can use distance to their advantage and can prevent adversaries from attempting detailed information gathering or deep strike offensives.

The use of UAS in multi-domain operations (MDO) is critical to completing the five phases that constitute the MDO. The phases for MDO are: Compete, penetrate, dis-integrate, exploit, and re-compete.

During compete phase, UAS will be called upon to conduct counter-reconnaissance efforts that are effective as a deterrent and serve to defeat asymmetric and informational warfare techniques.

The phase of penetration is where unmanned and manned systems will be utilized to mitigate any stand-off the adversary has developed, such as a robust IADS belt, allowing maneuver and reduced effectiveness of long-range fires.

The dis-integrate phase will use UAS to further defeat long-range fires, while gathering and defeating short-range systems and maintaining individual freedom of movement.

The exploit phase is designed to defeat and neutralize mid- and short-range weapons and to isolate adversarial maneuver units.

The re-compete phase will allow friendly forces to consolidate and expand gains from previous phases. The UAS will be integral in each phase as the eyes of the force gathering critical information on unit locations and configuration. This will provide manned aviation and ground forces with additional security through knowledge and multiply lethality by use of accurate situational information.

THE FUTURE FOR UAS

Many countries around the world have invested heavily in unmanned systems of all types, along with technology to create an advantage across all domains. With the growing advances in technology and materials becoming more widely available around the globe and the increase of research and development, countries are outfitting themselves with cutting edge unmanned systems. Nations around the world use and rely on the same technological systems we do, and much like us, are finding ways to ensure the capabilities remain available but are denied to an adversary. Assured usage and dominance in the five domains will be the key advantage if faced with a large-scale operation in the future.

Russia and China (among other nations) currently employ unmanned systems on a broad spectrum of operations ranging from border security to direct kinetic and non-kinetic attack. Both nations have made public their efforts with unmanned systems that utilize land, sea, and air, with a wide-ranging array of sensors, kinetic, and non-kinetic weapons. Most recently, Russia released video evidence of MUM-T operations between a manned Su-57 jet fighter and the Hunter-B (Pravda Report, 2019). While this was a training mission, it shows the forward progress of UAS and manned assets. Russia has also deployed its current fleet of unmanned systems in continuing combat operations with a striking level of success. The systems come equipped with modern sensor arrays that are being used to reconnoiter targets to give precision long-range fire coordinates with devastating accuracy.

What does the unmanned system of the future look like? Nobody really knows. These systems will come in all shapes and sizes both fixed-wing and rotary; however, one thing is for certain, they will be a major cornerstone component of a truly modern army in large-scale operations. Unmanned systems will skim the tree tops and soar silently in the stratosphere, they will ride the waves and lurk in the depths of the oceans the world over and will reach beyond the horizon and stretch their limits among the stars.

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DOOR GUNNERS

AIMING TO STAY AHEAD OF THE CURVE IN FUTURE COMBAT OPERATIONS

By SFC Jonathan L. Felts

It was late August when the Brigade Command Sergeant Major (BDE CSM) approached me and said, "SFC Felts, I want you to run the brigade door gunner training program, and we are already behind the power curve" (personal communication with BDE CSM Etheridge, August 2019). I thought to myself, "We are just under a year out from our deployment, how can we be behind already?"

I was the newly appointed brigade standardization noncommissioned officer (NCO), not yet confident that I was the right person for the job. I was most recently a platoon sergeant for 18 months and a 2 year drill sergeant prior to that. It has been over 4 years since I had anything to do with Army aviation standardization. I would soon find out why we were behind. In a desk-side meeting with the 4th Combat Aviation Brigade (CAB) CSM, as well as three other CSMs from the brigade, we "white-boarded" a generic timeline. The end state was 50 Readiness Level 2 (RL2) door gunners, qualified through Table VI (TC 3-04.3, section 8-14)[1] by February 2020, when our brigade-wide gunnery was previously scheduled. Army Regulation (AR) 600-106, "Flying Status for Nonrated Army Aviation Personnel" states:

The door gunner of a UH-60 Black Hawk helicopter fires his M240H at targets of interest during a training event near Nellis Air Force Base, Nevada, Aug. 26, 2019. U.S. Special Forces utilized the UH-60 Blackhawk helicopter for infiltration and exfiltration purposes while conducting training with U.S. Air Force Joint Terminal Attack Controllers. U.S. Army photo by SGT Steven Lewis

[1] This document (2019) holds a distribution restriction, and is available via the Enterprise Access Management Service-Army Web page with a valid common access card.

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Aviation commanders of tactical units may, upon notification of deployment to imminent danger or hostile fire areas or assumption of the Global Response Force (GRF) mission, authorize one additional crewmember per assigned UH-60 or CH-47 to support door gunner missions. Effective date of flight status will not exceed 180 days prior to deployment or assumption of GRF mission. Termination of flight status will not exceed 120 days after redeployment or transfer of GRF mission. (Department of the Army, 2018, p. 3)

Equipped with this information, we were able to work back from February and set an approximate start training date for mid-December 2019.

Now knowing what training needed to be done and when it needed to be done by, we still needed to identify who would participate. "We want the best" said the BDE CSM (personal communication with BDE CSM Etheridge, August 2019). So as I typed brigade tasking order 19-0918 for battalions to produce the Soldiers required, we developed realistic expectations of what the best really meant. "Soldiers should have a 240 or above Army physical fitness test (APFT) score, be an expert on their assigned weapon system, and will not have had any adverse action in the past 24 months (4th CAB, September 2019). (APFT, and weapons score can waived with the endorsement of the battalion CSM). Now I had a measureable formula to order of merit list (OML) potential candidates, ensuring the best Soldiers made it to a flight company.

There were still a few overarching obstacles the Ivy Eagle brigade was facing. Two task forces were yet to complete their 30 day culminating training exercises to certify for deployment, and a 2-week block leave period began at the exact time we anticipated the flight training to begin. If that weren't enough, the brigade faced a U.S. Forces Command (FORSCOM), Aviation Resource Management Survey (ARMS), and Directorate of Evaluation and Standardization inspection beginning on the first day back from block leave. I now realized why the BDE CSM said we were behind.

So where do we start? How can we streamline certain tasks to maximize efficiency with what now seemed like a condensed timeline? The answer is to attack the areas that we cannot affect—flight physicals. I knew that there would not be a shortage of Soldiers willing to fly, but how many would be medically fit? Though this would not be our

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A U.S. Army door gunner crewmember aboard a CH-47 Chinook helicopter scans the terrain for potential threats while in flight during Operation Inherent Resolve in Iraq, Mar. 22, 2018. U.S. Army photo by SGT Randis Monroe

biggest challenge, it would prove to be the most enduring. Medical prescreening was the solution that the brigade surgeon, presented. To get to 50 Soldiers, the brigade's medical staff initially screened 100 Soldiers. This meant that the clinic dedicated time and personnel to scrub through each individual candidate's medical records to identify any obvious, and in some cases, not so obvious disqualifications. This daunting task completed by the professionals in the Ivy Eagles clinic allowed us to move forward with academic training on Soldiers that we were confident could pass a flight physical. The attrition for flight physicals alone was a little more than 30%.

By November, I completed the first round, of weeklong door gunner academics. With the medical attrition, academic failures, pending Uniform Code of Military Justice (UCMJ), and other Soldier-related issues, it didn't seem that we were going to meet the 50 Soldier mark.

The BDE CSM utilized the State of the Brigade Brief, to solicit more volunteers, as well as emphasizing the importance of participation in the door gunner program by eligible Soldiers. The BDE CSM's campaign ensured that there were enough Soldiers to fill the authorized slots; however, it was still not enough to account for Murphy's Law.[2] We wanted a bench of academically trained Soldiers with a completed flight physical, to be able to call on last minute when unforeseen predeployment issues came up. The campaign ultimately resulted in three rounds of brigade-level academic training and testing, to ensure that as a whole, we had 65 total Soldiers: Fifty Soldiers highest on the OML to be assigned to flight companies, and 15 Soldiers prepared fill vacancies in the event of a dropout.

The most challenging issue we faced was sourcing enough gear to outfit 50 additional aircrew members with the proper Air Warrior assemblies to keep them safe and in accordance with AR 95-1, "Flight Regulations," requirements (Department of the Army, 2018). At face value, it doesn't seem like it would be an issue. Army Regulations authorize the CAB's additional aircrew members. Thus, it would be safe to assume the modified table of organization and equipment would account for units to have the additional gear on hand. Unfortunately, for a number of dif-

[2]"Murphy's Law ("If anything can go wrong, it will") was born at Edwards Air Force Base in 1949 at North Base. It was named after Capt. Edward A. Murphy, an engineer working on Air Force Project MX981, (a project) designed to see how much sudden deceleration a person can stand in a crash." Reference source: http://www.murphys-laws.com/murphy/murphy-true.html

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ferent reasons locally, and no fault of the Army, it just was not the case for us. Countless efforts made by the brigade S4 officer were unfruitful, even though he explored everything from PM Air Warrior directly, to the potential lateral transfer from other CABs. Just as it seemed I was going to have to ask the 4th CAB Commander to assume risk and deviate from AR 95-1, as well ask his boss, the 4th Infantry Division Commander, to authorize a deviation—(Department of the Army, 2018, p. 49) we found the gear. Through the local Fort Carson Central Issue Facility, the brigade S4 officer was able to coordinate an initial flight issue for 50 assigned door gunners. This included flight helmets, flight suits, and boots. This coordination was completed prior to our predeployment rapid fielding initiative, which allowed aircrews to train and prepare for the upcoming February 2020 aerial gunnery.

This article is not written to highlight the success of the 4th CAB, although it shouldn't go without mention that the S4 pulled off a miracle in the fourth quarter and the never-ending efforts of the medical staff throughout our brigade who found a way to complete more than 65 door gunner's flight physicals while short staffed. I'd also be remiss if I didn't mention the NCOs within the brigade's standardization community who are executing the flight training and gunnery, day in and day out. These NCOs have led this training from the front! This article was written to share the lessons that we have learned as a brigade. As the BDE CSM put it, "SFC Felts, I've never been a brigade CSM before; you've never been a brigade SI, and we will figure it out" (personal communication with BDE CSM Etheridge, November 2019).

So, the how-to guide? I'd recommend the following list to any organizations preparing for future combat operations as a template to work from:

1. DEVELOP A TRAINING PLAN BACKDATED OFF OF THE TRANSFER OF AUTHORITY/LATEST ARRIVAL DATE

- Considerations (combat training centers, block leave, ARMS inspections)

2. SET STANDARDS TO BE CONSIDERED TO BE A DOOR GUNNER

- Considerations (past UCMJ, APFT, weapons)

3. CONDUCT MISSION ANALYSIS TO DETERMINE WHERE YOU CAN PULL SOLDIERS FROM THE CAB TO BE DOOR GUNNERS

- Considerations (deployment force manning level)

4. IDENTIFY CANDIDATES TO BE MEDICALLY SCREENED.

- Considerations (it takes 100 to make 50)

5. CONDUCT ACADEMICS

- Considerations (instructor to student ratio, class room size)

6. ORDER OF MERIT

- Considerations (academic scores, APFT score, weapons qualification)

7. COMPLETE FLIGHT PHYSICALS

8. ASSIGN SOLDIERS TO BATTALIONS 1 X PER LIFT AIRCRAFT

- Considerations (S-1 processing time)

9. RESOURCE FLIGHT GEAR

- Consideration (early coordination with central issue facility)

10. CREATE FLIGHT ORDERS

- Consideration (date of request for orders in accordance with 600-106 [Department of the Army, 2018])

11. RL PROGRESSION

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[3] This document (2019) holds a distribution restriction, and is available via the Enterprise Access Management Service-Army Web page with a valid common access card.

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THE IMPACT OF THE FUTURE LONG-RANGE ASSAULT AIRCRAFT ON UNITED STATES ARMY AIR ASSAULTS — PART 2

By Mr. Steven A. Yeadon

THIS IS THE SECOND AND FINAL ARTICLE IN A 2-PART SERIES

The Future Vertical Lift (FVL) acquisitions program offers an opportunity to revolutionize United States Army air assaults. The purpose of this article and its analysis is to assess the FVL program's effect on U.S. Army air assaults from the perspective of tactical need against near-peer competitors in major combat operations. The purpose of this assessment is to offer recommendations concerning the FVL program to maximize its potential for the warfighter while providing a primer on air assaults using FVL aircraft.

The FLRAA CD&RR project agreements under the AMTC OTA were awarded to Bell Textron Incorporated, and Sikorsky Aircraft Corporation. These competitively awarded OTA agreements consist of risk reduction activities that combine government research with input from industry partners to inform the future development and procurement of the FLRAA weapons system. Deliverables include initial conceptual designs, requirements feasibility, and trade studies using model based systems engineering. These CD&RR agreements will extend over 2 years, informing the final Army requirements and the program of record planned for competition in 2022. Photo courtesy of Industry

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In the FVL program, there are five "capabilities sets," each designating different aircraft fulfilling different roles (Coll & Hunter, 2019; Hirschberg, 2016, p. 25). This analysis concentrates on "FVL capabilities set 3" aircraft now embodied in the Future Long-Range Assault Aircraft (FLRAA) program. These aircraft will replace the current fleet of Sikorsky UH-60 Black Hawk variants as the premier medium lift aircraft of the U.S. Army (Judson, 2019). However, this analysis mentions all five 'FVL capabilities set' aircraft as they relate to the broader subject of U.S. Army air assaults. "Future Vertical Lift capabilities set 1," now embodied by the Future Attack Reconnaissance Aircraft (FARA) program, will replace half of the current fleet of Boeing AH-64 Apache attack helicopters, which are serving in the role of retired Bell OH-58 Kiowa Warrior aircraft to become the premier attack reconnaissance aircraft of the U.S. Army (Trevithick, 2019). "Future Vertical Lift capabilities set 4" aircraft will most likely be the next FVL acquisitions program, and they will replace the U.S. Army's Boeing CH-47 Chinook helicopters to become the premier heavy lift aircraft of the U.S. Army (Freedberg, 2019b). Further into the future are both the "FVL capabilities set 2" aircraft, a heavy attack reconnaissance aircraft to replace the Army's Apache attack reconnaissance helicopters (Whittle, 2015), and "FVL capabilities set 5" aircraft, which will be a new ultra-heavy lifter with Vertical Take-Off and Landing (VTOL) performance between a Lockheed Martin C-130J Super Hercules cargo plane and an Airbus A400M Atlas cargo plane (Trimble, 2011).

I began this analysis with an examination of FLRAA's effect on future U.S. Army air assaults with the introduction of the aircraft. Second, I examined the aircraft's external payload capability for moving equipment in support of air assaults. Third, I examined FLRAA's effect on aeromedical evacuation during air assaults. Fourth, I examined limitations to air assaults using FVL aircraft. Fifth, I analyzed the promise of "FVL capabilities set 4" aircraft for U.S. Army air assaults. Sixth, I analyzed the promise of "FVL capabilities set 5" aircraft for U.S. Army air assaults. Last, I offer recommendations for the FVL program to maximize its effect on U.S. Army air assaults.

FLRAA'S REVOLUTIONARY CAPABILITIES IN SUPPORT OF U.S. ARMY AIR ASSAULTS

Simple math shows just how revolutionary FLRAA is to the Black Hawks it will replace. Black Hawks have a 121.5 nautical mile (nmi) combat radius allowing air assaults against an area of 61,417 square miles; an area around the size of the State of Washington. Future Long-Range Assault Aircraft will have a combat radius of 200–300 nmi (110 nmi with external payload). Two hundred nmi is the minimum, or 'threshold,' capability demanded by the U.S. Army and 300 nmi is the objective range desired by the U.S. Army (Freedberg, 2019a). The objective combat radius for FLRAA may be up to two and a half times the combat radius of Black Hawks. This allows for air assaults against an area of 374,775 square miles, which is one and a half times the size of the State of Texas or half the size of the State of Alaska.

Future Long-Range Assault Aircraft's combat radius will enable it to operate from intermediate staging bases outside the range of most near-peer field artillery such as mortars, howitzers, and rocket artillery systems. However, enemy ballistic missiles and cruise missiles will be able to strike U.S. Army intermediate staging bases at ranges of 300 nmi or greater. Furthermore, restricted terrain with limited infrastructure demands vertical aircraft,

At the National Training Center in Fort Irwin, California., a UH-60 Black Hawk helicopter comes in for a landing at Task Force Ragnar's tactical assembly area, May 9, 2018. U.S. Army photo by CPT Katherine Zins

such as in Afghanistan (Congressional Budget Office, 2016, p. 36–37). These conditions exist in many lawless regions around the world from where terrorists may seek to operate. In such conditions, the range of FLRAA will result in fewer forward operating bases and provide the ability to arrive in force against remote locations.

Black Hawks have a cruising speed of 145 knots (120 knots maximum with external payload). Comparatively, FLRAA will have a threshold cruising speed of 250 knots and an objective cruising speed of 280 knots (140 knots with external payload) (Freedberg, 2019a; Department of the Army, n.d.). Thus, FLRAA will have a comparable cruising speed when transporting external payload to Black Hawks while transporting air assault troops. Additionally, the objective cruising speed for FLRAA is double the cruising speed of Black Hawks. Future Long-Range Assault Aircraft's cruising speed will allow it to swiftly take advantage of short-lived tactical situations, such as suppressed enemy air defenses, to strike at an enemy's critical vulnerabilities. Additionally, FLRAA will have both the range and speed to disaggregate and then quickly mass forces against an enemy. For instance, FLRAA will be able to disaggregate and then mass aircraft to penetrate enemy weak points in their anti-access/area denial defenses.

Black Hawks can transport 11 air assault troops weighing 290 pounds (with all equipment) or 3,190 pounds of internal cargo (Sikorsky, 2016). Future Long-Range Assault Aircraft will transport an additional air assault Soldier (with all Soldiers weighing 365 pounds each) or an additional 1,190 pounds of internal cargo while doubling, or more than doubling, its performance (Freedberg, 2019b). This gives a squadron of 10 aircraft an additional 11,900 pounds of internal cargo or at least 10 Soldiers, all weighing more than before.

U.S. Air Force members from the 181st Intelligence Wing, 113th Air Support Operations Squadron, practice vehicle movements with the High-Mobility Multipurpose Wheeled Vehicle during the April 2013 Unit Training Assemble at Hulman Field, Indiana. U.S. Air Force photo taken by SMSgt John S. Chapman/ Released

By possessing a self-deployable range with a threshold of 1,725 nmi and an objective of 2,449 nmi (Department of the Army, n.d.), FLRAA will be able to deploy to any intermediate staging base in a theater of operations. This allows for the rapid massing of assault aircraft where needed for air assaults. Future Long-Range Assault Aircraft will also be able to transit the Atlantic and Pacific Oceans via their shortest possible routes (Department of the Army, n.d.).

Last, additional goals of FLRAA are a reduced logistical footprint, improved survivability, all-weather capability, improved functionality in degraded visual environments, and an Integrated Mission Equipment for Vertical Lift Systems to provide a digital backbone of open architectures that will enable the Army to update and modernize equipment much faster and more effectively than currently fielded systems (Wins, 2019; Lopez, 2012). This will make it easier to upgrade the hardware and software for FVL aircraft and will keep the fleet of aircraft relevant faster. Additionally, it will be easier to sustain aircraft in austere environments and will also mitigate two limitations of current air assaults: both the effect of adverse weather and the presence of battlefield obscurants limiting visibility (Department of the Army, 2015a, p. 8-5 to 8-6).

THE IMPACT OF FLRAA'S EXTERNAL PAYLOAD CAPABILITY IN SUPPORT OF U.S. ARMY AIR ASSAULTS

The current medium lift aircraft, the Black Hawk, can carry up to 9,000 pounds of external payload a combat radius of 35 nmi (Staff Writer, 2009). This allows the external transport of Avenger Short-Range Air Defense (SHORAD) vehicles; M119 105 millimeter (mm) towed howitzers; many curb weight variants of High-Mobility Multipurpose Wheeled Vehicles (HMMWVs), including some "up armored" HMMWVs; tandem fuel blivets; in-development Infantry Squad Vehicles (ISVs); and in-development robotic support vehicles, such as General Dynamics' Multi-Utility Tactical Transport (MUTT). This means that soon, Black Hawks with externally transported ISVs of a very limited range will mitigate one limitation of air assaults for light infantry formations, and that inserted forces will have reduced ground mobility (Department of the Army, 2015a, p. 8-5 to 8-6). However, 9,000 pounds is not enough weight for HMMWV

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ambulances (or most "up armored" HMMWVs), nor is it enough weight for the M777A2 155 mm towed howitzers.

Future Long-Range Assault Aircraft will carry a threshold of 8,000 pounds, up to an objective of 10,000 pounds, as an external payload up to a revolutionary distance of 110 nmi (Department of the Army, n.d.). Thus, at its threshold external payload, FLRAA will be capable of transporting ISVs, Avengers, M119 105 mm towed howitzers, and M120A1 120 mm towed mortars up to 110 nmi. This means that air assaults up to 110 nmi will mitigate their vulnerability to air strikes due to the availability of Avenger air defense weapon systems (Department of the Army, 2015a, p. 1-21). However, a caveat to enhanced air defense capabilities is that both terminal high-altitude area defense units with a range of 108 nmi and MIM-104 Patriot surface-to-air missile launchers with a range of only 37.8 nmi, will be too far away to be of use to an air assault with a 110 nmi range. This leaves U.S. forces at a range beyond vulnerable to near-peer ballistic missiles, cruise missiles, and aircraft at medium altitude or high altitude. In addition, the transport of towed M120A1 120 mm mortars and towed M119 105 mm howitzers up to 110 nmi will help overcome a dependency on fires from aircraft and ships (Department of the Army, 2015a, p. 1-21). Such field artillery could also have some mobility through the transport of M998 HMMWV prime movers.

The objective external payload for FLRAA is for 10,000 pounds transported a combat radius of 110 nmi, with a maximum payload of 13,100 pounds transported a shorter distance. This is well beyond the capabilities of the Black Hawk and more comparable to the CH-47F Block I Chinooks, which can carry 16,000 pounds 50 nmi (Department of the Army, 2015b, p. 5-6). If FLRAA achieves its objective external payload, it will be capable of transporting M777A2 155 mm towed howitzers, all non-"up armored" HMMWV variants, and more "up armored" HMMWVs a distance of 110 nmi. However, a caveat of having enhanced field artillery capabilities is that while the M119 and M777A2 howitzers are useful against the infantry-centric forces the U.S. Army has warred with in the Global War on Terrorism, they will likely be insufficient against near-peer forces that possess longer-ranged artillery, surveillance drones, and advanced counterbattery fires.

An important aspect of FLRAA is the mission radius of external payloads above 10,000 pounds. Long-range artillery like the M777ER developed for the extended-range cannon artillery program will be necessary in near-peer conflicts. The M777ER howitzer weighs no less than 1,000 pounds heavier than the M777A2 (Poindexter, 2017). This means that the M777ER weighs around 11,000 pounds. Thus, three FLRAA, assuming an external payload of 11,000 pounds, can transport such a howitzer and both can transport more than 100 rounds of 155 mm ammunition and the gun's crew. The objective maximum external payload of FLRAA, may incentivize the purchase of light self-propelled artillery like the Hawkeye Mobile Weapon System to provide air assaults with mobile artillery. The Hawkeye Mobile Weapon System is a soft recoil 105 mm howitzer transported by vehicles as light as a HMMWV. Currently, the Hawkeye 105 mm soft recoil howitzer weighs 2,550 pounds, and its prime mover is the M1152A1 w/B2 HMMWV that weighs 8,760 pounds, for a total of 11,310 pounds (AM General, n.d.a, n.d.b). The Hawkeye could provide a more mobile option for infantry brigade combat teams than their M119 105 mm howitzers towed by HMMWVs.

Additionally, FLRAA's objective maximum external payload of 13,100 pounds, if achieved, will allow the transport of all HMMWV variants, including "up armored" HMMWVs, at gross vehicle weight. Thus, given the Block I Chinook's combat radius of 50 nmi with 16,000-pound external payload, a revolution in air assault and air movement capabilities will happen if more numerous medium lift FLRAA are able to transport "up armored" HMMWVs and all the infantry

The M777A2 and M777ER side by side at a test site. Retrofitting an M777A2 howitzer into an M777ER—the "ER" stands for extended range—only requires changing five components, which add little additional weight or cost. The long-range cannon project team is evaluating whether equipping artillery batteries with the extended-range howitzer plus new radar and tracking systems can increase their firepower while the Army develops more significant modernization solutions for long-range precision fires. U.S. Army photo by U.S. Army Acquisition Support Center

brigade combat team's artillery the same (or larger) combat radius as Block I Chinooks. However, depending on the combat radius of FLRAA with maximum external payload, there may be a reliance on forward arming and refueling points (FARPs), which can rearm and refuel vertical aircraft, to extend the range of FLRAA and Block I Chinooks performing heavy cargo hauling.

THE IMPACT OF FLRAA ON MEDICAL EVACUATION FOR AIR ASSAULTS

Future Long-Range Assault Aircraft will enable aeromedical evacuation with extraordinary range and speed, providing the ability to swiftly pick up wounded troops and transport them to a medical facility. The 'Golden Hour,' a U.S. Secretary of Defense mandate to get the wounded to appropriate medical care within 60 minutes of injury (McKinney, 2018), will be possible with aeromedical evacuation up to 100 nmi from a medical facility (this assumes an aircraft speed of around 280 knots). This will be up from 40 nmi currently (Robinson, 2014, p. 31).

However, due to the large combat radius of FLRAA, a new vulnerability for medical evacuation (MEDEVAC) presents itself. If a Soldier becomes wounded more than 100 nmi from the nearest medical facility, then it will require more than an hour to transport a wounded Soldier to a medical facility for treatment. Thus, it would not be possible to meet the 'Golden Hour' mandate. Should FLRAA fly out to an objective closer to the edge of its combat radius of 200–300 nmi, it could take well over an hour for a Soldier to reach a medical facility. For instance, a wounded Soldier 240 nmi from a medical facility responded to by an aircraft traveling around 280 knots will require 90 minutes to arrive at a medical facility. This assumes 15 minutes for a FLRAA to get airborne and 5 minutes to load a wounded Soldier (Robinson, 2014, p. 31). Another inherent problem is that only FLRAA will have the range and speed to respond to such long-range emergencies. Ultimately, this means that during a long-range operation, there will be a need for forward medical treatment in-field away from a medical facility to attempt to meet the 'Golden Hour' mandate.

SGT Brinon Rogers, a health care specialist for 2nd Battalion, 501st Aviation Regiment, descends on a hoist from an HH-60L medical evacuation Black Hawk helicopter at Fort Bliss, Texas, March 10, 2015. The Soldiers of Company C, 2nd Battalion have been preparing since last summer to assume 24/7 medical-evacuation coverage for the vast Fort Bliss training area, which totals about 1.1 million acres. U.S. Army photo credited to SGT Alexander Neely / 1st Armored Division Combat Aviation Brigade

MORE LIMITATIONS OF LONG-RANGE AIR ASSAULTS

FIRST, any type of air assaults using FLRAA will have many of the same vulnerabilities of air assaults in Field Manual 3-99, "Airborne and Air Assault Operations" (Department of the Army, 2015a, p. 8-5 to 8-6).

SECOND, while intermediate staging bases for U.S. troops will be beyond the range of most near-peer field artillery, such bases will still be within the range of opposing cruise missiles; tactical fixed-wing aircraft; and short-range, medium-range, and intermediate-range ballistic missiles. Intermediate staging bases may also be within range of tactical ballistic missiles and strategic multiple rocket launchers, such as the Chinese Weishi rockets. Thus, intermediate staging bases hosting FLRAA will need a robust air-defense; indirect fire protection capability, especially against rockets; cruise missile defense; and ballistic-missile defense. This will require that Patriot air defense systems and later, medium extended air defense systems; terminal high-altitude area defense systems; and indirect fire protection capability systems protect intermediate staging bases. In addition, enemy tactical low-observability aircraft will pose a significant threat to such bases due to their ability to avoid detection.

THIRD, FVL aircraft must work with legacy aircraft for 20 years or more, beginning in the 2030s. The problem is one of funding to replace legacy aircraft when alternatives are available. Legacy aircraft will need to have their performance

increased through programs such as the improved turbine engine program and the future affordable turbine engine initiative. Survivability for legacy aircraft may need to increase substantially against integrated air defense systems, which will require changes in training so that pilots learn to fly low and undetected by radar. Additionally, there is a need for new materiel (such as sensors) to assist pilots in degraded visual environments, sensors to detect threats and notify pilots quickly, and active protection systems for vertical aircraft (Freedberg, 2017).

FOURTH, taking full advantage of the combat radius of FLRAA will still leave air assaults dependent on fires from ships and aircraft. This is due to operating outside the reach of even the longest-ranged U.S. Army field artillery, such as Army Tactical Ballistic Missiles, which have a range of 162 nmi. In the wake of the collapse of the Intermediate-Range Nuclear Forces Treaty, new opportunity presents itself to develop land-based ballistic missiles and cruise missiles with a range to support air assaults operating at a radius of 300 nmi. However, air assaults of up to 200–300 nmi will be without land-based tactical fires.

FIFTH, long-range air assaults will require an attack reconnaissance aircraft team with FLRAA. The reason for this is so that,

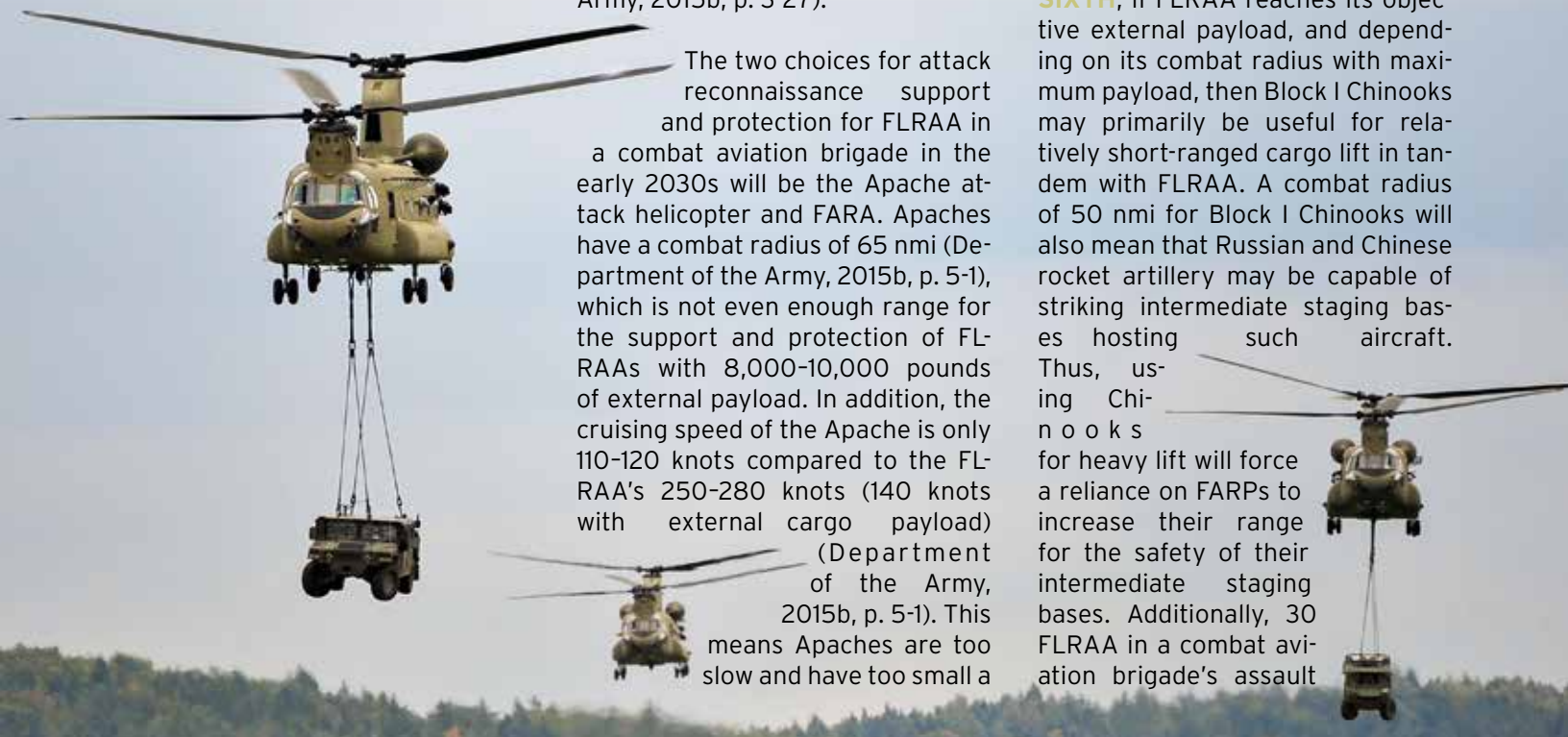
"...attack and reconnaissance units, utilizing MUM-T [manned-unmanned teaming], conduct a range of tactical and enabling tasks in support of the air assault, to include: air route reconnaissance, LZ/PZ [landing zone/pickup zone] reconnaissance, attacks prior to and during the landing phase, attacks as shaping operations prior to the assault, and attacks, screens and reconnaissance operations in support of the GTF [ground tactical force] after landing" (Department of the Army, 2015b, p. 3-24).

Additionally, attack reconnaissance aircraft will be necessary to ensure "...an [air assault task force] must arrive intact at the LZ. The force must be tailored to provide en route security and protection from the PZ, throughout the entire air route, and at the LZ" (Department of the Army, 2015b, p. 3-27).

The two choices for attack reconnaissance support and protection for FLRAA in a combat aviation brigade in the early 2030s will be the Apache attack helicopter and FARA. Apaches have a combat radius of 65 nmi (Department of the Army, 2015b, p. 5-1), which is not even enough range for the support and protection of FLRAAs with 8,000–10,000 pounds of external payload. In addition, the cruising speed of the Apache is only 110–120 knots compared to the FLRAA's 250–280 knots (140 knots with external cargo payload) (Department of the Army, 2015b, p. 5-1). This means Apaches are too slow and have too small a range to support and escort FLRAA, taking full advantage of their speed and combat radius. Thus, the introduction of FLRAA will immediately make the age of the Apache design apparent, which will not be able to keep up with FLRAA. The Improved Turbine Engine Program may help alleviate these problems for Apaches when they get the more powerful engine. Yet, even if the mission radius of Apaches were to double, then such aircraft may only be useful for the support and protection of FLRAA transporting external loads.

As for the possibility of FARA escorting, supporting, and protecting FLRAA, FARA's minimum requirements are smaller in range and cruising speed than for FLRAA. Future Attack Reconnaissance Aircraft will have a minimum speed of 205 knots and a minimum combat radius of 135 nmi (Freedberg, 2018). This means that unless industry delivers an aircraft with capabilities far in excess of the minimum requirements, FARA will not be able to effectively support and protect FLRAA taking full advantage of their range and speed. However, FARA may be able to escort and protect FLRAA transporting external loads.

SIXTH, if FLRAA reaches its objective external payload, and depending on its combat radius with maximum payload, then Block I Chinooks may primarily be useful for relatively short-ranged cargo lift in tandem with FLRAA. A combat radius of 50 nmi for Block I Chinooks will also mean that Russian and Chinese rocket artillery may be capable of striking intermediate staging bases hosting such aircraft. Thus, using Chinooks for heavy lift will force a reliance on FARPs to increase their range for the safety of their intermediate staging bases. Additionally, 30 FLRAA in a combat aviation brigade's assault



U.S. Pilots use their CH-47 Chinook helicopters to transport critical equipment while conducting an air assault mission during Exercise Saber Junction 2019 (SJ19) in Hohenfels Training Area, Germany, Sept. 26, 2019. U.S. Army photo by SGT Henry Villarama

helicopter battalion will outnumber the Block I Chinooks in a combat aviation brigade's heavy lift company by 2.5:1. Combined with the possibility that FLRAA and Block I Chinooks will transport similar equipment, this means that the fielding of FLRAA will show the age of Block I Chinook helicopters in terms of their role as a cargo hauler.

Instead, an effective use of Block I Chinooks may be to transport air assault troops in force up to 120 nmi, with 33 air assault troops per aircraft. This is also a range that Black Hawks can operate to deliver infantry in an air assault, and it allows FARA to provide attack reconnaissance support and protection of aircraft. For maximum effect for air assaults from 110–120 nmi, this may mean FLRAA's purpose in an air assault will be a combination of combat air assault and transport of external payload. Future Long-Range Assault Aircraft transporting external loads will also slow down to a cruising speed like Chinooks, so both aircraft can better work in tandem. Even then, Block I Chinooks and FLRAA will still be insufficient to carry new Joint Light Tactical Vehicles (JLTVs), vehicles with better protection and the capability of carrying heavier weapon turrets than HMMWVs.

However, these roles for Chinooks; FLRAA; and Black Hawks, while allowing very different aircraft to work together, does not exploit the revolutionary range and cruising speed FLRAA can provide. The reason for this is a mismatch in capabilities between Chinooks, Black Hawks, Apaches, and possibly FARA compared to the enormous cruising speed and range of FLRAA, should it achieve its objective cruising speed and range. This may one day segregate U.S. Army air assaults into two models: air assaults with ranges up to 200–300 nmi primarily using FLRAA working with "FVL capabilities set 2" aircraft. Such air assaults will transport infantry with little in the way of supporting assets. The second model of air assaults will have ranges of up to 110–120 nmi that can bring air assault troops in force with support assets while incorporating legacy aircraft. These support assets could be tactical artillery; ISVs; SHORAD units; and HMMWV variants, including some "up armored" HMMWV variants, (as prime movers) mounted reconnaissance, logistical vehicles, ambulances, and used in weapons companies.

Last, attack reconnaissance, medium lift, and heavy lift aircraft provide an integrated ecosystem of capabilities to accomplish air assaults in a combat aviation brigade. Thus, the significant differences in range, payload, speed, survivability, and other characteristics among aircraft that work in tandem will hurt the combined capabilities of the whole ecosystem of U.S. Army aircraft. The FVL program faces a 'jumbled mess' of capabilities between its new FVL aircraft and its older legacy aircraft. For instance, Chinooks, Black Hawks, and Apaches will simply have a difficult time partnering with aircraft possessing over double the speed and radius of action as legacy platforms. Another example of a capabilities mismatch is that medium lift FVL aircraft may offer external cargo lift capabilities more comparable to current Block I Chinooks, depending on whether they achieve their objective external payload.

FUTURE CONSIDERATION: THE PROMISE OF FUTURE VERTICAL LIFT CAPABILITIES SET 4 AIRCRAFT

As a hypothetical, replacing Block I Chinooks with the Lockheed Martin CH-53K King Stallion in all combat aviation brigades is a useful thought experiment to gauge the promise of a new heavy lifter to replace the Chinook.

The King Stallion can lift 27,000 pounds 110 nmi in high altitude and hot conditions. Additionally, it has a cruising speed of 170 knots without external payload (Sikorsky, 2018). This means that operations with a range of 110 nmi, the same or superior combat radius to FLRAA with external payload, will have superior heavy lift in comparison to FLRAA's capabilities.

The King Stallion's lift will provide weapons companies armed with combat-loaded JLTVs, two "up armored" HMMWVs per lift, high-mobility engineer excavators, light capability rough terrain forklifts, curb weight Family of Medium Tactical Vehicles (FMTVs), or fully loaded M1095 trailers. Additionally, FLRAA can transport 8,000–10,000 pounds of cargo on pallets for FMTVs with a King Stallion providing light capability rough terrain forklifts to load cargo. This will allow

The CH-53K King Stallion lands after a test flight in West Palm Beach, Florida, on March 22, 2017. Lockheed Martin announced the CH-53K King Stallion passed its Defense Acquisition Board assessment that approved for the aircraft to begin low-rate initial production on April 4, 2017. The CH-53K will be considered the most powerful helicopter in the Department of Defense and is scheduled to completely replace the CH-53E Super Stallion by 2030. U.S. Marine Corps photo by LCpl Molly Hampton

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transport of all the organic equipment of an infantry battalion and most of the equipment of a cavalry squadron and artillery battalion of an infantry brigade combat team a distance of 110 nmi. While weighing more than 27,000 pounds and thus with reduced range in high-altitude, hot conditions; it will be possible to lift a curb weight, unarmed High-Mobility Artillery Rocket System (HIMARS), a Light-Armored Vehicle (LAV) variant, and the M1117 Guardian Armored Security Vehicles using King Stallions. It may be possible for FLRAA to transport HIMARS launch boxes in order to place them on the ground for loading. This much heavy lift may also give relevance for the U.S. Army in respect to the Marine Corps' Armored Reconnaissance Vehicle, if it is capable of external transport.

Thus, King Stallions working with FLRAA will make the infantry brigade combat team incredibly air mobile. This could drive future equipment for infantry brigade combat teams to take advantage of this heavy lift capability. However, even King Stallions cannot transport a Heavy Expanded Mobility Tactical Truck or a Mobile Protected Firepower light tank. The target acquisition platoon of an infantry brigade combat team is also not capable of helicopter transport because the AN/TPQ-53 target acquisition radar is too heavy even for the King Stallion. However, the AN/TPQ-50 target acquisition radar vehicle and towed generator could be air transportable by the King Stallion.

King Stallions should also be able to deploy FARPs using Extended Range Fuel System IIs to refuel and rearm other vertical aircraft. An intriguing possibility with King Stallions would be the ability to deploy reconnaissance and surveillance units and field artillery units 110 nmi to find and suppress enemy anti-access/area denial defenses at points along the occupied territory of a near-peer competitor. King Stallions can then support the U.S. Army FARA, FLRAA, Black Hawk, and Chinook aircraft through the establishment of FARPs 110 nmi from an intermediate staging base. This will allow forcible entry air assault operations in force more than 200 nmi from an intermediate staging base.

Of course, these scenarios are revolutionary, but the King Stallion is a conventional helicopter and not the new kind of aircraft, such as tiltrotors, requested for FVL. "Future Vertical Lift capabilities set 4" aircraft will need the range, speed, and survivability to work in tandem with other FVL aircraft. An aircraft with a tiltrotor's speed and range and the King Stallion's heavy lift will provide infantry in force and internally transportable equipment in support of the U.S. Army air assaults with long ranges. This is while providing revolutionary lift in support of operations at a range of 110–120 nmi.

FUTURE CONSIDERATION: THE PROMISE OF FUTURE VERTICAL LIFT CAPABILITIES SET 5 AIRCRAFT

"Future Vertical Lift capabilities set 5" aircraft will revolutionize air assaults by providing heavy equipment previously unavailable to troops. This will both mitigate some of the limitations and vulnerabilities of air assaults while providing powerful, new capabilities. For instance, an "FVL capabilities set 5" ultra-heavy lifter will allow for an expansion of capabilities for the Global Response Force using forward-deployed aircraft. Such aircraft may provide air assault capability in support of airborne operations hundreds of nmi from the nearest base or ship when LZs are created. This will both aid air resupply and mitigate a limitation of airborne operations through the provision of aeromedical evacuation early in an operation (Department of the Army, 2015a, p. 2-5 to 2-6). There is even the possibility of ground forces extraction should the airborne operation fail to achieve its objective. Additionally, ultra-heavy lifters could provide a surge of mediumweight forces into a recently seized bridgehead or airhead. This may allow for a more rapid exploitation for forcible entry air assault

The AN/TPQ-50 counterbattery radar plays a key part in a JPEO-CBRND experiment at Yuma Proving Ground, providing radar data in which the experiment will look for information on CBRN threats. The experiment's aim is to determine whether radar systems like the AN/TPQ-50 and AN/TPQ-53 can detect ordnance filled with chemical or biological weapons or materiel, either in flight or upon detonation. U.S. Army photo courtesy of U.S. Army Acquisition Support Center

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operations and airborne operations. However, heavier armored vehicles, such as M1A2 Abrams main battle tanks, will need to transport via a runway or port.

An "FVL capabilities set 5" ultra-heavy lifter with a payload comparable to a C-130J Super Hercules will enable air assaults of light armor. This potentially changes the character of air assaults into a more "mediumweight" than lightweight force. This is because infantry-centric air assault forces might include a mixture of light tactical vehicles, medium tactical vehicles, LAVs, flat-bottomed Stryker variants, towed artillery, HIMARS, and mortar carriers. Such lift may also allow the transport of FMTVs loaded with around 10,000 pounds of cargo, the AN/TPQ-53 target acquisition radar, and armored combat earthmovers. Thus, medium lift, heavy lift, and ultra-heavy lift transports can drive the size of combat equipment for the infantry brigade combat team and the Stryker brigade combat team to make each as air mobile as possible. The ability to air assault Stryker variants with significant firepower, such as the antitank guided-missile variant or the mobile gun system variant, will give LZs enormous firepower early in an air assault operation or when needed, such as to repel an attack. The ability to air assault armored combat earthmovers will allow air assault forces in remote locations to rapidly fortify positions, construct dirt airfields, swiftly construct or repair roads and supply routes, or remove enemy obstacles. Earthmovers creating dirt runways may allow the transportation of a limited number of heavyweight assets by larger aircraft, such as Patriot air defense systems and M1A2 main battle tanks. However, such ultra-heavy lifters will undoubtedly have a high flyaway cost per unit and thus, will be numerically inferior compared to smaller, cheaper airframes.

In terms of logistics, ultra-heavy lifters may provide enormous amounts of bulk liquid, ammunition, and other logistic supplies for forces on the front lines. This allows for the sustainment of brigade combat teams hundreds of nmi from a base or ship. An ultra-heavy lifter may be able to provide aerial refueling like a KC-130J variant of the Super Hercules aircraft. Its VTOL capability will also allow such an aircraft to create FARPs.

However, there will be problems escorting and protecting such aircraft in their vast combat radius. Another limitation of such air assaults is that their combat radius may be beyond the range of a variety of tactical fixed-wing aircraft, which will need to obtain air superiority, provide fire support to ground forces, interdict enemy reinforcements, and aid suppression of enemy air defenses. Last, the price of such aircraft may be prohibitively expensive (Army Science Board, 2016, p. 55-56).

RECOMMENDATIONS

ACQUISITION FARA THAT CAN ESCORT AND PROTECT FLRAA OR RADICALLY ACCELERATE ACQUISITION OF FVL CAPABILITIES SET 2 AIRCRAFT

Future Long-Range Assault Aircraft will need an escort and protection aircraft with comparable range and cruising speed to conduct air assaults without using joint fixed-wing tactical aircraft as escorts. This means that the eventual winner of the FARA program will need the range and cruising speed to escort and provide protection for the eventual winner of the FLRAA program. If the two aircraft can easily work in tandem, then a simple solution is to concurrently field FARA and

The sun rises over the 374th Airlift Wing's C-130J Super Hercules aircraft on the Yokota Air Base flightline May 26, 2019. Japan is known as the land of the rising sun because it was originally considered the easternmost country before discovery of North America, but with a 4:30 a.m. sunrise, the moniker still holds true today. U.S. Air Force photo by SSgt Kyle Johnson, 374th Airlift Wing Public Affairs

The FLRAA CD&RR project agreements under the AMTC OTA were awarded to Bell Textron Incorporated, and Sikorsky Aircraft Corporation. These competitively awarded OTA agreements consist of risk reduction activities that combine government research with input from industry partners to inform the future development and procurement of the FLRAA weapons system. Deliverables include initial conceptual designs, requirements feasibility, and trade studies using model based systems engineering. These CD&RR agreements will extend over 2 years, informing the final Army requirements and the program of record planned for competition in 2022. Photo courtesy of Industry

FLRAA in the same combat aviation brigades.

However, if FARA are insufficient to escort FLRAA, then the U.S. Army must avoid the same kind of capability gap faced by the Marine Corps in escorting the MV-22 Osprey. This will require an acceleration of the "FVL capabilities set 2" aircraft to field it in the 2030s with FLRAA and FARA. If cutting costs through the cancellation of the AH-64F Apache upgrade does not provide enough funds to purchase "FVL capability set 2" aircraft, then further cuts must occur in other Army programs for the escort and protection of FLRAA.

SIGNIFICANTLY UPGRADE CHINOOKS OR RADICALLY ACCELERATE ACQUISITION OF FVL CAPABILITIES SET 4 AIRCRAFT

The promise of vertical heavy lift aircraft is enormous. The King Stallion's flyaway cost is $87 million (Macias, 2018), which is more than double that of a Block II Chinook at less than $29 million (Defense Acquisition Management Information Retrieval, 2017, p. 27). This could complicate replacing Block I Chinooks with an affordable FVL aircraft. That said, there is need for a heavy lift solution against near-peer powers, an aircraft that can work in concert with FARA and FLRAA and that can better support air assaults at ranges of 110 nmi.

As a result, the Army faces two options. The first solution is to upgrade the Chinook fleet to increase its utility compared to FARA and FLRAA. This may require the reinstatement of the Block II Chinook program, but there is also a need for upgrades beyond that program, such as new engines and increased survivability. This is inevitable if Chinooks must fly up to the 2060 timeframe.

The second solution is to radically accelerate the "FVL capabilities set 4" program to finish fielding a new aircraft by 2050. If the cancellation of the Block II Chinook program does not provide the funds for such a radical acceleration, then the U.S. Army faces the need for further cuts to other Army programs. The goal is to replace current Chinooks in tandem with replacements of Apaches and Black Hawks in combat aviation brigades.

Last, FLRAA should have an escort aircraft before the purchase of a new heavy lifter. If FARA do not have the characteristics to do so, then "FVL capabilities set 2" aircraft will need to do so through an accelerated program; a program that may need the funds necessary to accelerate the purchase of a new heavy lifter.

CONCLUSIONS

Future Long-Range Assault Aircraft will transform U.S. Army air assaults with an overview of a range of characteristics. These characteristics are self-deployable range, combat radius, cruising speed, internal payload, external payload, logistical footprint, survivability, all-weather capability, improved functionality in degraded visual environments, and open architectures. Future Long-Range Assault Aircraft will also revolutionize the range and speed of aeromedical evacuation.

Yet, there are several limitations to the kinds of long-range operations created by FLRAA. The 'Golden Hour' mandate may be impossible to meet when exploiting the full capabilities of FLRAA. There will be a need for intermediate staging bases

within range of enemy cruise missiles, ballistic missiles, and possibly strategic multiple rocket launchers. Many of the doctrinal limitations and vulnerabilities of an air assault will still stand. There will be a need for long-range fires and for attack reconnaissance aircraft to escort FLRAA. Legacy aircraft will need improvements to operate in future environments and will find it hard to work with newer FVL aircraft with far superior performance. Additionally, because of the range and speed of aircraft, air assault operations may segregate into two broad types of operation with two very different ranges.

I analyzed the promise of a new heavy lifter and ultra-heavy lifter working with FLRAA. My analysis ended with two broad recommendations for the FVL program. The first recommendation is the need to acquisition a FARA that can escort and protect the FLRAA. The alternative is a radical acceleration of the "FVL capabilities set 2" program. Second, there is the need to upgrade Chinooks to better work with FVL aircraft or radically accelerate the "FVL capabilities set 4" program.

Last, there remain serious questions to answer at the end of this analysis: How useful are light infantry formations in great power competition? What supporting assets will they need to win on future battlefields against near-peer powers? The whole premise of FLRAA is that the light infantry forces it can transport will have an impact in great power competition and, if necessary, great power conflict. Is that true given the ground forces of near-peer powers such as the Russian Federation and the People's Republic of China? A proper treatment of this line of inquiry is beyond the scope of this analysis. However, it is at the heart of determining the relevance and proper use of U.S. Army air assaults and the future force structure of the U.S. Army.

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LESSONS LEARNED DURING COVID-19:

An Air Cavalry Perspective on Aerial Gunnery

By 1LT Brandon Lloyd,
MAJ Matthew R. Clawson,
and LTC Matthew J. Clementz

The combat power that Army aviation provides continues to create high demand from every combatant command (COCOM), resulting in frequent deployments and lower than Army average dwell time. Due to the vast spectrum of operations, combat aviation brigades are required to conduct training across the operational spectrum; from counterinsurgency to decisive action, each training environment has a unique, complex set of challenges. In recent years, Army aviation has operated with bolstered national-level resources to function uncontested on the battlefield. Nonetheless, warfare is not always one-sided, and resources are not always abundant. The characterization of a contested battlefield forces Army aviation units to operate in an austere environment with minimal resources and personnel to facilitate their employment. The challenge for every command team remains the same: where can we assume risk, and how do we decisively employ our forces on the battlefield to achieve victory?

TRAIN AS YOU FIGHT!

The ongoing global COVID-19 pandemic created additional restrictions that Army aviation units would have to negotiate to find unique opportunities to train. Although functionally the mission remains the same, units must protect the force while generating combat power through individual and unit readiness. The optimal solution is to train in the most rigorous environment possible, where operations are planned and executed from austere field sites. Natural friction is created, producing opportunities for leaders to develop creative solutions. Items such as tactical assembly area security, ground resupply operations, main command post manning, field feeding, and others all demand leader involvement. Additionally, support to a ground force commander creates realism and a sense of purpose. However, in the

U.S. Soldiers assigned to 2nd Squadron, 17th Cavalry Regiment (Air Cavalry Squadron) conduct a fighter check in brief with the Range Tower OIC, signifying the start of their Aerial Gunnery Table on April 22nd, 2020 at Fort Campbell, Kentucky. U.S. Army photo by 1LT Austin Lachance

onset of a COVID-19 environment where national medical guidelines were first being developed, realistically any form of training is better than no training at all. As the squadron staff conducted mission analysis, we concluded that we could not realistically conduct a field training exercise tied with an aerial gunnery during a pandemic. The leadership had to prioritize what was required of the COCOM commander, what training objectives met that requirement, and identify risks and develop control measures to efficient and safe training.

OPERATIONAL NEED

At the onset of the COVID-19 outbreak, 2nd Squadron, 17th Cavalry Regiment, 101st Combat Aviation Brigade was preparing for our final predeployment training exercise, a large-scale collective training event that would qualify the entire squadron through gunnery table (GT) XII. The subsequent outbreak of COVID-19 scaled back the majority of military training events across the Department of Defense; however, with appropriate control measures in place, 2-17 CAV was able to conduct a modified version of this mission-essential training. Driven by operational needs, the squadron conducted aerial gunnery from 14–26 April 2020 while adhering to Health Protection Condition Level (HPCON) Charlie (experiencing substantial sustained community transmission) restrictions (U.S. Department of Defense, 2020) and the Centers for Disease Control and Prevention COVID-19 guidance (Centers for Disease Control and Prevention, 2020). Aviation gunnery is a keystone training event that integrates both individual crew gunnery skills and collective training at the squadron level. Due to aerial gunnery range limitations on the Korean peninsula, the Commanding General of the 101st Airborne Division deemed 2-17 CAV's gunnery a mission-essential training event. Before April 2020, the squadron's last aerial gunnery qualification occurred in December of 2019. Without a spring 2020 aerial gunnery, the squadron would go unqualified during our upcoming United States Indo-Pacific Command (INDOPACOM) rotation, making it unable to fully support operational requirements in the Republic of Korea.

U.S. Soldiers assigned to 2nd Squadron, 17th Cavalry Regiment (Air Cavalry Squadron) utilize a vertical unmasking technique in order to search for and engage targets within their assigned priority fire zone on April 22nd, 2020 at Fort Campbell, Kentucky. U.S. Army photo by 1LT Austin Lachance

COVID-19 MISSION IMPACTS

By the end of March 2020, the Department of Defense and the 101st Airborne Division (AASLT) elevated the HPCON level to Charlie. Simultaneously, all training on Fort Campbell, Kentucky, was postponed until further notice, and units were operating with only mission-essential manning. For the squadron, this meant that roughly 3% (~20 out of 573) of the formation operated from their place of duty daily. The headquarters, hangar, motor pool, and aid station were nearly vacant as COVID-19 cleaning teams were identified and executed a deep clean of all facilities. The squadron designated mission-essential personnel and ensured that in case of an outbreak, that there were redundancies. For example, the squadron commander and command sergeant major were on opposite shifts, along with the executive officer and operations officer. The aviation maintenance officer was also separated from the production control officer. The command developed teams that would work in their critical functions, but the squadron held redundant capability that was teleworking. The squadron was able to mitigate risk and not have any positive COVID-19 cases, but as a contingency, a positive COVID-19 test would result in the entire team going into isolation. After the area was disinfected, the second team would assume its roles, or training may be canceled. The remaining bulk of the formation sheltered in place at their residence. Daily tasks were developed, such as conducting predeployment classes, completing administrative actions, executing professional military education and Installation schools, and other military occupational specialty-specific certification training. The operations section developed success criteria and metrics to track progress. At the same time, the squadron was preparing to conduct the U.S. Army Forces Command-directed aircraft transfer from Fort Campbell to Fort Hood, Texas, that would also incorporate a night vision system/night vision goggle re-

U.S. Soldiers assigned to 2nd Squadron, 17th Cavalry Regiment (Air Cavalry Squadron) conduct routine maintenance on an AH-64E Apache helicopter prior to the first flight of the day on April 24th, 2020 at Fort Campbell, Kentucky. U.S. Army photo by CSM Michael Narvid

set. The aircraft transfer would be completed before the advance party departed for INDOPACOM. Under those timeline restrictions, the staff conducted mission analysis on COVID-19 impacts to aerial gunnery and prepared a decision brief for the Commanding General of the 101st Airborne Division. The squadron planned to qualify every available AH-64E aviator and Shadow® RQ-7Bv2 tactical unmanned aircraft system operator from GT III through GT XII over 12 training days with less than 15% (86 out of 573) present for duty.

PLANNING CONSIDERATIONS

One of the greatest challenges the squadron faced in executing this aerial gunnery was "how to do more with less." Aerial gunneries are typically a squadron-level effort, where nearly every available Soldier is involved to reduce friction and increase throughput. Under mission-essential manning, every facet of aerial gunnery required deliberate planning to maximize effectiveness while mitigating risk. Initially, the squadron staff focused primarily on flight schedule and gun line efficiencies for maximum output. Individual aircrews were reexamined and when required, executed another GT III in the Longbow crew trainer. Advanced team tables were also examined to ensure maximum air mission commander (AMC) training for platoon leaders and the next wave of AMC candidates. Prioritization of line crews with staff augmentation ensured that the training would have the most benefit for the individual aviator and troop commander before the INDOPACOM rotation. Concurrently, the squadron worked with the 101st Airborne Division to secure any required land and training facilities across the installation, while the majority of the division and tenant organizations sheltered in place. With division-level support, the squadron created co-use agreements with tenant units on Fort Campbell, allowing for greater bandwidth on the ranges. The squadron developed a plan that allowed manning of two ranges simultaneously over 12 training days; whereas, previous iterations were limited by land availability over an extended period. Other planning considerations were the availability of the ammunition supply point (ASP) for ammunition draw and refuel support. The forward support company commander was forced to balance cold refuel capability with his forward area rearm/refuel point (FARP) and could not rely on the airfield FARP as a backstop. The distribution platoon leader and aviation support battalion class V (ammunition) cell also had to conduct coordination with the division to ensure that the ASP would be available.

MAINTENANCE SUPPORT

Throughout the entirety of aerial gunnery, the squadron conducted 24-hour air and ground maintenance by pooling all available assets at the squadron level to operate effectively with minimal manning. A single noncommissioned officer was selected to lead and manage each day and night shift, augmented with Soldiers from the flight troops. This allowed the squadron to rapidly distribute limited maintenance personnel across the entire fleet of aircraft, resulting in minimal not mission capable (NMC)-maintenance rates. Admittedly, this extremely limited manning and operational pace would not be sustainable for extended periods, but being able to select highly motivated and well-

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U.S. Soldiers assigned to 2nd Squadron, 17th Cavalry Regiment (Air Cavalry Squadron) prepare an AH-64E Apache helicopter for rearm and refuel procedures at an active Forward Arming and Refueling Point (FARP) on April 22nd, 2020 at Fort Campbell, Kentucky. U.S. Army photo by CSM Michael Narvid

trained maintainers was critical to our success. The brigade supply support activity and the squadron technical supply were also minimally manned. Solders were on call and would only report when there were parts to be processed and released for NMC aircraft. Those Soldiers processing parts were not to intermix with the maintenance Soldiers and were not to rotate or intermix within their sections. As an additional risk-mitigation measure, Soldiers wore masks because maintenance tasks required Soldiers to operate less than 6 feet from each other, and tools were wiped with cleaning supplies after each use. AH-64E and RQ-7Bv2 tail numbers were managed by the production control (PC) officer to ensure appropriate phase flow and to align the current maintenance status with the daily flight schedule. By controlling the tail numbers, the PC officer also reduced the amount of concurrent scheduled maintenance, and in effect, the number of required Soldiers. Further ensuring the fleet of aircraft was ready for aerial gunnery, the squadron conducted another round of pre-gun checks and rocket pod alignments on all of the aircraft. Each day, spare aircraft were identified and flown to the FARP to serve as an armed backup, allowing crews to rapidly bump aircraft with minimal maintenance delay.

FORWARD ARMING AND REFUELING POINT (FARP) OPERATIONS

Sequencing aircraft at the FARP is always essential to maintain momentum and maximize range time but was absolutely critical during this operation. Significant delays at the FARP can potentially lead to missed training opportunities for the squadron. To limit social interaction due to COVID-19, the squadron established a four-point FARP, but with the traditional manning of two FARP pads. The four-point FARP with several maintenance pads provided aircraft the ability to stage for arming and refueling while reducing delays as FARP personnel moved between each aircraft. Upon arrival to the FARP, each aircraft loaded two to three GT allocations of ammunition to reduce aircrew transition timelines and FARP rotations. Although the overall number of personnel at the FARP was cut in half, the overall caliber and quality of the hand-selected personnel operating the FARP allowed the squadron to maintain the required operational tempo. These hand-selected, highly skilled armament personnel provided additional coaching and mentorship to junior members of the team and directly contributed to the success of the FARP. Additionally, due to their proximity, the Soldiers were required to wear masks, limited bunching together, and reported any symptoms of COVID-19 to medical personnel immediately. A notable metric of success for the entire operation was the fact that the FARP did not limit operations.

COVID-19 RISK MITIGATION

The squadron's efforts to mitigate the threat of exposure to COVID-19 went beyond operating under mission-essential manning and limiting

U.S. Soldiers assigned to 2nd Squadron, 17th Cavalry Regiment (Air Cavalry Squadron) launch a RQ-7Bv2 Shadow on April 21st, 2020 at Sabre Army Airfield, Fort Campbell, Kentucky. U.S. Army photo by CSM Michael Narvid

social interactions. The squadron implemented additional control measures to protect the force. Personnel were initially screened by the flight surgeon to identity the Soldiers or family members who were considered high-risk to COVID-19. This population required additional attention and were limited in their involvement in aerial gunnery, even if they were field grade officers or senior warrant officers. Protecting the force came first. Cleaning products were ordered by the S-4 and medical team, and all excess troop cleaning products were consolidated and redistributed to high-traffic areas such as the FARP, grade shack, and aircraft hangar. All personnel were required to wear face masks, and aircrews were required to clean the aircraft cockpit before and after every crew change, reducing exposure to themselves and others. The grade shack provided sufficient space to evaluate tables and provide feedback to aircrews for follow on tables. Aircrews standing outside the grade shack were kept to a minimum by an efficient gunnery flow and social distancing.

GUNNERY QUALIFICATION

After 12 days of aerial gunnery operating under less than ideal conditions, the squadron completed 175 GTs, qualifying 27 crews through GT VI and 12 teams through GT IX. The integration of the RQ-7Bv2 Shadows into team and collective tables also validated manned-unmanned teaming, in addition to conducting 12 RQ-7Bv2 GT VIs. The squadron executed 281 AH-64E flight hours, pumped over 28,800 gallons of jet fuel, and validated troop mission-essential tasks. Despite flying more than 450 hours for the reporting period, the squadron maintained an operational readiness rate above 85% throughout the operation. Overall, the execution of aerial gunnery further enhanced the proficiency and lethality of aircrews under day and night conditions. The squadron relied heavily on COVID-19 risk mitigation efforts, deliberate mission planning, crew and team selection, and a task force-based maintenance program to ensure mission success in a contested environment.

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Operationalizing the Aviation Support Company

CW2 Joshua Cormier (left), aviator with Company B, 207th Aviation Battalion and CPT Todd R. Miller (right), aviator and company commander of Company B, 207th Aviation Battalion perform flight checks on their UH-60 Black Hawk helicopter before a mission. U.S. Army photo by SGT TJ Moller

By MAJ John Q Bolton, CPT David Repsold, and 1SG David Keener

This article discusses the unique requirements of an aviation support company (ASC) and "a way" to implement a robust training program and effective task organization in order to maximize the company's contributions to the aviation brigade. The ASC provides the combat aviation brigade (CAB) with capabilities such as a deep bench of maintainers, including aircraft specific and component repair, downed aircraft recovery, night vision goggle (NVG) and radio maintenance, as well as senior warrant officers for each Army airframe. While Army Techniques Publication (ATP) 3-04.7, "Army Aviation Maintenance," describes the ASC's role, to effectively operationalize the ASC, leadership must understand each of these roles: task organize appropriately, invest in standard operating procedures (SOPs), daily processes, and unique training requirements suited to a large, diverse organization (Department of the Army, 2017, 2-12–2-15).

With more than 250 Soldiers assigned across 30 different military occupational specialties (MOSs), the scope and scale of the ASC make it a challenging organization to manage—the ASC is effectively a small battalion with no staff.[1] These inherent management challenges quickly make the company unwieldy if not managed properly. Unfortunately, the modified table of organization and equipment (MTOE) provides neither an orderly room nor an operations section. The command team must build these capabilities out of hide, which means taking noncommissioned officers (NCOs) and Soldiers away from maintenance. Additionally, the ASC is typically undermanned or under-ranked. The ASC should have Captain's Career Course and Aviation Maintenance

[1] Every ASC has a different MTOE, but they are generally the same size with similar allocations.

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Officer's Course captains, a Chief Warrant Officer 5 maintenance test pilot as the quality control officer-in-charge, eight Chief Warrant Officer 3s, seven Sergeants First Class, and a senior First Sergeant. As a typical example, however, we only had Lieutenants or junior Captains, 3/7 senior NCOs, and six of eight warrant officers with a CW4 in place of a CW5.

As a result, command teams must balance having a strong orderly/training room (required for a 250-Soldier Company) against pulling Soldiers and NCOs from maintenance. In the B/209th ASB, we staffed the orderly room with a competent Staff Sergeant for operations, an NCO for personnel actions, and an NCO for training management (digital training management system [DTMS] and records), and two clerks. The Headquarters Platoon Sergeant oversaw the orderly room. Later, we dual-hatted the component repair platoon leader (15B CPT by MTOE, filled by 1LT) as the operations officer to return the operations NCO (E-6) to the hangar floor. Commanders may also decide to utilize the production control (PC) commissioned officer as a company executive officer.

Developing a solid company-level battle rhythm consisting of separate, weekly training (mission-essential task list assessment and calendar scrub) and administrative (evaluations, awards, actions) meetings help ensure predictability and clear due-outs. While we published training calendars (Outlook and DTMS) weekly, quarterly safety stand downs helped publicize major events, make the commander's intent clear, and meet safety, aviation resource management survey (ARMS), and regulatory requirements such as Army Regulation (AR) 350-1, "Army Training and Leader Development," (Department of the Army, 2017).

To maximize available personnel and focus on unique competencies, we task organized differently than ATP 3-04.7 prescribes (Department of the Army, 2017, 2-13). Rather than separate avionics and armament platoons, we combined them into the avionics, armament, and communications equipment (AACE) platoon. Each of these sections has overlapping technical skills (electrical troubleshooting, for example) along with similar workloads. Additionally, after some trial and error, we placed the tool room within the maintenance platoon (Figure 1).

Despite its size, the ASC only has three mission-essential tasks (METs):

1. Conduct Expeditionary Deployment Operations

2. Conduct Aircraft Maintenance Support

3. Perform Downed Aircraft Recovery Missions (Department of the Army, 2020, March 29).[2]

Of course, performance in these METs also means meeting basic Army benchmark requirements such as 350-1 training (Department of the Army, 2017), physical fitness, and weapons qualifications. Moreover, maintenance is training so the

[2] This reference may be accessed via the Enterprise Access Management Service using a valid common access card.

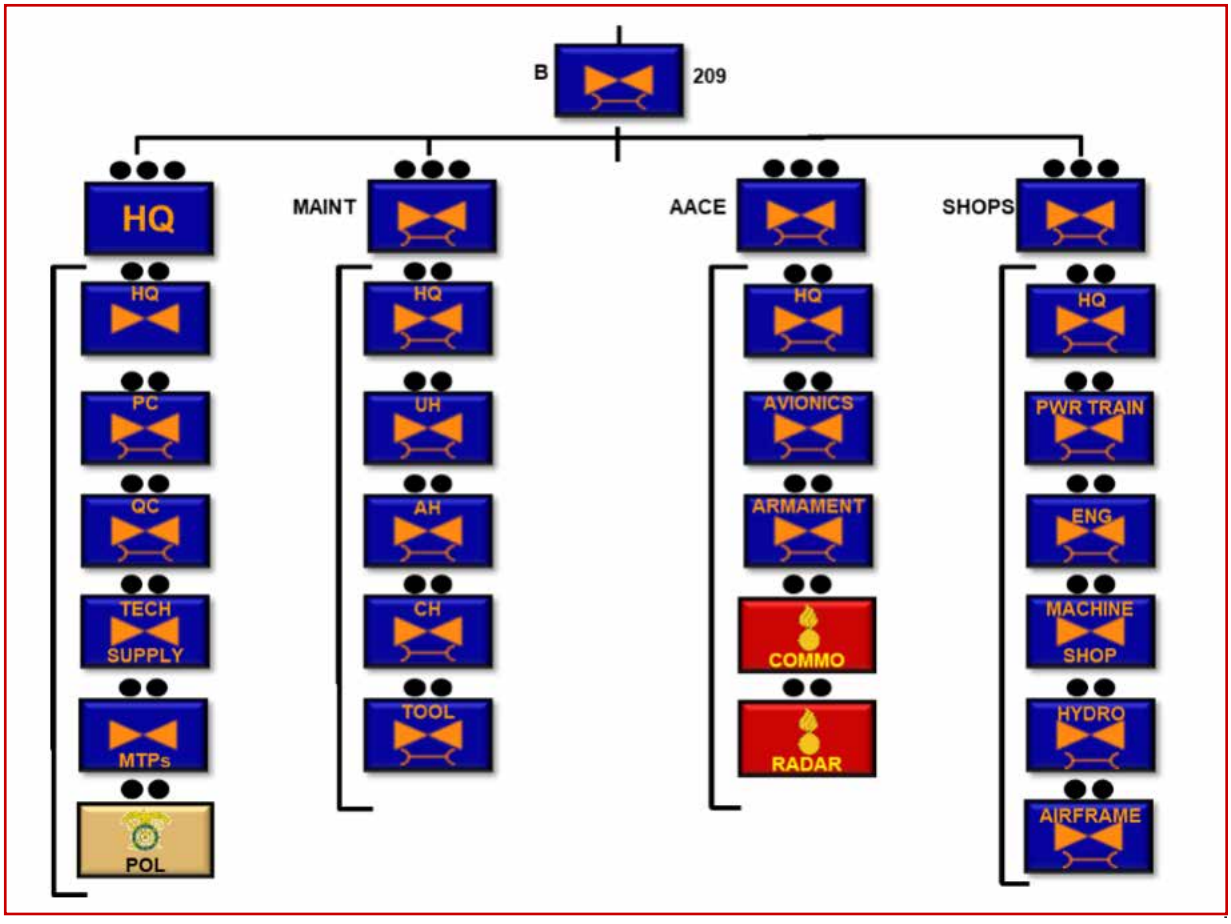

Figure 1. "A Way" to task organize the ASC (Bolton, Repsold, & Keener, 2020).

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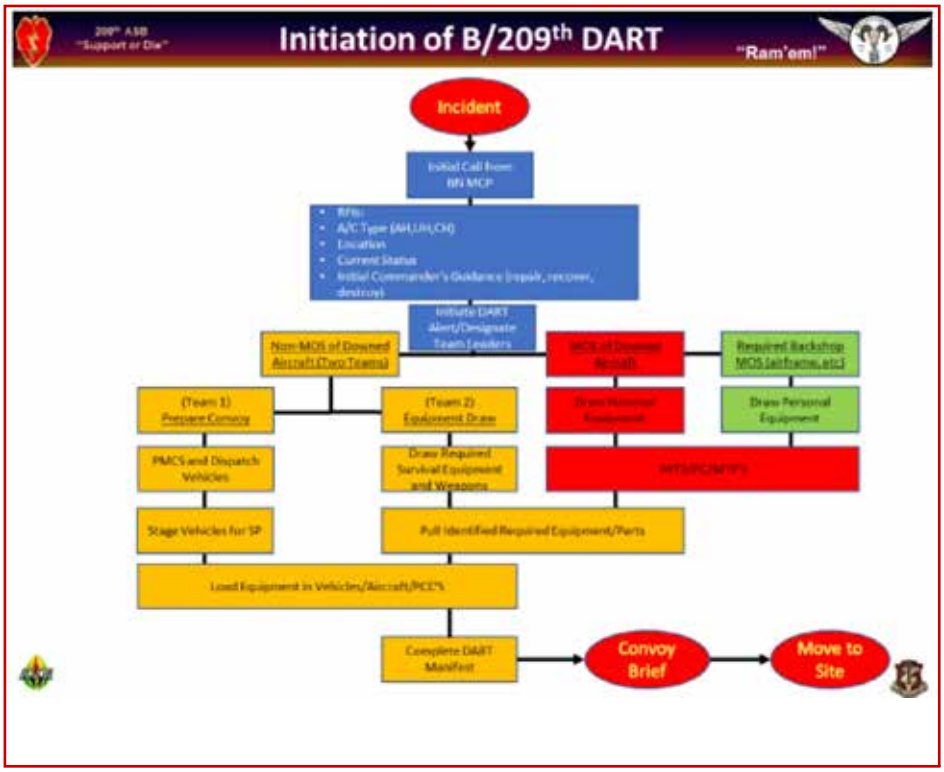

Figure 2. B/209th DART battle drill (Bolton et al., 2020).

leadership made a deliberate effort to build the phase teams right to broaden new Soldiers, avoid burnout by overworking the best maintainers, and build junior leaders. Additionally, the ASC has a role to fill in the aviation support battalion's (ASB) METs as well, particularly in terms of base defense operations. We found that we could accomplish METs 1–3 through standardized processes and daily, programmatic support to the CAB. These processes included the PC meeting, phase maintenance briefs and updates, on-call unscheduled maintenance, quarterly safety meetings (ARMS and 350-1 requirements), and Deployment Readiness Exercises combined with convoy operations.

However, the Downed Aircraft Recovery Team (DART) MET requires a deliberate training plan to build an effective team, develop familiarity with specialized equipment, and integrate with the ASB and CAB. As of Fiscal Year 2019, only the ASC has the unit maintenance aerial recovery kit (UMARK) assigned—making the ASC the brigade's lead organization for dedicated surface recovery DART and the only unit equipped for a dedicated recovery (Department of the Army, 2018, 1-5; 1-7). To develop a capable DART, we planned a robust Sergeant's Training Time plan focused on convoy operations, along with UMARK training. Quarterly exercises served as cumulative events, helping to validate SOPs and identify shortfalls. When able, we incorporated DART exercises into larger events to practice a handover from the owning flight battalion to the ASC for a dedicate recovery (Department of the Army, 2018, 1-5; 1-7). In Hawaii we are fortunate to have S-60 Seahawk and OH-58A/C aircraft hulls on-hand, but we also utilized CAB aircraft for exercises.

Typically, we would fly an aircraft to a field site while the battalion staff concurrently executed a scripted notification to the DART element. We would also incorporate elements from the flight battalion maintenance companies in order to make the event an effective training tool for battalions without the UMARK (Figure 2).

The Fiscal Year 2020 MTOE gives the ASC unique capabilities, albeit with a slight reduction in overall personnel. The ASC now has a ground maintenance section consisting of a 91B10 wheeled mechanic, and 91C HVAC (heating, ventilation, and air conditioning) technician, and two 92F fuelers. The ASC has two M978 fuelers, a 5-ton wrecker, and a 22.5-

ASC Soldiers recovering an OH-58A hull. U.S. Army photo credited to 1SG Keener

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ton lowboy trailer which, in addition to a 10K forklift, give the company robust material handling, self-recovery, and sustainment capabilities. These capabilities allow the ASC to conduct a combination of DART and logistics operations with minimal support. The NVG section, with minimal cross-training, can also complete services on ground NVGs like the PVS-14 monocular. This additional capability can greatly aid the flight battalion's forward support company's single technician.

These unique capabilities, coupled with the ASC's depth of manpower, give the company flexibility to concurrently support four aircraft phases (2x UH, 1x AH, 1x CH, per MTOE), armament/avionics support, and component repair, as well as respond to unscheduled work orders across the brigade. Though doctrine does not prescribe that the ASC perform a specific percentage of scheduled maintenance, anecdotally and practice, the ASC should perform 40–50% of the CAB's phases to allow for unscheduled maintenance as well (Personal discussion with LTC Matt Elliot, commander 209th ASB, and others. Multiple dates from February to March 2020). In the 25th CAB, we routinely operate four lanes and still have room for unscheduled work orders and other support requests.

A common concern for supported units is phase timeline management. Having grown accustomed to 24/7 operations and dedicated contract maintenance during deployments, owning units may expect aircraft to leave phase under the goals prescribed in ATP 3-04.7 (Department of the Army, 2017, Table 1-1). Maintenance leaders should also consider that phase maintenance often consists of additional tasks such as compliance with safety messages or software updates, and other upgrades.

Another key area in which ASC provides critical support is deployment activities such as air load and port operations and the associated preparation or build-up maintenance. The ASC should be integrated from the beginning of planning or, depending on the situation, be given lead for some operations due to its unique capabilities. For example, the ASC could act as the lead agency for aircraft build-up during a multimodal deployment or coordinate port operations along with the ASB's distribution company.

ASC, 25th CAB augments 1-25 Arctic Attack's air load at Travis Air Force Base, California, March 2020. U.S. Army photo credited to MAJ Bolton

With a test pilot for each airframe, three 151 Aviation Maintenance Technical Warrants (PC, tech supply, armament), as well as an Electronic Systems Warrant Officer (948B0) and a CW5 Maintenance Examiner (quality control), ASC functions as a repository of knowledge and flexible experience (U.S. Army Directorate of Force Management, 2020).[3] While the ASC is typically a low manning priority, these warrant officers can be critical to the brigade's force-generating capabilities, specifically as a repository for aviation maintenance examiners. The ASC technical supply warrant manages the brigade's corrosion prevention/control and care of supplies in storage programs, helping to reduce waste and ensure compliance with shipping requirements and Army directive. The ASC's warrant officers, if fully manned, are relatively untasked (compared to their flight battalion counterparts) to maneuver across the brigade to aid maintenance efforts. Our warrant officers helped spearhead efforts to improve facilities, develop an SOP for DART operations using an S-60 Seahawk hull, and develop a relationship with U.S. Air Force maintenance personnel at nearby Hickam Air Force Base, Hawaii. This last effort directly aided maintenance, as we were able to expedite parts and source airframe repairs via the facilities at Hickam while the maintenance wing leveraged our expertise in expeditionary operations.

Warrant officers also assisted the ASC command team by building a base of professional excellence in our NCOs through deliberate training programs that incorporated outside agencies such as the United States Army Aviation and Missile Command (AMCOM), Corpus Christi Army Depot (CCAD), and brigade logistics assistance representatives. This effort resulted in a CCAD representative coming to teach a 2-week aviation ground support equipment (AGSE) class and the opportunity to send multiple NCOs to CCAD and other locations offering hands-on training with engines, avionics, and other systems. Warrant officers can also facilitate basic professional development for the ASC's commissioned officers (since they will likely not be 15Ds) and the ASB staff (which is only authorized two 15B aviators).

The ASC should be the CAB's lead for integration with the Army avia-

[3] This reference may be accessed via the Enterprise Access Management Service using a valid common access card.

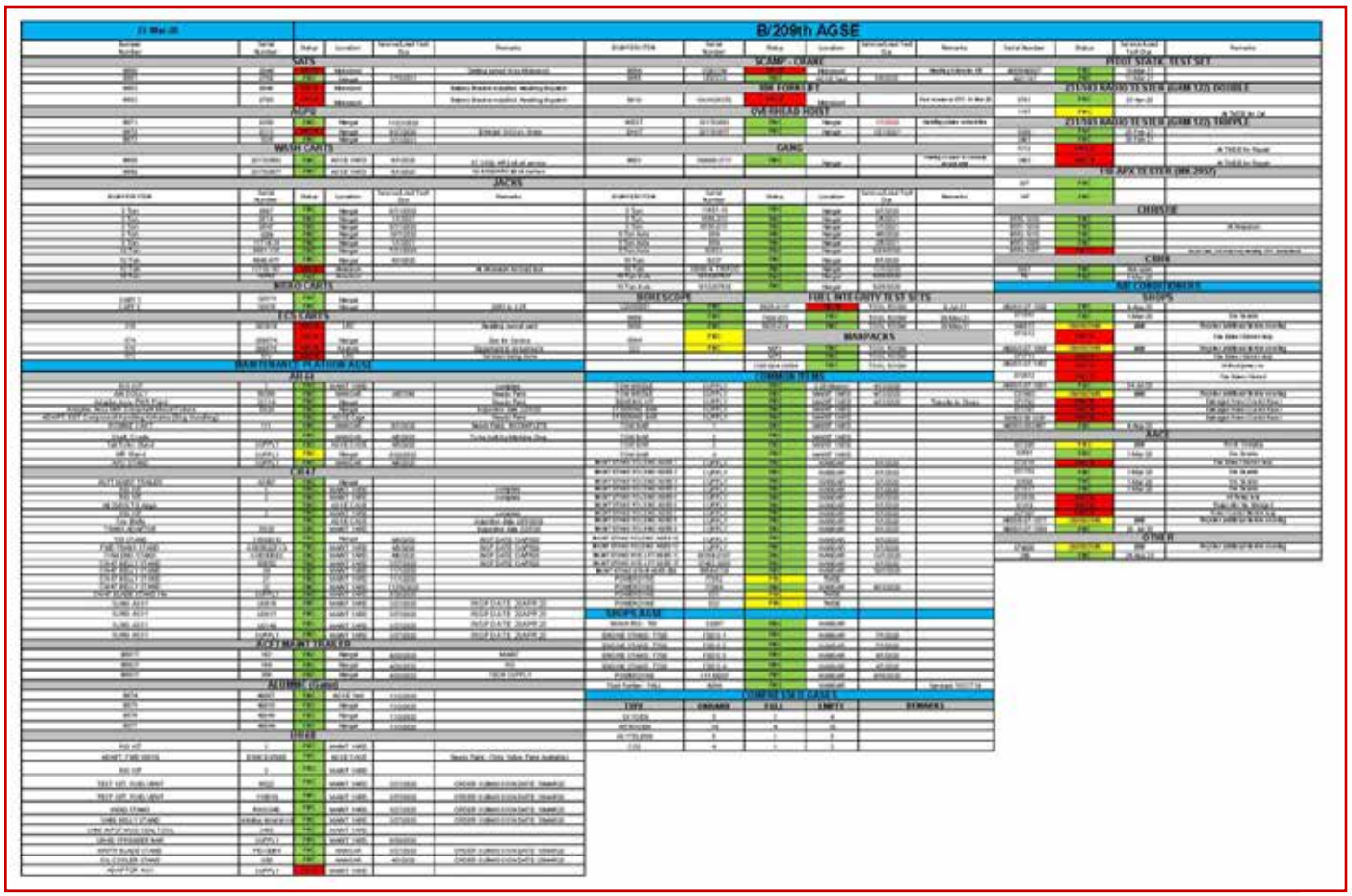

Figure 3. **Example AGSE tracker (Bolton et al., 2019).**

tion enterprise—in conjunction with the brigade aviation maintenance officer—as flight battalions typically focus on major training events and lack a reserve of AGSE. For example, we shared our nitrogen carts and generic aircraft nitrogen generator across the brigade since we had spares, and the ASC tool room led an effort to exchange other equipment. A good relationship with AMCOM is critical to facilitate the quick exchange or turn-in of AGSE and test equipment, such as pitot-static or avionics sets rather than sending them through the supply system.

Scale is the ASC's biggest challenge. The ASC is, by far, the largest company in an aviation brigade with a property book comprised of 2,500+ items listed on approximately 100 pages. Leaders need to immediately familiarize themselves with a variety of AGSE/peculiar ground support equipment and special tools. Often, the challenge is to simply track the equipment, much of which may be missing from the property book or only known by a few people. Leaders should ensure that trackers contain most, if not all, equipment and assign responsibility for all AGSE (Figure 3).

A key point raised at the August 2019 AMCOM 101 conference is that Army AGSE is typically not reported in G-Army, the system of record (Discussion during AMCOM 101 AGSE panel at Redstone Arsenal, AL, August 26–28, 2019). As a result, the Aviation Enterprise could allocate funds for repair, replacement, or reset based on inaccurate data. Aviation ground support equipment cannot be allowed to fall in the gap between ground and aviation tracking systems. The PC meeting should capture all AGSE statuses for test, measurement, and diagnostic equipment and fully mission capable/not mission capable reporting purposes. Additionally, the ASC often acts as a backup for flight battalion AGSE, providing cranes, tugs, and other equipment on demand per ATP 3-04.71, "Aviation Maintenance Training Program" (Department of the Army, 2018, 1-10).

Proper tracking of AGSE also influences task organization. The ASC tool room supports the entire brigade with spare and unique tools, making it a critical element. Originally, we had the company tool room organized as a part of the headquarters platoon. This resulted in the wrong Soldiers assigned to the tool room, which some aviation units often use as a punishment or rehabilitative assignment. To provide better oversight and ownership, we placed the tool room within the maintenance platoon, allowing that platoon leader and platoon sergeant direct oversight and the ability to rotate Soldiers and NCOs through the tool room for professional development. Like the orderly room, the tool room is not a separate MTOE organization—it requires internal staffing.

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The ASC is vital to the aviation brigade's maintenance program. It is a large, challenging organization that can quickly "get away" if not properly managed. Utilizing the ASC's experienced warrant officers and NCOs, along with the right commissioned officers, to lead change within the organization and support the brigade is key, as is focusing on maintenance support and DART operations. Combat aviation brigade command teams should consider assigning personnel to the ASC as an investment in their maintenance and DART programs. With a strong focus on integration with supported units, achieving proficiency in its four METs, and building effective systems and processes, the ASC can effectively operationalize maintenance and act as the brigade commander's reserve.

Note: These recommendations and processes are not meant to be considered the "right way" but merely "a way" for ASC leadership.

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1SG David Keener is the B/209th First Sergeant. He previously served as a First Sergeant for two troops in 6-6 CAV, 10th CAB. He served the first 12 years of his military service as a CH-47D mechanic, Flight Engineer, and Flight School XXI instructor. He served four years as a Tactical Unmanned Aerial System (TUAS) Platoon Sergeant and Senior Maintenance Chief in 3rd SBCT at Fort Lewis. His assignments include 7th BN 101st AVN, 3-10 GSAB, 1/223rd AVN, 1-14 CAV, 3-2 SBCT, 6-6 CAV, and 25th CAB with multiple deployments. He is currently finishing his BS in Aviation Maintenance Management from Liberty University.

CPT David Repsold is a student at the Aviation Captain's Career Course. He previously served as the Executive Officer in B/209th ASB and D/2-25 Aviation Regiment. He is a 2015 graduate of Whitworth University and a UH-60M Pilot in Command. He completed two rotations to Thailand, Korea, and Philippines during Pacific Pathways 18-03 and 19-01.

ASC visit to 15th Maintenance Group at Hickam AFB, Hawaii. U.S. Army photo credited to SSG Vanski

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TACTICAL MISSION PLANNING:
HOW ENEMY THREAT AND THE EIGHT FORMS OF CONTACT SHOULD DRIVE FRIENDLY SCHEME OF MANEUVER

By CPT Lindsay G. Heisler

The last 18 years of counterinsurgency (COIN) operations displayed Army aviation's exceptional ability to quickly launch a lethal attack weapons team in combat with little information and minimal amounts of planning. Tactical mission planning during COIN operations often consisted of only calculating station time and forward arming and refueling point turn time. This is widely known to be true due to the low enemy threat and the decisive advantage Army aviation holds against the enemy in the Global War on Terror. Attack weapons teams launch knowing that the enemy will likely only have small arms, and the combat-proven way to avoid effective enemy contact is to orbit at an altitude outside of the small arms' weapons engagement zone (WEZ). Alternatively, in order for Army aviation to be successful in large-scale combat operations and decisive action fights, commanders must instill in their unit a method for tactical mission planning in which, by phase of the operation, the unit thoroughly understands the enemy threat first, the enemy's likely forms of contact second, and finally plans friendly maneuver third. Planning in this sequence allows the commander to systematically and effectively select his or her friendly maneuver course of action while utilizing appropriate enablers by phase for the desired effect on the forms of contact they expect to encounter.

TACTICAL MISSION PLANNING

The AH-64 Aircrew Training Manual (ATM) Task 2012 "Perform Tactical Flight Mission Planning," is arguably the most important task to master when facing a near-peer threat (United States Army Aviation Center of Excellence, 2020).[1] Well-executed tactical flight mission planning will be the difference between accomplishing the mission within the commander's intent or being decisively engaged by the enemy at numbers that leave you attrited beyond the minimum force required to accomplish the mission. This imperative ATM task, however, provides little to no detail and vague procedures on *how* to tactically mission plan. The *Army Aviation Handbook* (United States Army Aviation Center of Excellence, 2019)[2] begins to bridge this gap by introducing a standardized format for mission planning cells, but planning cells don't provide a method for how to plan. There is still little grasp of the best method with which to tactically mission plan against a near-peer threat. While planning each phase of the operation, commanders must direct their formation to analyze the enemy threat first. Once a thorough understanding of the threat is developed, commanders must then direct planning cells to analyze, by phase, through what form the threat will gain contact with his or her friendly forces. Once the threat and likely forms of contact are determined, companies can now begin to plan their friendly scheme of maneuver.

WHAT IS THE ENEMY THREAT?

For all tactical mission plans, it is essential to understand the enemy threat first. Through intelligence preparation of the battlefield, the battalion S2 analyzes the characteristics of the enemy threat through composition, disposition, strengths and weaknesses, and the threat's doctrine and tactics. Once this initial enemy analysis is complete, the battalion S2 creates the modified combined obstacles overlay (MCOO), determine enemy capabilities and limitations, enemy order of battle (ORBAT), enemy courses of action (COAs), and the high-value target list (HVTL) to develop detailed enemy situation templates (SITEMP). These products are important in understanding the enemy threat and essential to have before planning friendly scheme of maneuver. Once mission analysis is complete,

[1] This resource may be found via Army Knowledge Online with a valid common access card.

[2] This resource may be found via Army Knowledge Online with a valid common access card.

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the commander and battalion staff will transition to COA development. Key outputs of COA development are the information collection matrix (ICM) for reconnaissance and security missions or engagement area (EA) development for attack missions. Attack reconnaissance companies cannot stop analysis at the products they receive from the battalion—they must develop them further at the company level.

Once a company receives the mission from its higher headquarters with the aforementioned products, the company must expound on these products at the company level. Utilizing the MCOO, the company threat planning cell must further analyze the terrain focusing on adding key terrain and mobility corridors to the battalion's MCOO. At a minimum, platoon-sized mobility corridors should be analyzed at the company level and added to the MCOO. Focusing on key terrain and mobility corridors will begin to drive friendly scheme of maneuver because they indicate where the enemy will likely be and where the enemy can go. If you are planning a screen or reconnaissance mission, named areas of interest (NAIs) developed at the company level should be added to the event template where the threat planning cell identified pieces of key terrain and mobility corridors. If you are planning an attack mission, identified pieces of key terrain and mobility corridors should drive the selection of EAs. Aviation Mission Survivability Officers (AMSOs) should utilize the terrain analysis and intervisibility tools on the Aviation Mission Planning System to analyze terrain. Doing so will allow selection of observation posts to observe NAIs or battle positions from which to attack in EAs.

In addition to adding to the MCOO, company threat cells must further examine the analysis the battalion S2 conducted on enemy capabilities and limitations. The threat cell must analyze the enemy by warfighting function so that the company commander has a clear picture of the capabilities and limitations of the forces he or she will be arrayed against. Additionally, this analysis will validate the HVTL determined by the battalion S2. Understanding the enemy's mission, capabilities, and limitations is essential to validating the HVTL. The Worldwide Equipment Guide (WEG), Volume 1, "Ground Systems," Volume 2, "Air and Air Defense Systems," and Volume 3, "Naval Systems" are publications that will assist in analyzing a threat's capabilities and limitations (United States Army Training and Doctrine Command, 2016).

Enemy/Threat/ASE (AMSO, IP, Mission Planner)

1. Analyze MLCOA and MDCOA
   a. Develop enemy SITEMP Overlays
2. Analyze ICM and add to Event Template Overlay
3. Conduct terrain analysis
   a. Create MCOO – focus on key terrain and mobility corridors
   b. Add NAIs at company level to facilitate maneuver
4. Analyze PIRs (enemy, terrain, WX, time) – which apply to my Company?
5. Analyze threat by Warfighting Function
   a. Confirm HVT analysis from BN S2
   b. Focus on ADA/EW first
6. Analyze ORBAT
   a. Break ORBAT down into the platoon level
   b. Refer to enemy and threat tactics doctrine to facilitate analysis
7. Develop threat rings on overlays for enemy systems (ADA, artillery)
8. Complete Enemy SITEMP overlays
9. Select appropriate MDS to be used for mission
10. Determine CMWS settings and flare/combo load
11. Determine FCR Terrain sensitivity/priority scheme settings based off the likely threat

Figure 1. Wolfpack mission planning timeline (Heisler, 2019)

Once the analysis on each warfighting function is complete, the company threat planning cell must also break each enemy COA and the ORBAT down to the platoon level. In order to do this, the personnel in the threat cell (usually the AMSO, an instructor pilot, and a mission planner) must become familiar with enemy threat doctrine. The *Russian Way of War* book (Grau & Bartles, 2016) and Field Manual 100-2-1, "The Soviet Army: Operations and Tactics," (Department of the Army, 16 July 1984) are publications that depict how a near-peer threat will array its forces in a decisive action environment. Additionally, the Army Training Network provides opposing forces threat force structures and tactics reports with historical examples of how near-peer threats have operated.[3] These publications must be utilized to further develop the enemy COA statements down to the platoon level. The threat cell must understand how the enemy arrays its forces, by warfighting function, between the disruption zone, the battle zone, and the support zone. This allows the company commander to visualize the forces they will be arrayed against at the platoon level.

After the enemy COAs and the ORBAT are broken down to the platoon level, the company threat cell must refine the ICM or EA received from the battalion. The company commander must ensure that the company NAIs the threat cell identified are added to the battalion's ICM for a reconnaissance or security mission. For a deliberate attack mission, companies must further develop the EA provided by battalion. Once the threat planning cell has further developed the battalion products to facilitate the company tactical mission plan, the friendly maneuver cell can utilize information provided by the threat cell to begin their mission planning. Figure 1 is an example of a proposed company enemy/threat planning cell.

[3] The Army Training Network is accessible via the Enterprise Access Management Service-Army network with a valid common access card.

HOW WILL THE THREAT GAIN CONTACT?

Utilizing the enemy analysis conducted by the threat planning cell, the commander should direct the friendly maneuver cell to determine which of the **eight forms of contact** will the enemy gain contact with friendly forces. **Army Doctrine Publication 3-90, "Offense and Defense" defines the eight forms of contact as: direct, indirect, non-lethal, obstacles, CBRN, aircraft, visual, and electronic/electronic warfare (EW)** (Department of the Army, 2019). This is often remembered by the acronym '*Dinocave*.' In a decisive action operational environment, units may experience multiple forms of contact simultaneously. During friendly maneuver, encountering one or more of these forms of contact requires either a lethal or nonlethal response to the enemy. Before planning your friendly actions on contact, you must deliberately conduct tactical mission planning to avoid contact altogether or to mitigate risk by accepting one form of contact while avoiding another. For an example, upon receiving a mission to conduct an attack out of friendly force contact against the disruption force of a mechanized infantry fighting vehicle brigade tactical group (BTG), the threat cell must use information from the battalion S2 and threat doctrine to determine how the enemy arrays its forces between the disruption, battle, and support zones. An example of an enemy doctrinal template follows:

An enemy Mechanized Infantry Fighting Vehicle BTG is conducting an envelopment attack. Enemy threat doctrine suggests that the disruption force will likely be composed of one mechanized infantry battalion as the main body and a reconnaissance platoon composed of a mixture of BMPs (Soviet infantry fighting vehicle), BRDMs (Soviet reconnaissance vehicle), and BTRs (Soviet armored personnel carrier). The disruption force is positioned forward of the battle zone to conduct reconnaissance to shape the battlefield for the battle zone. Also in the disruption force is an engineer platoon that sets the conditions to allow the battle zone to move freely across the battlefield. The reconnaissance forces are protected by SA-18 (man-portable air defense systems [MANPADS]) and a Sborka-M1 (air defense armored command vehicle) with Dog Ear radar in the most forward elements. SA-13 (surface to air missile [SAM] systems) are positioned in the rear to protect the main body of the disruption force. Following the disruption zone, the enemy will use its remaining mechanized infantry battalions and its armor battalion as the battle zone. These are also protected by SA-13s. Following the battle zone, the support zone is comprised of an air defense battalion with SA-15 (SAM systems) and a field artillery battalion with 2S19 (self-propelled artillery), both of which are strategically positioned such that they are protected while mutually supportive of surrounding units. They are out of range of direct fire and most indirect fire while still in range to protect the forward most reconnaissance elements in the disruption force (Niehl, 2019). Figure 2 is an illustration of the BTG's ORBAT and expounds on the written content in this paragraph.

Now that we understand how the enemy will array its forces after the battalion S2 and company threat cell determines the enemy capabilities by zone, the company commander should direct their planning cells to identify how the enemy will gain contact by phase. Assuming the commander will break up the operation into four phases—planning, movement to battle positions, actions on the objective, and reconsolidation—the company planning cells will have to analyze forms of contact within each phase.

Starting with phase two, movement to battle positions, we can utilize the MCOO and enemy SITEMP overlays to determine that we will likely encounter the brigade reconnaissance platoon during this phase while moving to our battle positions. Understanding the composition of the reconnaissance platoon, we can anticipate

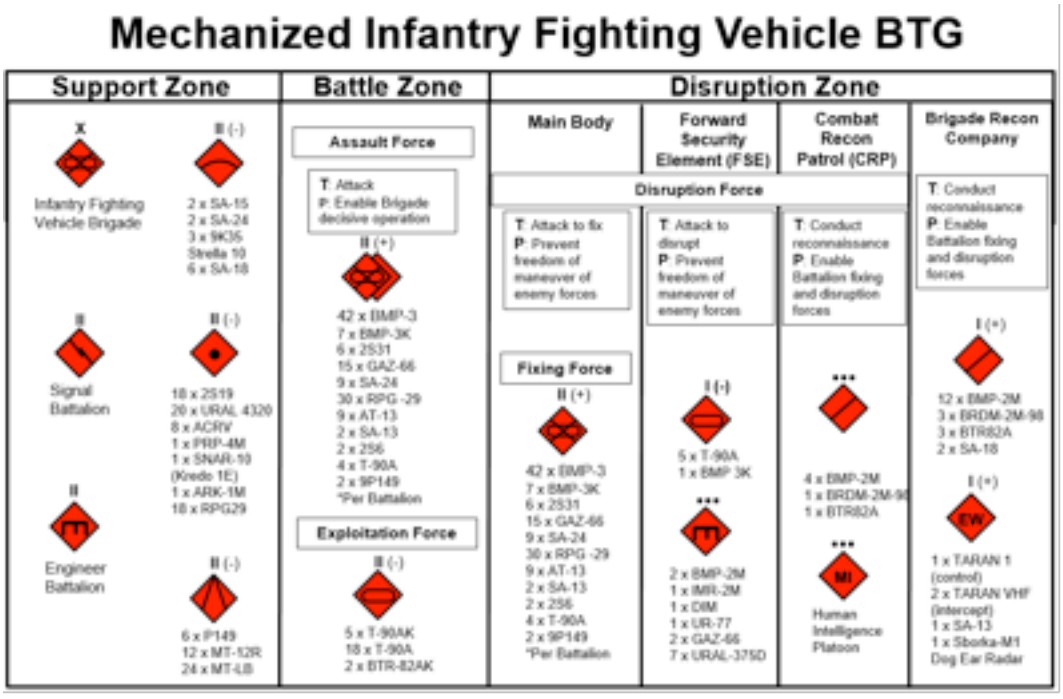

Figure 2. Mechanized infantry fighting vehicle ORBAT (Niehl, 2019)

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that the enemy will likely make contact with us in three forms—visual, direct, and electronic. The reconnaissance platoon that likely positioned themselves on a piece of key terrain that allows good intervisibility of the battlefield can make contact visually. The SA-18s, also likely positioned on that piece of key terrain, can make direct contact with the AH-64s upon acquiring and engaging. The Sborka-M1 with Dog Ear radar can make contact electronically because it has an 80 kilometers (km) detection range and 22 km tracking range with targets flying below 1500' above ground level.

In phase three, actions on the objective, we can infer that while in our battle positions observing the engagement area, we will likely encounter the main body of the disruption force. Additionally, we must account for the high probability of operating within the WEZs of the 2S19s and SA-15s that are within the enemy support zone. Understanding that the main body consists of BMPs, protected by SA-13s, and that our battle positions will unavoidably be positioned in the WEZ of the 2 S-19s and SA-15s, we can determine that the enemy will likely gain contact with us in four forms—visual, direct, indirect, and electronic. While maneuvering in our battle positions, the main body will have opportunities to gain visual contact with the AH-64Ds. The SA-13s and SA-18s can gain direct contact when we operate within their 5 km engagement ranges. Because our battle positions will inevitably have to be planned within the WEZ of the 2 S-19s that are within the support zone, the enemy will be able to make indirect contact with us, especially if we stay in a single position for too long. Finally, because we are operating within the detection ranges of the SA-13's Snap Shot radar (10 km) and the Dog Ear radars (80 km), the enemy can gain contact with us electronically.

For phase four, reconsolidation, the same forms of contact in phase two hold true for phase four.

HOW WILL THIS DRIVE YOUR FRIENDLY SCHEME OF MANEUVER?

Now that we understand through what forms the enemy will gain contact with us, we can utilize this information to plan the friendly scheme of maneuver. The maneuver cell should plan friendly movement techniques, altitudes, airspeeds, and formations for each phase of the operation. Figure 3 is an example of part of a synchronization matrix that depicts this process for phases two and three, utilizing the analysis from the threat cell.

This process should be utilized for every phase of the operation.

Now that the maneuver planning cell has planned the friendly scheme of maneuver by phase of the operation based off of the forms of enemy contact we expect to encounter, the company commander can clearly visualize the enemy their company will fight on the battlefield and how the threat should drive friendly maneuver. Additionally, deliberately planning in this method allows the commander to determine if enabler support should be requested for a specific effect. For example, the commander can request EW effects or suppression of enemy air defense while en route to the battle positions to minimize certain enemy forms of contact, or call for fire during actions on the objective to integrate all warfighting functions into the fight.

PHASE		Phase II - Movement to Battle Positions	Phase III - Actions on the Objective
ENEMY		The lead elements of the disruption force's main body enters into the engagement area. The BTG's battle zone approaches the international boundary.	Most of the disruption force has entered into the engagement area. At least one SA-13 is in the engagement area, indicating the rear elements of the disruption force.
Likely Form(s) of Enemy Contact		Visual (SA-18), direct (SA-18, BMPs), and electronic/EW (Dog Ear radar)	Visual (SA-18), direct (SA-18, SA-13, SA-15), indirect (2S19), and electronic/EW (Dog Ear radar, Snap Shot radar)
MOVEMENT & MANEUVER	1st PLT	Launch criteria is met - 1st platoon launches from TAA to their battle positions. **Movement Technique**: traveling overwatch because enemy visual, direct, and electronic contact is possible. **Altitude:** 100' AHO and below until RP to stay masked from SA-18 visual and direct contact and radar detection from the Dog Ear radar; 50' AHO and below from RP to battle positions. **Airspeed:** 100 knots until RP; 40 knots from RP to battle positions. **Formation:** Lead-trail and loose separation to minimize radar signature.	The trigger to start engaging has been met. 1st Platoon executes its direct fire plan. **Movement Technique**; bounding overwatch because enemy visual, direct, indirect, and electronic contact is likely. **Altitude:** NOE altitudes while maneuvering between BPs to avoid SA-13 and SA-15 direct contact and radar detection from the Dog Ear radar and Snap Shot radar. **Airspeed:** 40 knots and below; no more than 2 minutes spent in each BP to avoid indirect fire threat from the 2S19s. **Formation:** Lead-trail and loose separation to minimize radar signature.
	2nd PLT	Once lead elements of the enemy's disruption force enters into the engagement area, 2nd platoon will assume REDCON3 and await launch criteria to be met for BHO	Launch criteria is met to conduct BHO with 1st platoon - 2nd platoon launches from TAA to their battle positions. **Movement Technique**: traveling overwatch because enemy visual, direct, and electronic contact is possible **Altitude:** 100' AHO and below until RP to stay masked from SA-18 visual and direct contact and radar detection from the Dog Ear radar; 50' AHO and below from RP to battle positions. **Airspeed:** 100 knots until RP; 40 knots from RP to battle positions. **Formation:** Lead-trail and loose separation to minimize radar signature.

Figure 3. Synchronization matrix (Heisler, 2019).

CONCLUSION

This article aims to provide a method for tactical mission planning to supplement the undeveloped ATM Task 2012 "Perform Tactical Flight Mission Planning," (United States Army Aviation Center of Excellence, 2020). Instead of relying on Task 2012, commanders should ensure his or her threat cell thoroughly defines and evaluates the threat first, understands the threat's likely forms of contact second, and then plans friendly maneuver by phase of the operation third. An ARB or attack reconnaissance squadron will not succeed against a near-peer threat utilizing Task 2012 as its guide for planning. This method begins to bridge Army aviation's gap in understanding deliberate tactical mission planning. Units can utilize this method as a starting point and continue to refine the process within their own standard operating procedures to increase their ability to win in large-scale combat operations against a near-peer threat.

The culminating event for our Commander's Training Exercise (CTE) took place the evening of November 25, 2019, where we established a forward arming and refueling point (FARP), a tactical action center (TAC), and conducted air assault missions at a central location between Fort Hood, Texas and Fort Sill, Oklahoma. This exercise challenged our mobility, logistical planning, and communication tactics between multiple locations and made us a more proficient and lethal force for it. U.S. Army photo by SGT Sydney Mariette

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Joint Interoperability—Sustaining Capability

By COL Tommy Lewis, in collaboration with CW4 Shon Thompson and CW5 Tom McClellan

Before the end December 2019, the U.S. embassy in Baghdad was attacked and nearly breached by Shi'a militia groups and sympathizers following U.S. strikes on Kata'ib Hezbollah targets after the terrorist organization attacked an Iraqi airbase in Kirkuk that killed an American contractor and wounded others. The chance for miscalculation on either side was great, and a series of surgical strikes could quickly spiral into an all-out state-on-state war. The geographic combatant commander responsible for the region, U.S. Marine Corps Gen. Frank McKenzie, appealed to the National Command Authority and Secretary of Defense to strengthen forces in theater with increased combat power and missile defense capability to deter the Iranian regime from countering against U.S. interests in the region. On 03 January 2020, the U.S. military successfully struck and killed the commander of the Iranian Revolutionary Guard Corps, Maj. Gen. Qasem Soleimani, and Abu Mahdi al-Muhandis, founder of Kata'ib Hezbollah, at the Baghdad International Airport.

MFATF aircraft conducting deck landing qualification (DLQ) in the Arabian Gulf. Photo credited to CW4 Thompson, USARCENT AMSO

On 10 January 2020, Gen. McKenzie requested a multi-functional aviation task force (MFATF) to assist in the defense of the Arabian Gulf and peninsula to be led by U.S. Navy Central (USNAVCENT). Following the death of Soleimani, the Iranian regime vowed revenge, and U.S. Central Command (USCENTCOM) was responsible for defending U.S. embassies, bases, and interests–both on land and at sea. The MFATF mission was to operate from a USNAVCENT vessel postured to destroy Iranian fast attack craft (FAC) and fast in-shore attack craft (FIAC) as a larger effort to deter Iranian aggression. Planning, coordinating, and executing Army aviation attack/reconnaissance in a maritime environment is very complex and requires detailed and methodical planning by staff echelons from the battalion task force level to the regional combatant commander. Planners from USNAVCENT, U.S. Army Central (USARCENT), the forward deployed division-level headquarters, and the MFATF quickly coordinated to further develop and refine "joint interoperability" capabilities to support USCENTCOM objectives over air, cyber, land, and sea.

This article describes an Army service component command's (ASCC) lessons learned from a recent alert through the deployment of one of the Army's most lethal fighting forces: the MFATF.

Both USNAVCENT and USARCENT agreed that a clear objective in attaining interoperability was the ability to routinely act together coherently, effectively, and efficiently to

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AH-64D returning from training mission to the USN vessel. Photo credited to CW4 Thompson

achieve tactical, operational, and strategic objectives. In order for U.S. Army aviation to achieve joint interoperability, it is imperative to take full advantage of every opportunity that our Army units have to conduct missions with our sister services, be it during joint exercises or, in this case, an actual deployment with weapons at the ready.

Beginning in the late 1980s through today, special mission units and conventional Army aviation units previously conducted joint operations in support of maritime security. Army aviation has been active within the Arabian Gulf throughout the past decade and continues to refine the tactics, techniques, and procedures (TTPs) for operating across multiple domains. Building on previous lessons learned, the concept significantly evolved as technology rapidly increased the capabilities available to the warfighter. Today's capabilities now provide commanders with multiple options to engage hostile targets. Identifying the capabilities required and matching those needs to resources available are key parts of this well-defined process.

The challenge is injecting today's advanced Army aviation capabilities rapidly into a joint environment. To ensure a high state of readiness, Army aviation units train and conduct precombat checks prior to deployments so they are ready to fight when called. To ensure a decisive victory at the joint level, this must be a top-down driven process with leaders fully engaged. When operating in a joint environment, we bring together the best equipped and trained warriors to the fight by providing our warfighters with the most advanced weapon systems.

NEW EQUIPMENT FIELDING AND TRAINING

The MFATF deployed to the Middle East in January 2020, having just replaced its AH-64D aircraft with the Army's latest AH-64E models. The unit did not have time to complete gunnery, let alone train individual aircrew members on critical system upgrades to the level of proficiency required immediately in the maritime domain. These aircraft were designed to operate securely within the joint operational environment but require individual knowledge and proficiency to integrate quickly and effectively into an existing network. We must continue to seek ways to refine this integration process with joint counterparts. This is critical when the response timeline to a crisis is compressed and driven by conditions to enable the combatant commander to gain the strategic advantage. We often use the crawl-walk-run phase during training in an unfamiliar environment. This is not the macro level of institutional knowledge as it already exists in the form of joint publications and service-specific manuals and regulations. Instead, it is necessary to focus on the micro (warfighter) level as it pertains to systems integration in the joint fight.

Link 16, a military tactical data link network was recently fielded to the unit prior to deployment. Link 16 enables military aircraft, as well as ships and ground forces, to exchange their tactical picture in near-real time. Although familiar with utilizing Link 16 at home-station, joint integration procedures had to be developed, established, and practiced routinely in order to refine and ultimately standardize. In order to move past this crawl phase, units should designate a link unit manager (LUM) with, at a minimum, LUM 220 course completion. This is an additional duty that is often overlooked until it becomes critical to mission success. In this instance, the absence of a LUM created delays and required assistance from the Apache project manager (PM) in troubleshooting systems in theater. The designated Apache PM forward support representative was crucial in working the unit through the problem set and eventually establishing connectivity for the Link 16 system; however, this delay cost critical time in achieving "Full Operational Capability" (FOC) status.

Considering the complex network structure that supports Link 16 and the technical expertise required for integration and the joint interoperability it was designed to achieve, the addition of a warrant officer (140A) command and control systems integrator at the combat aviation brigade level would provide the higher level expertise to the deployed unit and complement the capabilities of the LUM.

PREDEPLOYMENT

A good rule of thumb for leaders at all levels to follow is that ongoing unresolved issues and challenges during predeployment will most likely be exacerbated upon arrival to an operational environment. As the MFATF is alerted and assembled, unit leaders must know all aspects of the unit's readiness level. This is especially critical when conducting operations that are outside of the unit's mission-essential task list

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and require additional resources and training. Although not routine and not conducted on a day-to-day basis, Army aviation is trained and equipped to conduct overwater operations. Units should ensure special mission equipment is on-hand, serviceable, and that aircrews are trained to standard. Arriving into an operational theater without the required equipment strains the logistical network, and oftentimes, the special mission equipment is not readily available for short notice procurement.

Aerial gunnery is an annual requirement and facilitates aircrew proficiency. Establishing a training schedule that ensures the immediate reaction force (IRF) is qualified and current would reduce strain on the limited resources within the deployed theater and provide the commander the ability to quickly build and employ combat power when and where it is needed. Activation of a unit that is at a high state of readiness reduces time to reach FOC and the need for additional theater resources. Degraded unit readiness as a result of new equipment training and new equipment fielding (NET/NEF) must be considered prior to alerting for deployment.

An additional challenge to deploying Army aviation in support of maritime operations is the need for aircrew members that are qualified, current, and proficient in deck landing overwater qualification. With few exceptions, conventional Army aviation does not maintain deck landing qualification (DLQ)-ready crews. When units are alerted/activated in support of overwater operations, resources are available for training at the unit level in a classroom environment. These classes are formalized programs of instructions and can be provided by the supported Navy unit. The academics are required prior to actual flight and can be used as refresher training for previously qualified aircrews. These requirements must be taken into account during the planning phase in order to establish a realistic timeline for achieving FOC to support overwater operations. U.S. Army Central anticipated the challenge of in-theater overwater qualifications and worked closely with USNAVCENT to provide vessels to conduct the requisite training. It is imperative that at least some overwater training is conducted at home station in order to reduce the limited time and resources required to attain this level of proficiency upon arrival in theater.

Two Navy deck crew secure Army aircraft after landing on deck. Photo credited to CW4 Thompson

ARMY SERVICE COMPONENT COMMAND INVOLVEMENT

As the higher headquarters, USARCENT, USCENTCOM's Army service component command (ASCC), carries the responsibility of providing the supporting unit (MFATF) with the necessary requirements to ensure mission success. This includes providing the unit with clear and concise guidance of the expected mission, as well as the end state prior to deployment. This occurred at the macro level between the ASCC and the MFATF division and corps headquarters. Liaison at several echelons during early stages of deployment preparation proved to be paramount during all stages of the deployment. Once the MFATF received notification to deploy, the ASCC should have immediately requested an aviation liaison officer (LNO) from the MFATF parent organization to ensure the micro level of coordination was occurring. Upon arrival in theater, the MFATF was assigned operational control (OPCON) to the division headquarters already established in theater and direct support (DS) to USNAVCENT. Once arriving in theater, the same LNO should have immediately been attached to the OPCON division headquarters in theater and also utilized as the LNO to USNAVCENT during the overwater qualification and embarkation windows.

Constant collaboration and over communication is essential when adhoc organizations are assigned OPCON to a different headquarters. The MFATF organic division headquarters also deployed and was simultaneously conducting operations as part of the IRF. The MFATF provided General Support (GS) support to its parent/sister units upon request while conducting missions in DS of USARCENT/USNAVCENT. In the early phase of the deployment, the priority of DS and GS missions presented challenges to track flight hours in support of the directed mission and sometimes caused confusion over and delays of available resources. Early identification and maximum utilization of a dedicated LNO expedites both the efficiency and effectiveness of staffs at all echelons and would serve to reduce friction rendered from miscommunication and/or under reporting.

FULL OPERATIONAL CAPABILITY

With the short notice alert and deployment coupled with recent NET/NEF, USARCENT fully anticipated

the extended time for the MFATF to reach FOC. With a deliberate concerted effort to not rush to failure, USARCENT implemented crawl-walk-run methodology for the unit to attain joint FOC while refining joint interoperable TTPs with USNAVCENT. Aerial gunnery, DLQ, understanding Navy TTPs, and conducting joint battle drills were a requirement after arriving in theater. Training and exercise repetition with our sister services is vital in keeping Army aviation beyond the "crawl phase" of joint interoperability. The lessons learned toward achieving FOC to conduct joint missions in the future are:

1) Upon deployment notification, establish communication early and through all echelons,

2) Ensure the IRF aviation unit is fully manned, trained, and equipped; ready to fight immediately upon entry into theater,

3) Establish Army-wide standards and TTPs for joint interoperability. This should include an aviation "Reaction Force" standard operating procedure used by the IRF to train its aircrew members. Joint TTPs and rules of engagement should be trained early to avoid delays in achieving joint FOC; and

4) Build continuity and sustain learned skills of joint interoperability with other joint components.

Ordered to redeploy early, the MFATF was not able to complete all of the joint interoperability training objectives. The MFATF did complete aerial gunnery and DLQs for all required aircrews and also conducted two embarkations totaling 21 days aboard USNAVCENT vessels where overwater TTPs were practiced and refined. The lessons learned serve as a significant foundation for the next iteration and benefit the next unit that is called to support the Navy and counter FAC/FIAC mission. The actions performed by all those assigned to the MFATF, planners from the IRF division headquarters, the forward deployed division headquarters, and USNAVCENT represented true dedication and professionalism. All can agree that the capability produced from joint ground/maritime interoperability gives the combatant commander a powerful, agile, and lethal force that cannot be matched by any enemy force. All leaders and key stakeholders of this mission recognize that we must continue to strive for opportunities to refine our joint interoperable skill sets. The USCENTCOM mission of deterring Iranian aggression is ongoing, and the necessity for joint interoperability is in more of a demand today than in previous years. Employing the MFATF as a direct support capability to USNAVCENT served as an excellent primer to do so.

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AH-64D being loaded for transport to the Middle East. Army stock photo

AH-64D completing DLQ. Photo credited to CW4 Thompson

Letters to the Editor

War has changed. The information revolution has changed the way we fight with greater consequence than the industrial revolution. Since my 2017 *Aviation Digest* article, "The Information Revolution in Warfare," highlighting this fact and capability gaps, funding has become available allowing a restart in the Department of Defense as it pertains to future programs, combat systems, and a general investment in the capabilities of our military. This is beginning to allow the capability gaps or regional overmatches created during the last decade to be corrected. However, a huge capability gap remains—the ability to 'fight our networks.' To win against a peer competitor in modern warfare, the military must think of a network as a weapon system, and we must therefore train on and fight the network as such.

It not only requires investment in tools such as new software, but more importantly a shift in thinking and culture. No longer can the military afford to treat the network as a sustainment function that only allows our email to work. Literally no combat system that fires a projectile or flies through the air can be used on scale without the network. Command and control breaks down without the network despite our best Primary, Alternate, Contingency, and Emergency plans. Our brave signal and cyber Soldiers receive little or no training in operationalizing the network from either a defensive or offensive operations perspective. Our commanders rarely consider the network until it is taken away as an inject at a National Training Center/Joint Readiness Training Center rotation. It can no longer be considered a norm to have a fully operational and secure network against a peer or near-peer adversary. The culture must be one of thinking and training warfighters to use tactical networks in a similar manner to other battlefield systems. In most brigade and above warfighter exercises, the tactical network is replicated through preexisting, on-post digital infrastructure, or at best, the unit will breakout the tactical systems in a "field" location but supplement it with additional or inorganic assets.

If we want to 'train as we will have to fight,' then we should be able to manage our networks in a manner that allows leaders at all echelons to make informed decisions, based on the current tactical situation using real-time network status. At many recent training exercises, units at brigade and above struggle to efficiently monitor their networks, even after a lengthy period of time for establishment of the network using garrison digital infrastructure (in an uncontested environment). The capability to manage and inform leaders across the operations centers at every echelon remains unattainable. Every operations center, command post, or staff huddle has some sort of common operating picture (COP) by which they attempt to achieve a level of shared understanding or awareness. No two are alike, and they deviate by organization and echelon from many different types of software tools. Everything from Command Post of the Future and the Army RDA Internet Issue Entry System to Theater Battle Management Core Systems are displayed on a large screen in order to achieve some level of shared awareness. The goal of shared understanding allows a rapid decision-making process to occur in an effort to match the demands of modern combat. Rarely is the tactical network an item of interest on the COP, much less the decision-making process. The situational awareness provided by overlaying the network status displaying both friendly and enemy locations on map would be unmatched. Off-the-shelf software solutions are available and have already been used in test cases and experiments inside of a network operations cell, but operational use of connecting what is culturally the S6/G6 to tactical operations in the S3/G3 staff functions has yet to be achieved.

The traditional norm of stovepiped software systems and programs of record created by competing companies that, in use, struggle to communicate even within the same service will no longer work in an environment requiring near real-time decisions and actions. The shared understanding of the tactical situation to include the network status will be required at echalon, and a warfighter mentallity to the network's application will be paramount. A pivot to adapt strategy must be used in order to provide off-the-shelf software to the warfighter in same manner the rapid fielding initiative was able to supply troops with equipment outside the lengthy traditional aquistions process.

The network must be thought of as a weapon system with multiple employment methods in order to break the legacy way of thinking. The network can no longer be viewed as a sustainment function in support of maneuver. Instead, the network must be employed in every dimension as part of the maneuver plan. The establishment of the network where the enemy wishes to deny or disrupt network capabilites has become the new key terrain. Push-

Letters to the Editor

ing the network to the edge of the fight against the enemies' attempts to stop it is nearly impossible with the current capabilities in the field. However, there are tools available like Conoptic and strategic unified network operations provided by the commercial data management software supply company, CodeMettle, that when combined with training and a warfighter mindset, can fill the current capabilty gaps in fighting the network. The Army relies on industry to provide useful information-sharing technologies that transcend the legacy boundries extablisted by outdated programs of record bogged down by large corporations and politics. Small veteran-owned software companies are providing useful solutions now. All we have to do is change the way we think.

Sincerely,
Lee Ambrose
LTC, Army Aviation
Corporate Fellow

I wanted to write a short note to comment on the article "Maintenance Situational Unawareness" in the recent issue of *Aviation Digest*. It was an excellent article. Unfortunately, I've seen a lot of changes during my Army career (1981–2001) as a CH-47 mechanic/flight engineer/squad and platoon sergeant/technical inspector/technical inspector supervisor. At the time, our only contractors were primarily overseas, in Europe and Korea. As Soldiers, we were still the primary "wrenchers," with a small contract team assisting our multiple phases in our high-flight time; 12 to 16 aircraft units. The general support aviation battalion was in its infancy, 9/11 hadn't happened yet, and the only units that I was aware of with flight companies and maintenance companies were the 160th–67Uniform–"U" stood for u do it all!

Post-Army, I took a short break from aviation, but I couldn't stay away. In 2006, I joined the RESET program at Fort Hood, and began to see how contractors have taken over maintenance. No fault to the Soldiers, as they are constantly predeploying and postdeploying, just to get right back to predeploying! I was blessed during my Army career, beginning as a private in a maintenance squad and being guided in the right direction. There was no shortage of work with the B Co 159th Aviation, Fort Campbell, Kentucky, with 32 CH-47 Bs, Cs, and Super Cs. We even had the job books back then! I've been trying to follow the Army Mission Training Plan transition but being in the position I am, I only get feedback from the Army National Guard Soldiers as they come through their training. It will work if it is supported from the senior leadership down to the technicians.

I do like the "Boot Camp" idea, and I sure would enjoy being a part of it. I used to spar with my Command Sergeant Major while I was in Korea and my Sergeants Time topics. I was mentoring, guiding, and training my shop of technical inspectors, but for me to hold a Sergeants Time day of historical records and hands-on special tools was taboo. Anyone remember J - G (or) H + E = K? I agreed with and supported the Soldier tasks, but all I asked for was once a month technical training. I wasn't trying to pull teeth! I got my once a month, but the scrutiny did follow.

As I train the Army National Guard Soldiers from all over the states, I am truly impressed with what I am seeing. Most of them don't have contract support, and the full-time technicians remind me of me back in my day. Even most of the part-timers have shown the desire to work, and their technical knowledge base surprises me.

I do hope the noncommissioned officer leadership out in the units embrace the Aviation Maintenance Training Program (TC 3-04.71), Army Aviation Maintenance (ATP 3-04.7), and provide their subordinates with the training they need. It's a dangerous field we are in, and too much can go wrong without the proper support and leadership.

Michael Ward
Academic Instructor
EAATS
Special Applications Group (SAG)

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Letters to the Editor

I appreciate CW5 Zabko's response to my article published in the January-March 2020 issue of *Aviation Digest* titled, "Reinventing the Warrant Officer Professional Military Education Wheel." My article was intended to ruffle some feathers and generate discussion. At least on the first point, it succeeded. I was intentionally vague in some areas. A 5-page article on a complex subject doesn't lend itself to in-depth analysis of every point. Similarly, I used some terms such as "O-grade" in the interest of brevity and which I believe the target audience understood. My bad if that's not the case. I became aware of some of the changes to AWOAC prior to my article being published and considered pulling it. But the main points remained true.

We were told by the cadre at WOILE that the course was designed as an abbreviated version of ILE. If that's not true, then the cadre, some of whom designed the course, doesn't understand its origins, which seems unlikely. In fact, the course name was changed from the senior course to WOILE to drive that point home.

The lengthy paragraph discussing PCs shows a fundamental lack of knowledge about the reserve component. Regulations may well say that COMPO 2 and 3 aviators have the same requirements and "should" do several things, but the reality of the situation dictates otherwise. A part-time aviator cannot realistically be expected to reach PC status in the same timeframe as a full-timer. I cannot emphasize this enough, COMPO 2 and 3 pilots should not be put in a situation that their promotion depends on making PC and attending a tracked course as a prerequisite for AWOAC.

Regarding talent management, of course there are means out there to incorporate this, such as the student evaluation on the DA 1059. My point was that these things aren't being used to help inform important decisions such as OERs, promotions, and job assignments. There is a lot of potential here that is untapped, both in terms of how these data can be used and in putting our people in the best positions.

The assertion that a post-graduate flying course similar to the USMC's WTI has benefits that do not outweigh the costs is dubious at best and contradicts evidence compiled by all the other armed services. No, I don't know how much it would cost, and I don't think anyone else does either because a true cost-benefit analysis hasn't been accomplished. In terms of effectiveness, the Navy has gone a step further and now has WTI courses for surface warfare officers, in addition to every airframe. That's the model we should be looking at, not how to reduce institutional training because of a belief that we are spending too much money.

In the end, hopefully, we all want the same thing. Professional military education should be sought after, not just a check-the-block event. Commanders should look forward to sending their people to PME because they know they'll get back a better-trained aviator who can pass that knowledge on to the rest of the unit. And just as importantly, the training needs to constantly evolve.

Respectfully,
CW4 Charles J. Boehler
UH-60 SP/IE
NMARNG

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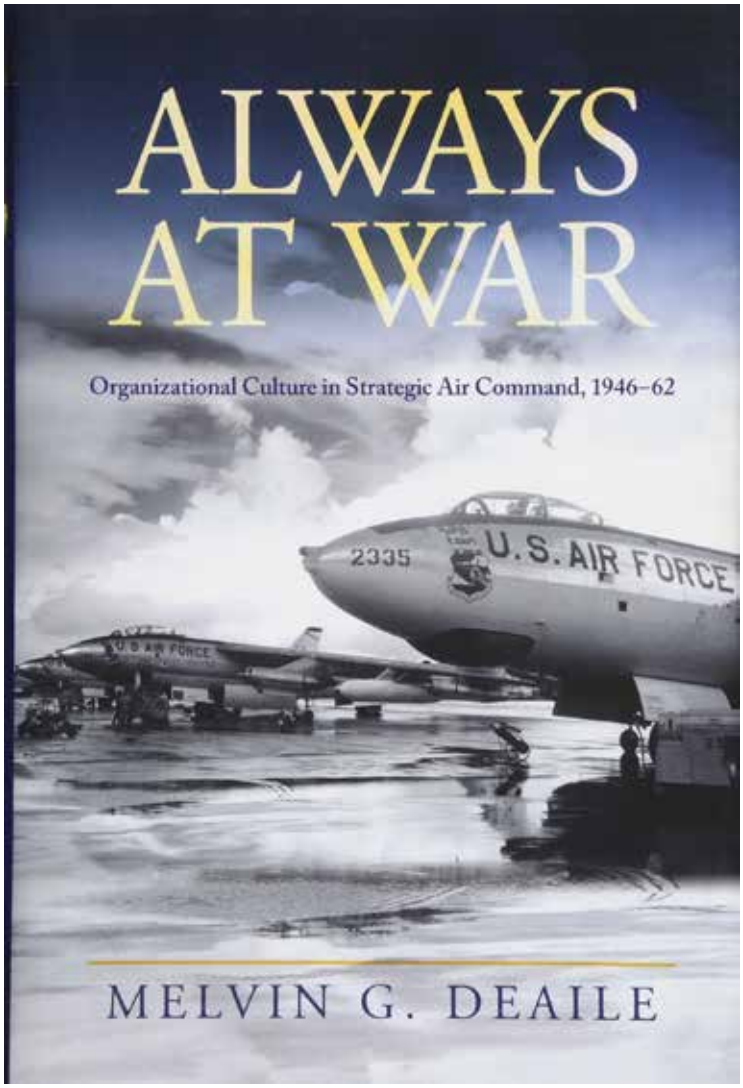
Always at War: Organizational Culture in Strategic Air Command, 1946–62

By Melvin G. Deaile, Naval Institute Press, 2018, 296 pages

A book review by CW4 Leonard Momeny

Professional reading does not have to be dry in nature. In fact, professional reading can be both relatable and exciting. Many would say that such books are, at times, few and far between; however, Melvin G. Deaile's *Always at War* excels in its ability to provide both a compelling read and practical points of application for any Army aviation leader or aspiring leader.



Always at War is a unique book that focuses on the organizational history of the Air Force Strategic Air Command, or SAC. This work specifically analyzes the period of SAC's inception all the way to a key moment before the Cuban Missile Crisis. While historic in context, the book tends to maintain a focus on the real strength of SAC, its critical organizational culture and dynamic leadership. Though the history is interesting, it is the analysis of the SAC leadership, the development of an aviation-centric organizational culture from the ground up, and the ability of the organization to evolve with tremendous utilization rates in an ever-changing national security scenario that keeps the reader hooked.

Deaile tends to write about two things. The first is the evolution of an organizational culture that proved pivotal to SAC and its development as a meaningful arm of the nation's greater force projection. The other item receiving a great deal of attention in Deaile's writing would be the leadership of Air Force General, Curtis Lemay. Lemay may be a familiar name to most senior readers, as the Lemay Center is a focal point for tactics instruction at Maxwell Air Force Base. Lemay is recalled as an independent thinker who had a vision for establishing critical components of team, culture, and environment necessary to equip an organization to do the impossible. The impossible goal for SAC was described by Deaile as establishing the relevance of strategic bombing as a means to defeat any enemy. This is a thought many were interested in exploring as the Air Force was still in its infancy and looking to establish relevancy as an equal member in the Defense Department.

Deaile prefaces the in-depth study of SAC's historic evolution by first exploring the unique facets of what he describes as the foundation of pilot culture. The evolution of pilot culture allows the reader to first be acquainted with the uniqueness of the underlying personalities that would form SAC. This is an important first step by the author as it allows the reader to understand

purpose for the tactics, standardization efforts, and training that General Lemay would employ in each of his organizations, specifically focusing on SAC. After all, Lemay himself was both a leader and a pilot, and he ensured that both he and his subordinate commanders never lost their technical edge for flight, thereby staying fully grounded within the culture they sought to cultivate.

The success of SAC begins in the European and later Pacific theaters of World War II. The shared experiences of Lemay and his subordinate commanders from that time laid a foundational groundwork that would later inform the creation of an organizational culture that would last well beyond their time within SAC. The relevance of this shared experience is that it was created in moments of success while at war across multiple theaters. Lemay knew this from the very beginning and quickly put SAC on a war time footing. The premise was that post-World War II SAC had to realize that they were not training for the next war, they were at war now. Lemay knew this was the only way to ensure the Air Force could provide strategic bombing as a reasonable form of deterrent. Strategic Air Command could not afford to wait for the next war to come and then train up all elements in preparation to meet another global power in combat. Instead, SAC had to be ready now, and strategic readiness required the right culture, standardization, and preparedness.

Throughout SAC's evolution it is obvious that Lemay's influence was everywhere, as he took a holistic approach to organizational development and refinement. Deaile points out that Lemay looked to influence every aspect of SAC life: A must for any leader who wants to create a lasting culture. However, it is a credit to Deaile that he leaves no stone unturned in this work, and while SAC was an incredible organization, Deaile points out that high-performance organizations take a toll on families that support their members. Lemay worked to address this challenge as well, increasing opportunities and involvement for both spouses and family members. Deaile makes it clear that Lemay did not have on blinders, but instead fully understood every element of organizational environment would somehow contribute to the perceived total quality and impact of his leadership efforts.

Practical application of this book's information is tailored to assist Army aviation leaders in their ability to negotiate the challenges of current high utilization rates and the need to evolve with respect to large-scale combat operations. The problem set is similar, and Deaile runs through the challenges SAC faced in tremendous detail. Aviation, as a branch, is making strides to develop similar artifacts and results as those seen in the development of SAC. From new standard operating procedures to refined focus on more realistic training, aviation as a branch is striving toward similar metrics of success that Lemay and SAC experienced over 50 years ago. It is because of these similarities that *Always at War* should be mandatory reading for students at the Aviation Warrant Officer Advanced Course, the Captain's Career Course, Command General Staff College, and the Pre-Command Course. This book will simply resonate with leaders and aspiring leaders at any level in Army aviation, and promises to provide both inspiration and greater perspective to every reader.

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January–March 2021 articles due December 1, 2020
(magazine published on or about February 15, 2021)

Focus Topic: Multinational Interoperability and Large-Scale Combat Operations
April–June 2021 articles due March 1, 2021 (magazine published on or about May 15, 2021)

Along with articles corresponding to the listed focus topics, the Digest is always receptive to letters to the editor, leadership articles, professional book reviews, anything dealing with the aviation 7-core competencies, training center rotation preparation, and other aviation-related articles.

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