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Aviation Training Strategy

Table of Contents

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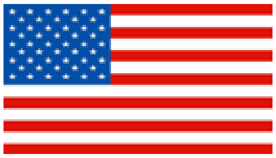

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The Doctrine Division, Directorate of Training and Doctrine (DOTD), U.S. Army Aviation Center of Excellence (USAACE), Fort Rucker, AL 36362 produces the *Aviation Digest* quarterly for the professional exchange of information related to all issues pertaining to Army Aviation. The articles presented here contain the opinion and experiences of the authors and should not be construed as approved Army policy or doctrine.

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About the Cover:

A U.S. Army AH-64D Apache Longbow helicopter lands in a dusty environment during the 1st Air Cavalry Brigade, 1st Cavalry Division's Combined High Altitude Training Strategy at Fort Bliss, Texas, June 7, 2012. Photo by SSG Christopher Calvert

The Command Corner

First, I would like to wish you all a very Happy New Year. Last year was another high tempo year for Army Aviation as we saw tremendous utilization across a multitude of operational environments, both combat and humanitarian. This past year also began a doctrinal pivot that featured the release of many new publications (such as the ***Army Aviation Handbook and Army Aviation Maintenance Standard Operating Procedure***), Training Support Packages (hoist, low-level), and the launch of the Aviation Warfighter Initiative (AWI). However, it's important to note that it was you, the Aviation Soldier, who made 2018 so incredibly successful, and I would like to extend a personal thank you on behalf of the entire USAACE Command Team for such tremendous efforts. Well done, but now it's time to turn our attention to the coming challenges.

With the recent release of TRADOC Pamphlet 525-3-1, ***U.S. Army Multi-Domain Operations 2028***, we must give it careful consideration with respect to aviation training currently being executed and in the crafting of future training strategies. How are your formations currently addressing MDO challenges with respect to operations in Denied, Degraded, and Disrupted Space Operational Environments (D3SOE) or the Cyber Domain? Aviation training for the next fight is not easy, but I am certain that some of these questions will help stimulate new thoughts and approaches to future training.

This month's issue of ***Aviation Digest*** is sure to provide some excellent food for thought with regard to your own future training. If you currently have no idea where to turn to begin, you may want to start with "Primer for Company-Level Collective Training" or if you have thoughts about future aviation training, I recommend the article, "Building Tomorrow's Training Environment." Finally, I would like to congratulate the Authors of the Year for the 2018 winning article, "Enhancing Warfighter Focus: Aviation Branch's In-Stride Shift to LSCO." As you read these articles, hopefully they will spark a great idea for you to write and share through this venue; I encourage you to do so as we need your knowledge, experiences, and ideas in order to move forward with another successful year for Army Aviation.

As always, Above the Best!

William K. Gayler
Major General, USA
Commanding

Aviation DIGEST

contents

Photo by CPT Travis Mueller

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6-6 Cavalry Heavy Attack Reconnaissance Squadron Aviation Maintenance Program

By CW2 Everett E. Colby, III

Aviation maintenance support has never been more critical than in today's operating environment where personnel and aircraft remain in high demand due to high operating tempo (OPTEMPO). Today's technically complex aircraft demand equally experienced aircraft maintainers and maintenance managers. When establishing the AH-64 Aviation Maintenance Program in the 6-6 Cavalry (CAV) Heavy Attack Reconnaissance Squadron (HARS), leaders discussed several factors regarding the direction in which the unit would obtain the most success and gain the most experience in the shortest amount of time, setting the conditions for the upcoming Korean rotation. The main factors contributing to the success of the 6-6 CAV AH-64 maintenance program were the unit's ability to implement and change the cultural perception and archaic approach to AH-64 aviation maintenance practices, establish a regimen of standardized maintenance, and hold Soldiers and leaders accountable for their actions at all levels.

Army Technique Publication (ATP) 3-04.07 states, "The ability of an aviation unit to perform its wartime mission is numerically represented by its aircraft operational readiness rates. Higher operational readiness rates are a direct result of effective maintenance and logistics management by all aviation maintenance commanders/leaders, officers, technicians, and noncommissioned officers in charge (NCOICs)" (Department of the Army [DA], 2017).

During the 6-6 CAV's Korean rotation, the success of the maintenance program produced statistically superior results directly contributing to the overall holistic success of the 2nd Combat Avia-

U.S. Soldiers with 1st Battalion, 3rd Aviation Regiment (Attack Reconnaissance), 12th Combat Aviation Brigade, conduct routine maintenance on an AH-64 Apache helicopter on Sept. 20, 2018, at Katterbach Army Airfield in Ansbach, Germany. (U.S. Army photo by Charles Rosemond)

photo by Charles Rosemond

Back to Table of Contents

tion Brigade's (CAB's) mission on the Korean peninsula. In a 9-month period, the 6-6 CAV flew more than 4,200 flight hours, surpassing the tenant AH-64 unit by more than 1,000 hours—averaging 471 hours per month and maintaining an 83.8 % Operational Readiness (OR) rate and an 81% Fully Mission Capable (FMC) rate—despite being at 81% Modification Table of Organizational Equipment (MTOE) strength for the duration of the deployment. During fiscal year 2018, the 6-6 CAV maintained the highest OR rate in United States Army Forces Command (FORSCOM) 3 out of 9 reportable months. The 6-6 CAV increased its squadron bank time from 47% to 60% by completing 10 AH-64 500-hour phases in 9 months, while simultaneously increasing OPTEMPO flight hours from 270 hours to 550-plus hours per month, surpassing the combat power goals directed by the brigade commander of 54% to 56%. Five of the phases completed during the rotation were D troop organic phases completed at or below the FORSCOM phase goal of 26 days, earning Army Materiel & Mission Command recognition several times.

APPROACH

The main key to success of the 6-6 CAV aviation maintenance program was changing the cultural perception of the unit and approach to AH-64 aviation maintenance practices. Aggressive maintenance managers must continually look for ways to improve, plan, organize, direct, and control the maintenance activities of their units. A systemic problem in aviation maintenance is that major maintenance events are not approached from a project management perspective, which contributes directly to prolonged lead times and an excessive loss of time management during these events. Many maintenance organizations approach maintenance events from a linear perspective, and their rigidity makes their systems and processes unable to adapt rapidly to unforseen unscheduled maintenance in their plans of action. Maintenance managers should adjust and implement contingency maintenance plans in premission P4T3 (P4-Problem People, Parts, and Plan; and T3-Time, Tools, and Training) in order to meet acceptable timelines. Inability to adapt rapidly results in increased timelines, further reducing a unit's combat readiness.

One of the biggest hurdles in forming the 6-6 CAV's AH-64 maintenance program was establishing precise timelines and efficient processes to allow our maintenance teams to meet their prescribed goals. For example, one of the biggest challenges in the AH-64 community is meeting the FORSCOM goal of 26 working days for a 500-hour phase. From the inception of our maintenance program, we identified exactly what a 26 working day phase entailed and then built our maintenance phase team, identifying work stoppage points and "Go Home" criteria, overall streamlining the maintenance execution plan to accomplish daily and weekly non-negotiable benchmarks. Education and a broader understanding by maintenance leaders at all levels about the importance of combat readiness and how their maintenance decisions impact that readiness was paramount in the success of establishing an aggressive maintenance program.

It was apparent that this Lean Six Sigma-style approach to maintenance management was applicable for all of our scheduled and unscheduled inspections and maintenance events. An audacious and well-balanced maintenance program allowed the 6-6 CAV to increase its monthly flying hours by almost 200% prior to deployment, enabling the accomplishment of several needed aerial gunneries at home station and Joint Readiness Training Center (JRTC) for pilot progressions.

Additionally, by identifying a recurring systematic approach to scheduled maintenance inspections, we were able to accurately forcast a real demand analysis of our shop stock parts, which ultimately allowed us to reduce the number of prescribed load list (PLL) items from 520 lines to 324. This reduction in PLL saved the unit hundreds of thousands of dollars in the process, reduced the overall footprint of the 6-6 CAV technical supply section, and enhanced our Care of Supplies in Storage (COSIS) efficiency.

PRODUCTION CONTROL/ AVIATION MATERIEL OFFICER

The Production Control (PC) officer is the principal maintenance manager-coordinator in the aviation maintenance troop and coordinates maintenance and sustainment actions at the troop and squadron levels. The aviation maintenance unit commander selects the PC OIC based on skills, qualifications, experience, and leadership abilities. In the establishment of the 6-6 CAV HARS maintenance program, the squadron commander, understanding the need for a cultural shift in maintenance practices as the squadron was establishing itself primarily with reclassified OH-58 pilots and maintainers, selected a 151A maintenance technician with a UH-60 background as the PC OIC and a Senior OH-58 previous maintenance examiner (ME) as the Aviation Materiel Officer (AMO). By selecting nontraditional personnel for these roles, the squadron established its own unique identity and cast aside the traditional AH-64 approach to maintenance culture, adopting a more encompassing aviation maintenance approach. The squadron established this specifically by incorporating lessons learned from a broader perspective of various airframe experience to better establish a well-rounded maintenance program derived from empowering maintenance managers and drawing on vast diverse backgrounds as opposed to "that's the way we have always done it" mentality.

Readiness. Aircraft readiness is the primary mission of all aviation

Back to Table of Contents

maintenance and logistics support personnel. As per ATP 3-04.07:

OR rates and RTL [restricted target list] data provide a quantifiable status for immediate planning, trend analysis and operations. Maintenance leaders synchronize OR rates and RTL to provide commander's [sic] with a representation of the maximum sustainable combat power generated with available maintenance personnel and resources. Units reporting high OR/RTL rates, but not supporting high operational requirements, may mask inadequate combat power generation. Units executing high flight hours against strong OR/RTL rates while sustaining or improving bank time ensure flexibility, predictability, and combat power generation (DA, 2017).

Our primary focus in the 6-6 CAV PC shop was combat power generation through upfront aggressive maintenance practices and nontraditional logistical support to our maintenance teams. Our plan for aggressive maintenance practices was to empower our NCOs at the lowest levels by tasking them with postions of greater responsibilty (e.g., phase team leaders, downed aircraft recovery team NCOs and PC NCOIC), all while mentoring them through a hands-on approach in a crawl-walk-run methodology. This approach to mentorship has given us the ability to cut down our not mission capable (NMC) maintenance time by roughly 50% and allowed us to multitask our maintenance troop onto several major tasks simultaneously.

A major ineffective practice that tends to plague some organizations is a maintenance leader's tendency to delegate to a junior NCO/Soldier a task with which that leader is not confident in performing independently. We identified this misstep and ensured we tasked the right leader to the right task in order to build confidence in the junior NCO/Soldiers until they could properly execute these tasks autonomously.

Maintenance Standardization. A shortcoming we identified was in our maintenance logistical support (i.e., long lead times in the supply system), which induced high NMC supply time. Our solution to this dilemma was to revamp and systematically organize our standard operating procedure (SOP) in the way we not only track and order parts, but how we maintain and utilize our parts. Using third-party systems that supplement the Army's Global Combat Support System (GCSS-A), such as IGC (Integrated Data Environment/Global Transition Network Convergence), United States Transportation Command (TRANSCOM), and Logistics Information Warehouse (LIW), Logistics Support Activity (LOGSA), we could identify instantaneously not only where and how many parts were located in the system, but also the previous units that ordered the part with quantity and priority. Having this information available, we could then contact these units directly (PC to PC) and reach out for support by either using an offline request, routing identifier code (RIC) to RIC, official mail, or in some cases, FedEx®/DHL shipping from unit funds.

Additionally, these same third-party programs also allowed us the ability to track real-time movement itineraries, flight manifests, and third-party transportation movements. Understanding how the parts ordering process works directly contributed to our success by allowing us to manipulate the supply system legally through priority designators, engage our Logistical Assistance Reps (LARs), and contact item managers personally. Aggressively utilizing the logistical supply system and adapting our processes to make it work for our maintenace program was the paramount piece to circumventing prolonged downtime on our aircraft caused by supply purposes.

Accountability. Supervision is an ongoing process and accomplished throughout every level of maintenance. Section sergeants are responsible for the direct supervision of maintenance personnel who are performing specific jobs or repairs. Additional technical supervision is provided by technical inspectors and aviation maintenance officers. From the onset of our maintenance program, we established "Verbal Contracts" and "Go Home Criteria" with flight troops and maintenance platoons made in the daily PC meeting. With the backing of troop commanders and the squadron leadership, we held the troops and platoons stringently accountable

U.S. Soldiers assigned to Company D, 1st Battalion, 3rd Aviation Regiment (Attack Reconnaissance) conduct 500 hours phase maintenance on an AH-64 Apache helicopter at Katterbach Army Airfield, Germany, Sept. 20, 2018. Phase maintenance inspections occur at regular intervals on all aircraft in order to keep them operational. (U.S. Army photo by Charles Rosemond)

Back to Table of Contents

SGT Ryan Perea and PFC Javane Moulton assigned to Task Force Viper 1st Battalion, 3rd Aviation Regiment, 12th Combat Aviation Brigade conduct maintenance on an AH-64 Apache helicopter during Saber Strike 18 exercises at Bemowo Piskie Training Area in Orzysz, Poland, June 14, 2018. (U.S. Army photo by Visual Information Specialist Eugen Warkentin)

for their timelines and maintenance progress.

This culture of accountability allowed us and them to hone in and streamline our processes in order to make their sections more efficient. Without accountability, there is no forcing mechanism to make line and maintenance troops better. From the onset of aviation restructuring initiative maintenance support through the last phase of our deployment, we continuously looked inward as an organization to streamline and adapt our process to be more efficient and set new bars of success for our organization as a whole (e.g., Phase maintenance plans, 24-hour shifts, several AH-64 aviation safety action messages [ASAMs] and safety-of flights [SOFs], and daily strap pack inspections). The requirements brought on by the various SOFs and subsequent battle drill exercises did not delay our readiness and proficiency as we developed our own squadron tactics, techniques, and procedures (TTPs) to adapt to the everchanging enviroment and maintain our effectiveness and ready-to-launch capabilities.

PERSONNEL

Flight Troops. As per ATP 3-04.07, "...[Flight] troop maintenance activities primarily focus on field level maintenance to include operational inspections (preflight, post flight, and daily), scheduled and unscheduled maintenance within the unit's capabilities. Allowing unit maintainers a degree of ownership in their assigned aircraft will enhance the quality and standards of maintenance performed, thus improving overall unit readiness" (DA, 2017). The key word we derived and enforced from this statement was OWNERSHIP. In order for the squadron to be successful in our future endeavors, it required the flight troops to unequivocally "buy in" on the greater cause and look "up and out" as to the impact of their maintenance and flight planning decisions.

The CAV culture played an important aspect in this ownership mentality as the line troops continuously worked together toward a common objective, achieving overall success of our squadron commander's end state. A technique we incorporated into the successful maintenance culture of the flight troops was backfilling them with our best maintainers from the maintenance platoon, giving younger Soldiers the urge to become better and move up in the hierarchy. Another key technique to the "up and out" approach was requiring platoon leaders to regularly attend PC meetings and consistently teach them the various aspects of aviation maintenance and why it is important to them as future commanders (e.g., bank time/phase flow equating into combat power, RTL criteria, and the importance of understanding/planning maintenance inspections with flight scheduling).

Flight troops regularly shared aircraft to assist with the squadron phase flow and scheduled maintenance tracker. Line troops' maintenance test pilots (MTPs) were at no point exclusive to their organic troops, and actively assisted each other by incorporating their own day/night shifts to cover down on the squadron's 24-hour operations. This allowed maintainers the flexibility to Maintenance Operational Check (MOC)/Maintenance Test Flight (MTF) their aircraft as they came up, not when a certain MTP was available. The higher echelon understanding by the MTPs played an integral part to our success as a squadron in Korea.

Maintenance Troop. The primary mission of the maintenance troop is to create combat power in support of the squadron mission. The maintenance troop conducts phase maintenance, troubleshoots airframe and component malfunctions, performs maintenance and repair actions, removes and replaces aircraft components, and performs MTFs and MOCs.

One of the ways the 6-6 CAV was most successful with its maintenance program at the troop level was by empowering, training, and establishing predictable, but aggressive, daily benchmarks. Five of the phases completed during the rotation were D troop organic phases completed at or below the FORSCOM phase goal of 26 days. During each of the 5 phases, D troop trained a different phase team leader, greatly enhancing our maintenance capabilities and expanding our flexibility to conduct split base operations. Investment in the Quality Control (QC) shop and empowering them to make the tough, right decisions was critical in the movement forward of our maintenance program, especially with significant ASAMs and SOFs currently plaguing the Apache community.

A major hurdle that we overcame as a learning organization was getting the midgrade NCOs to understand that they have to back plan and acknowledge that details, Army Regulation (AR) 350-1, "Army Training and Leader Development" training (DA, 2017), and maintenance requirements are all equally vital to the day-to-day operations of the unit. Realistic expectations, open dialogue with 1SGs, and PC allow all three of those missions to be accomplished without fail. Empowerment of the NCO/corps to think outside the box and come up with the solution was key to unimpeded success as a maintenance organization.

A major objective that we set out to accomplish utilizing the maintenance troop was to minimize the usage of 'Blue Suit' maintenance support for all unscheduled maintenance and rely on them solely for additional phase maintenance support, primarily giving us the ability to concurrently run overlapping phases and maintain scheduled and unscheduled maintenance 'Green Suit' teams. This task organization exposed our teams to several unscheduled maintenance events of varying difficulty. These events helped institutionalize proper planning, interpretation of the Interactive Electronic Technical Manuals (IETMs) and 204-series manuals, and showcased the role of direct supervision by maintenance managers, enabling success at all levels. This "return to your roots" movement is the cultural maintenance shift that makes D troop, 6-6 CAV, a premier field-level maintenance organization in United States Army Aviation.

SUGGESTED IMPROVEMENTS

Maintenance management improvements I would recommend to better the capabilities of any CAB are to invest in its respective Aviation Support Battalions (ASBs), adjust MTOEs to reflect a specific unit's requirement (since not every unit has the same mission set), and enhance communication efficiency between squadron/battalion, brigade, and division maintenance teams. The potential for the ASBs to be more of an integral force multiplier to the line battalions and squadrons is completely within reach of any CAB with minor adjustments to their maintenance culture and practices.

Some of the issues that currently plague many ASBs are their lack of urgency, maintenance prioritization and logistical support in the form of PLL, and budget. A common understanding by the ASB's PC section and supply support activity is that their maintenance programs directly affect a line battalion's combat readiness and effectiveness. Simply, ASB PC has to be held accountable for long lead times and better establishment of their processes to be an effective solution for any line battalion/squadron. The ASB in the CAB should be the "Center of Gravity" for strategic maintenance operations.

In many locations, authorized stockage list (ASL) reviews are not being properly conducted by accountability officers, thus leading to prolonged lead times on PLL parts units are showing a demand for in accordance with AR 710-2, "Supply Policy Below the National Level" (DA, 2008). Additionally, a common issue in a majority of supply support activities (SSAs) is COSIS, lack of oversight with command supply discipline (CDSP), and the ever enduring battle with corrosion.

This common issue puts a strain on line battalions/squadrons because they are forced to close out document numbers upon receipt of these components and fill out supply discrepancy reports to recoup class IX funds. This could take months, all the while still incurring additional downtime and gross overspending of our budgets due to the reordering of major components. The solution to this epidemic is more of a precedence of the ASB QC shop performing corrosion inspections on parts within the SSA before they are purchased by a line unit. Adjusting the ASB's budget to allow them to establish a better technical supply

Back to Table of Contents

section would greatly enhance the CAB's ability to operate in separate locations and accelerate the timeliness of the ASB's phase support. Having an ASB with the capability to build predetermined maintenance packages to support line battalions/squadrons would reduce the burdens and budgets of many CABs.

This would free line battalions/squadrons from carrying additional lines of PLL that they do not show a demand for, and in turn, reduce readiness timelines of the CAB by requiring a deploying battalion/squadron the need to only inventory and sign for a preestablished package designed for Contingency Operations/National Training Center/JRTC in lieu of sacrificing from their current maintenance posture and readiness. Simply, this would be a package modeled after a performance-based logistics window but controlled by the ASB.

Communication between battalion/squadrons and brigade maintenance managers needs to improve drastically. We are wasting numerous man-hours submitting, revising, and reviewing memo after memo because of inconsistencies in SOPs not specifically defined in division, brigade, and battalion SOPs (e.g., purge memos to remove items from a unit's overaged repairables item list, or clear-cut guidance of the transfer of aircraft). The lack of understanding of publications and regulations in which we are supposed to defer to in the absence of clear guidance in an SOP is in most cases overlooked or scrutinized to essentially "kick the can" until the unit either resubmits or loses out due to self-imposed timeframes.

CONCLUSION

Aviation maintenance is very complex and unlike any other type of combat service support organization. Aviation maintainers must be able to empower and resource the aviation force as it is designed to fight, not as it is organized for command and control.

The 6-6 CAV's AH-64 maintenance program was successful during deployment because the unit was willing and able to implement and change cultural perceptions and approaches to AH-64 aviation maintenance practices, establish a standardized maintenance regimen, and hold Soldiers and leaders accountable for their actions at all levels.

Investment in the QC shop and empowering personnel to make the tough, right decisions was critical in the movement forward of the unit maintenance program. Ultimately, allowing unit maintainers a degree of ownership in their assigned aircraft enhanced the quality and standards of maintenance performed, thus improving overall unit readiness and allowing the 6-6 CAV to be highly successful during its Korean rotational deployment.

CW2 Everett Colby is a 151A Aviation Maintenance Technician and currently serves as a Maintenance Platoon Leader in D Co. 3rd Battalion 160th SOAR (A), Savannah, Georgia. Ed was the Production Control Officer for 6-6 Cavalry Heavy Attack Reconnaissance Squadron (H-ARS), 10th CAB while participating in a 9-month rotational deployment to the Republic of South Korea. His prior assignments include Army Europe, Hunter Army Airfield, JMRC, Germany, Fort Eustis, Wheeler Army Airfield, and Fort Drum. He holds a Bachelor of Science degree from Liberty University. He also holds a Master's Degree in Education and History.

U.S. Soldiers with 1st Battalion, 3rd Aviation Regiment (Attack Reconnaissance), 12th Combat Aviation Brigade, conduct routine maintenance on an AH-64 Apache helicopter on Sept. 20, 2018, at Katterbach Army Airfield in Ansbach, Germany. (U.S. Army photo by Charles Rosemond)

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A primer for company-level collective training at Home Station

By CPT James R. Duffy, Jr.

photo by CPT James R. Duffy, Jr.

Whenever a unit leaves the National Training Center, a "snapshot in time" assessment is given on the mission-essential tasks observed by the observer, coach, trainers (OC/Ts) to the company. This mission-essential task list (METL) assessment is not meant to "grade" the company; however, it is meant as a guide to focus them on

Back to Table of Contents

specific areas during collective training at home station. What does company-level collective training at home station look like? I would venture to guess the majority of company commanders leaving the National Training Center either don't know, or they have a vision but are unsure where to start.

As a whole, Army Aviation does a very poor job of collective training at home station due to reasons such as perceived lack of resources, high operating tempo (OPTEMPO), propensity to conduct easy cross-country training, or a myriad of other reasons. We cannot be afraid to conduct multiship platoon or higher level missions on a weekly basis. This type of training will not have as many mission lines on the flight schedule but will be more effective training while utilizing the same amount of blade hours. With this guide, company commanders can hopefully have an initial framework and basis on how to form their collective training at home station. First, we must understand some of the fundamental aspects of collective training.

Aviation Collective Training Is No Different Than Any Other Branch

Commanders are responsible for training units and developing leaders. Commanders exercise this authority through formal and informal chains, assisted by other officers and noncommissioned officers, and through the development and execution of progressive, challenging, and realistic training (Department of the Army [DA], 2018). Commanders are responsible for ensuring their units are capable of performing their mission. Commanders cannot delegate this responsibility. They focus the unit's efforts to optimize available time, ensuring their units train the right tasks to meet mission requirements and support the next higher commander's intent (DA, 2018). What does this mean for an aviation company commander? The company commander must take a step back from leading his formation in a tactical sense and assume the role of evaluator. This role begins with the development of the unit training plan (UTP). The company, in conjunction with the battalion, must not focus simply on making the quarterly training brief slides look pretty, but instead discuss which mission-essential tasks will be trained in the next quarter. This includes the addition of other training events such as mandatory training, predeployment training, and installation support on the UTP (DA, 2018). This will provide the company commander with the complete view of all training scheduled and will help the company commander to prioritize lines of effort. The UTP should be written in a five-paragraph format that psychologically helps to codify the contract between the battalion and company. As the UTP is executed, unit commanders at all levels have a responsibility to minimize training distractions. A major training distractor occurs when the higher headquarters levies tasking requirements to subordinate units after training plans are approved and published (DA, 2018). This is inevitable; however, company commanders need to creatively work through problems and annotate the effects it will have on their formation, to include notating and keeping track of planned training that was not conducted due to these training distractors.

The first step in improving the company's collective training program after the establishment of the UTP begins with the flight schedule. One of the many jobs of the platoon leaders is to create the company's flight schedule. Too often, the flight schedule is filled with broad terms under the mission such as continuation training, readiness level (RL) 2-1, etc. The company commander must guide the platoon leader and company standardization pilot on the focus of collective training. The mission on the flight schedule must clearly define the mission-essential task and supporting collective task (SCT) to be trained during that flight. For example, Aerial Reconnaissance Mission: Operate within Airspace Coordination Measures. If the commander wants to focus on area reconnaissance or zone reconnaissance, that discretion is up to him. This all must be nested within the battalion commander's focus for training and intent that was previously codified in the UTP. The flight schedule meeting is an important touchpoint in the commander-to-commander dialogue that is too often delegated to the company instructor pilots (IPs) or platoon leaders to brief. The flight schedule approval process should act in conjunction with the battalion training meeting, not as a completely distinct and separate function. This further forces commanders at all echelons to properly plan and resource training, not rely on short-term execution.

Mission Binder: Quick and Efficient Training Management Program

There can be multiple collective training missions on a weekly basis. In order to increase throughput and expedite training, the company commander should create an off-the-shelf binder that the air mission commander (AMC) can reference to find the particular mission he is supposed to conduct. This binder should include all the relevant products required to begin mission planning, which will require some work on the front end by the company commander. The art of writing an operations order (OPORD) seems to have been lost on company commanders. The company commander needs to display a basic level of art and creativity necessary in executing the company training plan. The commander must write OPORDs for each of the missions he wishes to train under each mission-essential

Back to Table of Contents

task. For example, if he wants to train Aerial Reconnaissance Missions, he would have one OPORD for area reconnaissance, another for zone reconnaissance, and so forth. This binder would be tabbed out starting with the mission-essential task and then the sub-missions for each. This binder will pay huge dividends once it is implemented. This is not an endeavor a company commander needs to take on his own. He should get creative and employ the battalion staff, especially the intelligence officer (S2), to help develop the scenario and include any annexes/appendices, as appropriate.


photo by CPT James R. Duffy, Jr.

Once the flight schedule is approved, the designated AMC knows where to start. He can go directly to the mission binder and begin the troop leading procedures based on the included OPORDs. At this point, the AMC would conduct a confirmation brief with the company commander to ensure his azimuth is correct. Once the confirmation brief is complete, the platoon/company should split into mission planning cells based on Army Techniques Publication (ATP) 3-04.1, "Aviation Tactical Employment," Appendix C, Section II (DA, 2016) and begin their work. This approach requires time and effort from everyone involved. Gone are the days you show up to a team brief, ask what we are doing, and begin preflight. Every single person in the platoon or company should be gainfully employed in mission planning, just as if they were under the watchful eye of an OC/T at the National Training Center. Instead, they are under the watchful eye of their company commander, but with a little added flexibility of not being as time constrained. Inevitably, there will be numerous competing priorities such as equipment turn in, ranges, etc. It is the job of the company commander to identify these requirements early and specify them in the UTP. This allows the commander to effectively prioritize lines of effort, and most importantly, protect precious training time. The output of the mission planning should be an air mission brief in accordance with ATP 3-04.1, Appendix C, Section III (DA, 2016).

One of the most overlooked aspects of collective training, especially at home station, is the rehearsal. Rehearsals allow leaders and their Soldiers to practice key aspects of the concept of operations. These actions help Soldiers orient themselves to their environment and other units before executing the operation. Rehearsals help Soldiers build a lasting mental picture of the sequence of key actions within the operation (DA, 2014). In order to develop muscle memory, the platoon/company should construct a terrain model and prepare for a terrain model rehearsal. An accurately constructed terrain model helps subordinate leaders visualize the commander's intent and concept of operations (DA, 2014). It is crucial that all parts of the staff are present, most notably the S2, to brief the enemy forces. Often forgotten, the forward support company (FSC) and aviation maintenance company should be present for the rehearsal in order to understand their involvement in the operation. This further reinforces the point that the flight schedule should be discussed and approved at the battalion training meeting since these missions span multiple warfighting functions and companies to truly get after the collective training focus of not only that individual company, but the battalion as a whole.

Focus on Quality of Training; Not All Training Should be Live

Too often, we are focused in on aircraft live collective training at home station. Commanders must optimize the use of Training Aids, Devices, Simulators, and Simulations (TADSS) in training plans as an effective means to add realism to training, mitigate risk, and build low-cost competence prior to entering live training (U.S. Army Aviation Center of Excellence [AVNCoE], 2016).[1] The company commander must be present for all key aspects of the training and should understand the grading criteria of the training and evaluation outline (T&EO). The T&EO will objectively guide and provide a reference point for unit proficiency. A technique that could be utilized is the com-

[1]Document is available for registered users via Army Knowledge Online and requires a Common Access Card.

Back to Table of Contents

pany commander flying in a chase aircraft with the company standardization pilot. This provides expertise from not only the tactical maneuver, but also the standardization side of company training. If the training event does not achieve the desired outcome, or if inadequate personnel participated in the training event, commanders conduct retraining. Just executing a training event does not equate to task proficiency. If the unit failed to demonstrate the ability to proficiently execute the task to standard in accordance with (IAW) objective metrics contained in the T&EO, or if the appropriate number or percentage of authorized personnel required to conduct the task did not participate in the training, retraining must occur (AVNCoE, 2016).[2] An indepth and honest after action review (AAR) of the mission must occur immediately afterward and be recorded on paper. After action reviews are well-planned, resourced, and facilitated throughout the entire training process. Informal AARs also occur as training unfolds, with the best training ensuring that leaders identify faulty execution early enough in an event (i.e., during planning) to be corrected on the spot (DA, 2018).

One of the most important aspects of home station collective training is the process of recording the conducted training and creating a historical repository of that training. A system should be created to record the participation of individual aircrew members and the T&EO associated with the mission. One such system would be to create a second binder that essentially mimics the mission binder previously created. Each mission-essential task should have a spreadsheet with the names of pilots in the company showing the date the mission-essential task was performed and the resulting METL assessment. Additionally, a copy of the T&EO and a recorded AAR worksheet should be included in the binder so that the individual aircrews can use it as a reference for future mission execution (The digital training management system [DTMS] is a highly burdensome and unwieldy, but equally effective way of recording and storing training records).

Leaders, Not Managers

Training your company as a company commander is hard work and requires a lot of dedication to your craft. Training is the most important thing the Army does to prepare for operations. Training is the cornerstone of readiness, and readiness determines our Nation's ability to fight and win in a complex global environment. To achieve a high degree of readiness, the Army trains in the most efficient and effective manner possible. Realistic training with limited time and resources demands that commanders focus their unit training efforts to maximize training proficiency (DA, 2018). Aviation training is no different, but we have to get creative and understand the art of command, empower our subordinate leaders, and build our organizations. We must use the available time and training opportunities that are presented to us in order to maximize our lethality, even when presented with the easy way out. There is no doubt that what company commanders juggle on a daily basis is increasing and is impressive in its sheer volume. Company commanders are doing a great job preparing their formations to be "Ready Now," despite being pulled in a hundred different directions. Ultimately, with all the competing requirements, company commanders must guard themselves against becoming managers. We must lead our formations. Company commanders—stop sitting behind your desk, and get out and train your formations!

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photo by CPT James R. Duffy, Jr.

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Back to Table of Contents

BUILDING TOMORROW'S TRAINING ENVIRONMENT

By Mr. Wade Becnel

A Stryker vehicle commander interacts in real time with a Soldier avatar that is operated remotely from a collective trainer. The U.S. Army Research Laboratory, University of Southern California's Institute for Creative Technologies, the U.S. Army Combined Arms Center and the Program Executive Office for Simulation, Training, and Instrumentation are working together to develop a synthetic training environment that links augmented reality with live training—one of several U.S. Army Research, Development, and Engineering Command's efforts that link to the Army's modernization priorities. Photo courtesy of U.S. Army Acquisition Support Center.

The Army is currently pursuing multiple modernization efforts ranging from developing a new family of helicopters to the next-generation ground combat vehicles. The focus of the Army's modernization strategy is to make Soldiers and units more lethal and to reestablish our overmatch over any potential adversaries. This modernization process will leverage commercial innovations, cutting-edge science and technology, prototyping, and warfighter feedback (Office of the Chief of Public Affairs, 2018). Unique to this episode of Army modernization initiatives is the focused effort to address one of our key readiness enablers—training. I would argue that not since the introduction of the National Training Center (NTC) back in the early 1980s has there been this much Army senior leadership attention being placed on our training enablers and infrastructure. While over the last 15–20 years there have been incremental introductions of technological innovation into existing programs to enhance current training capabilities, there were no significant changes in our underlying approaches. Today's training modernization approach is significantly different in that the Army's acquisition approach is actively seeking disruptive technologies (Bower & Christensen, 1995) within an adaptive management approach that seems to mimic bestselling author Ori Brafman's chaos imperative (Brafman & Pollack, 2013). In simple terms, the Army isn't following the historic "we've always done it that way" mentality.

The Army's vision to accelerate innovation in response to its six modernization priorities has been entrusted to the recently established eight Cross Functional Teams (CFT) within the Army's newly formed Futures Command. For training, the Synthetic Training Environment CFT (STE) is tasked to develop faster processes to identify more accurate training requirements for the synthetic training environment and future training capabilities (Synthetic Training Environment Cross Functional Team, 2018). Part of the STE CFT's approach is to enable rapid prototyping, failing early and cheaply, then enhancing learning with increased operational inputs from units. The STE will converge current live, virtual, constructive, and gaming environments into a single simulation training environment. Part of the Army's vision for the STE is that

Back to Table of Contents

it will keep pace with, and adapt to the rapid development of technologies and to be the holistic environment for all training requirements noted by the Army's larger modernization efforts. While this article will highlight what the STE CFT is striving to achieve, it will also remind us that achieving the STE's full potential can only be realized because of the synchronized actions of innovative leaders who have been trained to exploit the STE's capabilities.

WHAT IS THE STE?

There are several key components that will comprise the STE capability (Figure):

- **One World Terrain (OWT)**–a singular terrain capability that will provide a fully accessible representation of the globe. This capability is accessible through the Army network and useable by all simulation trainers. It represents the complexities of the Operational Environment and the multi-domain battlefield.

- **Training Simulation Software (TSS)**–a single training software environment that uses an open architecture and common application programming interfaces (APIs). It develops and delivers a centralized capability to represent/adjudicate all simulation entities and user inputs. The environment is scalable and enables training from squad through Army Service Component Commander (ASCC).

- **Training Management Tool (TMT)**–a universal training management capability that is intuitive and easy to use, access anywhere and anytime to create training scenarios, and automatically retrieves and transformations authoritative data and automatically generates and populates simulation databases.

- **Reconfigurable Virtual Collective Trainer (RVCT)**–modern virtual training capabilities that allow formations to conduct collective, combined arms maneuver training from Soldier/squad through battalion level for all Army component formations, sufficiently representing both dismounted (Soldier/squad virtual trainers) and air and ground platform capabilities. Reconfigurable Virtual Collective Trainers will replace existing Aviation Combined Arms Tactical Trainers (AVCATTs).

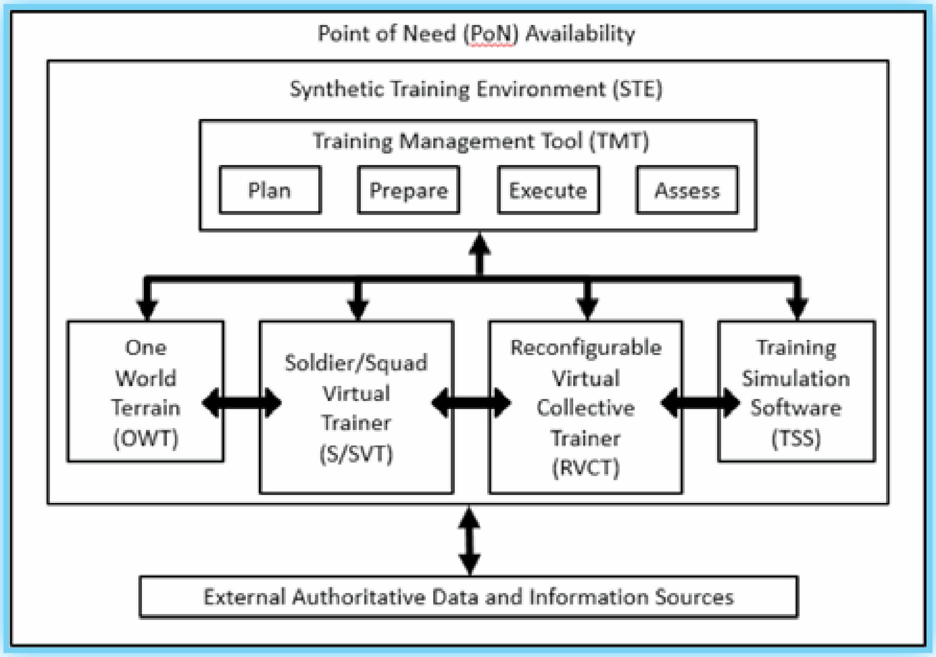

Figure. Components of the STE capability.

- **Point of Need**–the ability for the Commander to conduct realistic collective training and/or mission rehearsal at any location. The enhanced training enablers provided by the STE can be accessed by all Army component formations and locations using Army cloud and network capabilities.

- **Artificial Intelligence (AI) and access to Army Authoritative Data**–the ability to incorporate AI capabilities to enhance all aspects of training management and execution. The STE will provide intelligent tutor capabilities and methodologies to assess training effectiveness. This tool must be common across all training devices (virtual, constructive, and live training systems).

- **Live Training**–the requirement to integrate the virtual simulation trainers with the live environment enablers in a single synthetic training environment allowing fair fight engagements across all training environments and training devices.

For Army aviation, the STE will provide a viable replacement for the problematic AVCATT device. The STE's RVCT concept will strive to incorporate actual aircraft operational flight program (OFP) into the synthetic environment and to be able to reach concurrency with fielded aircraft within 90 days. The STE RVCT will exploit emerging technologies like mixed reality visual displays, haptic (motion input) gloves, and AI to expand and enhance training efforts. Additionally, the STE will be able to exploit the capabilities of the Aviation Mission Planning System (AMPS) in conjunction with the STE's TMT to preview, control, and assess training. To enable better training flexibility and to meet the Commander's needs to be able to train at locations other than static fixed sites (i.e., point of need), the STE RVCT is envisioned to be modular to the extent that it can be brought to various locations to support unique training or mission preview requirements. Finally, the STE will provide the tools to stimulate mission command systems to support various mission command training requirements.

Back to Table of Contents

U.S. Army Research, Development, and Engineering Command's CSM Stanley visits the Aviation and Missile, Research, Development, and Engineering Command's Systems Simulation, and Software Integration Directorate (S3I) Directorate. Here, the CSM pilots the Black Hawk Aircrew Trainer. The tour includes technologies related to Synthetic Training Environments (STE) with briefs on the Black Hawk Aircrew Trainer simulator (BAT), the Collective Aircrew Proficiency Environment (CAPE), the Unmanned Aircraft Systems/Platforms Division, the Universal Mission Simulator (UMS), and Army Game Studio STE Lab. Synthetic Training Environments are an important, emerging capability for training dominance, and provides a thorough and cost-effective alternative to live training. Photo by Joseph Mendiola

As envisioned, and being actively worked by the STE CFT today, the STE is a disruptive concept to our traditional ways of doing business and will embrace disruptive technologies to overcome our current training enhancement efforts. Our existing supporting training infrastructure is stove piped and forcibly integrated via technical workarounds. While multiple program management efforts have been envisioned to incrementally enhance our aging training technologies, these long-standing proposals don't fix underlying shortfalls and extend the current life of existing programs at significant costs. Introducing the STE at the expense of older training technology programs aligns with the Army's modernization vision to divest where appropriate in order to reduce and eliminate the associated sustainment costs (Office of the Chief of Public Affairs, 2017).

The envisioned end state being cited by this training modernization synergy is clearly what we need to meet current and future training and readiness requirements. Amid the publicity that has emerged concerning the potential of new efforts like Army Futures Command, CFTs, and the STE to modernize and enhance the lethality of our units, we need to remember the full potential of the STE will only be realized if we have a solid understanding of training management and leaders who are truly masters of the art of training (Delaney & D'Agostino, 2015).

HOW DO WE REALIZE THE POTENTIAL OF THE STE?

As America's military emerges from 15+ years of persistent deployments in support of operations in Iraq and Afghanistan, the Army's new modernization strategy is considering the challenges of an uncertain future and how to be prepared when our country calls. Our corps of combat-seasoned and dedicated officers, warrant officers, noncommissioned officers, and Soldiers are familiar with multiple deployments, but we do not know what new challenges our country will face nor where they will come from. While our combat experiences provide a definite advantage over potential adversaries, it does not guarantee victory. We cannot subscribe to the notion that combat experience alone equates to total readiness. The changing nature of warfare and the introduction of easily obtainable new capabilities places us in a situation where "we may not know what we think we know."

To posture ourselves for an uncertain future, STE is being designed to deliver a training overmatch capability that will allow us to develop the most lethal weapon possible—adaptive and agile aviation leaders and Soldiers. Unfortunately, the STE in and of itself is not the singular answer to future readiness. For example, when we do not exercise for an extended period of time, a certain level of muscular atrophy occurs. The same analogy applies to leadership skills; specifically unit training management (UTM). For the last decade, our leaders have excelled in "leading" training events dictated by higher headquarters. This cohort of leaders understand the value of quality training as it comes to readiness but may not be fully versed in the "art and science" involved with developing their own training plans, synchronizing training resources to support their plans, and how to successfully execute their own plans. In essence, America has the best trained Army...but perhaps an Army that does fully know how to build quality plans, or how to enhance such training with modern capabilities that the STE will offer.

Unit Training Management cannot be an exercise of weekly repetition void of innovation or imagination. Following a checklist or checking the block does not guarantee combat readiness. If the Army is applying significant resources and energy to revitalize the materiel side of the training equation, then we need to be mindful that the same level of attention and energy must be given to support the development of leaders who know how to train. We should question longstanding policies and guidance when it comes to how we train and educate our leaders on UTM. Our training management doctrine has been fully revitalized,

Back to Table of Contents

but are we inculcating a spirit of training innovation in our leader development efforts? The STE represents the "science" of training, but the full realization of this potential capability can only be achieved through a Commander's viable training plan and approach.

The STE represents our best vision of a tool to enhance training, but it is the synchronized plan of a Commander that turns potential into actuality. Commanders ensure that the right people are in the right place at the right time ready to train. Commanders develop a viable plan and communicate intent and actions to create shared understanding. Commanders ensure that key leaders are prepared to successfully execute their leader tasks to ensure the best training possible. While STE is a tool to be exploited by a Commander to achieve readiness objectives, it is our training doctrine that defines best practices on how we can build viable plans, synchronize preparation for training, effectively execute our plans, and learning for the next level of effort. The STE is the visible means to support effective training, but the vision of the Commander is the key to success.

As a new 2nd Lieutenant attending my first official Army class at the Armor Officer Basic Course in 1979, we were shown a picture of a burning tank wrapped in a cloud of black smoke. Within that smoke was the image of a Soldier pointing at me. There was a quote captured on the slide: "I do not want to wake in the middle of the night in a cold sweat with the haunting image of a dead Soldier crying out, 'Had I been properly trained!'" Back then we didn't have modern training technology or computer simulations. We were coached to use our imagination, understand our doctrine, and apply it wisely so as to achieve and sustain readiness. Today, we have a plethora of exciting and phenomenal training capabilities all offering the potential to support our training efforts. All of these tools are enablers that can help us achieve lofty goals. It is the leader's vision and spirit that can fully exploit the potential these tools offer.

Wins, RDECOM commanding general, tries out the HoloLens, Microsoft's advanced holographic glasses. The technology combines a holographic computer built into a headset that lets users see, hear, and interact with holograms within a simulated environment such as a living room or an office. Researchers are using the glasses to get a better understanding of how blast injuries affect Soldiers. (U.S. Army photo by Conrad Johnson, RDECOM)

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As a Simulation Operations Officer, Becnel was the Simulation Division Chief at USAACE, Commander of the United States Army Europe/ United States Air Forces in Europe Warrior Preparation Center (WPC) in Germany. The WPC was the mission command training center in Europe and supported brigade through theater exercises as well as NATO events. Wade also served as the Director of the Army War College Strategic Experiential Education Group responsible for the integration of simulations to enhance the war college's experiential education curriculum. Upon retirement, Becnel served as the Experimentation Coordinator for the Air Maneuver Battle Lab and was a senior instructor for the Army's Simulation Operations Course. Becnel also served as the lead USAACE coordinator for their "Leading Change" effort with Kotter International. He established the Commander's Initiative Group prior to assuming duties as the DOS Deputy Director.

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Back to Table of Contents

Realizing the Full Force of the Heavy Attack Reconnaissance Squadron

By CPT Benjamin Potter

The U.S. Army has spent years conducting counterinsurgency operations, but as the international situation changes, the Army must relearn forgotten lessons and train to defeat a peer or near-peer opponent in a decisive action fight. This shift in requirements necessitates broad changes in the Army's training and also potentially in its structure and equipment—a long and difficult process. However, the Army must be ready to fight and win with the resources on hand. Enter the Heavy Attack Reconnaissance Squadron (HARS).

The HARS, equipped with AH-64D/E and RQ-7Bv2 (Shadow tactical unmanned aircraft system [UAS]), is an exceptional example of a contemporary Army asset that has the potential to prove uniquely advantageous in a deliberate action fight. Utilizing manned-unmanned teaming (MUM-T), the AH-64s and Shadows that comprise the HARS can provide improved station time, greater survivability, and the ability to operate at greater distances over wider areas when compared with traditional rotary-wing pure formations. Due to the benefits of these enhanced capabilities, commanders can be afforded greater flexibility in integrating direct and indirect fires and the ability to create multiple dilemmas for the enemy with one formation. However, the HARS is not yet capable of providing all of these advertised benefits. These unique formations have yet to reach their full potential due to doctrinal shortfalls, lack of Aeroscout cultural indoctrination, and insufficient AH-64D/E aviator and RQ-7Bv2 operator training.

CURRENT DOCTRINE

Current doctrine provides an ample overview of the potential uses of UAS by itself and in the context of the HARS. Field Manual (FM) 3-04, "Army Aviation," details how UAS may be used in the breadth of potential combat environments and across the spectrum of aviation missions (Department of the Army [DA], 2015). It delineates the advantages UAS bring to the ground force commander, including persistent reconnaissance beyond ground intervisibility lines, long-range identification and designation of targets, and non-line of sight communications through UAS communication relay systems. Field Manual 3-04 also thoroughly describes how combining organic UAS with Apache attack helicopters creates a formation excelling at reconnaissance, security, and movement to contact (DA, 2015). The primary stated benefits of this combination are increased station time, improved survivability, and an increased ability to gain and maintain enemy contact. However, reaping these benefits requires well-trained and doctrinally sound UAS operators and manned aviators who are integrated at all levels of training, maintenance, and operations.

Unmanned aircraft system techniques and procedures are addressed throughout the main portion of Army Techniques Publication (ATP) 3-04.1, "Aviation Tactical Employment" (DA, 2016), but they are often relegated to a single paragraph addressing UAS per section. Appendix G of ATP 3-04.1 focuses on MUM-T, discussing operations and employment considerations, but the focus is heavily on defining terms at the expense of spending more time discussing how to tactically employ UAS.

Overall, current doctrine does not provide enough detail about the very specific manner in which some UAS platforms must be utilized in order for them to be combat effective. It also does not address how to develop UAS operators, who graduate advanced individual training (AIT) with little to no tactical training, into true Aeroscouts who are steeped in the Cavalry mentality and capable of providing the ground force with improved situational awareness, fires, and communications advantages that a UAS alone, or in conjunction with manned airframes, should be able to provide. These gaps in doctrinal tactics instruction, Aeroscout cultural indoctrination, and UAS operator and aviator combined training prevent the HARS from reaching its full potential.

To fix these problems requires the development and implementation of an indepth home station training program addressing the unique abilities and challenges associated with a HARS. This training program would require ground school, simulations training, live training, and indoctrination into the Cavalry culture and being an Aeroscout.

PROPOSED TRAINING METHODOLOGY

Phase I: Ground School (Table 1)

In Phase I, UAS operators and pilots would first be involved in a joint ground school that would be codified in at least the squadron standard operating procedure (SOP). This would be part of the RL2 to RL1 progression for both AH-64 pilots and UAS operators. Aviators and operators would start with learning about the HARS mission-essential task list (METL) tasks, with specific emphasis on the application of MUM-T to effective mission accomplishment. They would then participate in joint classes covering the capabilities of the AH-64D and the RQ-7B in order to provide a common knowledge base of the weapons, sensor, communications, and data transmit

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Background photo courtesy of CPT Jessica Donnelly

Back to Table of Contents

capabilities that each platform provides. The discussion of the sensors on both platforms would cover physical capabilities but would also emphasize operational employment techniques for accomplishing tactical tasks. In addition to the joint classroom education, aviators and operators would also participate in hands-on demonstrations, putting aviators in the RQ-7B simulator and UAS operators in the AH-64 simulator. With this education complete, operators and aviators would transition to joint mission planning, applying the technical information they have learned to develop an integrated manned-unmanned plan to accomplish various HARS METL tasks. The quality of the ground school portion will depend on recording and constantly reviewing these tasks within an evolving unit SOP. Training will be prioritized to ensure the squadron's best resources are brought to bear on operator and aviator development.

Table 1. Proposed Training Methodology: Phase I

Ground School Tasks				
Topic	Focus	Setting	Duration*	Doctrinal Basis
METL tasks	-MUM-T applications to each task	Classroom	Minimum 1 hour per METL task	Aviation training strategy/Combined Arms Training Strategy (CATS)
Reconnaissance	-Fundamentals of reconnaissance -Scout mentality -Maneuver familiarization -Fires education	Classroom	2 hours per each focus	FM 3-90
AH-64D Capabilities	-Weapon -Sensor -Communication -Data transmit/receive	Classroom	1 hour	Technical Manual (TM) 1-1520-251-10-2
AH-64D Ground demonstration	-Providing UAS operators opportunity to sit in AH-64 cockpit and use sensor	AH-64 simulator; AH-64, powered, on ground	15 minutes per UAS operator	
RQ-7B Capabilities	-Sensor -Communication -Data transmit/receive	Classroom	1 hour	Draft TM 1-1550-1689-10
RQ-7B Ground control station demonstration	-Providing AH-64 pilots the opportunity to sit in RQ-7B ground control station and use sensor	RQ-7B simulator; RQ-7B ground control station	15 minutes per AH-64 pilot	
Sensor techniques	-Reconnaissance and designation techniques	Classroom	1 hour	Squadron tactical standard operating procedure (TACSOP)
Mission planning	-Integration of manned and unmanned systems into plan	Classroom	8–16 hours (to include practice execution)	TC 3-04.1, squadron TACSOP
MUM-T tactics and techniques	-Integrating AH-64D and RQ-7B capabilities to accomplish METL tasks	Classroom	2 hours	FM 3-90 FM 3-0 squadron TACSOP

*Time durations are a rough approximation that will need to be validated and refined.

Phase II: Simulations Training (Table 2)
In Phase II, aviators and operators would enter simulations training, further developing their inclusive joint mission planning skills by utilizing simulators to execute MUM-T missions. Placing an operator in the Longbow Crew Trainer (LCT), the Apache crew-level simulation system, enables the first degree of integration. Similarly, pilots can be placed with operators in the unmanned system (UMS) or portable ground control station (PGCS), the Shadow crew-level simulation system, to participate in the UAS mission. The next level of integration would be linking the LCT with the UMS or PGCS to provide both operators and aviators the opportunity to complete an integrated simulated mission with their respective simulation systems. The simulations training would culminate with the execution of team and higher level missions in the aviation combined arms tactical trainer (AVCATT), where UAS operators can work with multiple Apaches from the team to the troop level in order to conduct a mission utilizing MUM-T.

After participating in ground school and simulations training together, aviators and operators will possess a high level of shared understanding of manned and unmanned platforms, integrated mission planning, and the missions that they will be expected to accomplish together. The operators and aviators are then ready to proceed to live training.

Phase III: Live Training (Table 3)
Live training, especially aerial gunnery, allows the commander, with assistance from the master gunner, to develop scenarios that train the specific mission sets that a HARS is particularly suited for—reconnaissance and security missions, movement to contact, and attack. This live training could be conducted over several phases, focusing on each of the METs in a logical and sequential order. For example, it could start with a reconnaissance phase and then transition to an attack or movement to contact phase. In this example, the information from the reconnaissance could be used to execute precise indirect fires from artillery, or UAS operators can designate for an AH-64 remote Hellfire engagement in order to allow the AH-64s access to an area protected by enemy air defense assets. This could then lead to a movement to contact where AH-64s and RQ-7Bs work together to identify enemy within an area of operations (AO), providing the squadron commander the information necessary to make timely decisions while also engaging enemy forces with direct and indirect fires.

Table 2. Proposed Simulations Training Tasks: Phase II

Simulations Training Tasks				
Event	Focus	Setting	Duration*	Doctrinal Basis
Mission planning	Continuing manned-unmanned integration	Planning rooms	76-hour planning window, reduced as participant proficiency improves	FM 3-0, TC 3-04.1, squadron TACSOP
Execution of planned mission in AH-64D simulator	Allowing UAS operators to practice MUM-T procedures and tactics while aviators execute simulated missions	LCT	Approximately 3 hours	ATP 3-04.1 squadron TACSOP
Execution of planned mission in RQ-7B control station	Allowing aviators to practice MUM-T procedures and tactics while UAS operators execute simulated missions	Ground control station	Approximately 3 hours	ATP 3-04.1 squadron TACSOP
Team to troop level execution of planned mission	Coordinating team to troop level formations while including UAS	AVCATT	Approximately 3 hours	ATP 3-04.1 squadron TACSOP
Team to troop level execution of planned mission	Executing METL tasks collectively with manned and unmanned airframes executing mission tasks from simulated versions of their cockpits	Future RQ-7B and AH-64D collective trainer	Approximately 3 hours	ATP 3-04.1 squadron TACSOP

*Time durations are a rough approximation that will need to be validated and refined.

Back to Table of Contents

Table 3. Proposed Live Training Tasks: Phase III

Live Training Tasks			
METL Task	Training Task	Standard/Outcome	MUM-T Application
Conduct aerial reconnaissance missions	Zone reconnaissance	-Priority information requirements (PIR) answered -Information integrated with higher level collection assets -Commander able to make decision	Reconnaissance completed by RQ-7B, AH-64D, or both
	Area reconnaissance	-PIR answered -Information integrated with higher level collection assets -Commander able to make decision	Reconnaissance completed by RQ-7B, AH-64D, or both
Conduct aerial movement to contact missions	UAS conducts indirect or remote engagement to suppress/destroy enemy air defense artillery (ADA) threat	-Provide AH-64D freedom of maneuver within the AO	UAS uses indirect fires or remote Hellfire engagement to eliminate air threat, maximizing AH-64D standoff and increasing survivability
	UAS conducts reconnaissance ahead of AH-64D	-AH-64D standoff maximized -UAS able to continue answering PIRs and gain enemy contact -AH-64D able to focus primarily on effective direct fire engagements	The combination of RQ-7B and AH-64D allow enemy contact to be made at greater distances from manned aircraft and with the smallest possible force
	UAS executes screen and potential indirect fire engagements during a delayed battle handover	-UAS forces prevent the follow-on force from having to conduct a second movement to contact over the same ground by conducting a screen and calling for indirect fire as necessary	UAS can extend the station time of AH-64Ds and cover what would otherwise be gaps in coverage between AH-64D units
Conduct aerial attack missions	UAS conducts indirect or remote engagement to suppress/destroy enemy ADA threat	-Provide AH-64D freedom of maneuver within the AO	UAS uses indirect fires or remote Hellfire engagement to eliminate air threat, maximizing AH-64D standoff and increasing survivability
	UAS conducts indirect or remote engagement to	-AH-64Ds are able to engage enemy from masked positions and at maximum standoff	AH-64Ds are able to remain covered or concealed while
	maximize AH-64D standoff		conducting precise and lethal engagements
	UAS provides rear and flank security for AH-64D battle positions	-Enemy forces are unable to maneuver on AH-64 battle positions	With UAS providing early warning for their battle positions aviators are able to focus maximum forces on direct fire engagements
Conduct aerial security missions	AH-64D and UAS screen together	-Size of area screened and duration of screen increased	Addition of UAS provides ability to increase the area screened and increase station time of screening force

Back to Table of Contents

Alternatively, the reconnaissance information could be used to develop a deliberate attack. This deliberate attack could be facilitated by UAS providing precise targeting for indirect fires or designating for an AH-64 remote Hellfire shot to suppress or destroy enemy air defense. During actions on contact, the UAS could act as an extra sensor for the air mission commander, support over the horizon communications, or provide continuity and extended station time for a phased or continuous attack.

Unique UAS Training Challenges

Live training, though critical to fully developing the HARS concept, also brings with it several challenges. For example, Biggs Army Airfield at Fort Bliss, the home of 3-6 CAV, is located in close proximity to the El Paso International Airport. This arrangement restricts UAS operations anywhere near either the airfield or the airport and forces 3-6's UAS operators to launch, recover, and operate a significant distance away from the squadron's main area of operations. This does not prevent manned aircraft from operating with UAS, but it does create a structural challenge in that the manned base of operations is 60 miles away from the unmanned base of operations. Though this is a situation unique to the Fort Bliss airfield, it is an example that demonstrates the airspace challenges that UAS face across the continental U.S.

Unmanned aircraft system platoons are also somewhat unique in that they are doctrinally led by a CW3/150U platoon leader. However, during 3-6 CAV's deployment in support of Operation Spartan Shield, aviation lieutenants were placed with each of the three Shadow platoons as a second platoon leader. This arrangement demonstrated that placing aviation lieutenants with the UAS platoon improved integration and helped educate the aviators involved about UAS operations. This somewhat anecdotal example is not intended to advocate for the removal of the CW3/150U position, but it does seem to indicate that forced integration of aviators and operators drives shared understanding and increased knowledge of both platforms. It also demonstrates a need for future debate and analysis on the advantages and disadvantages of placing a commissioned aviation officer in an RQ-7B platoon leader position.

The Aeroscout Mentality

Unmanned aircraft systems and the HARS as a whole, face numerous obstacles to reaching their full potential. The largest challenge is developing the Cavalry scout mentality in all members of the organization. The majority of the Apache pilots have never been asked to take on such a large portion of the reconnaissance mission, and the UAS operators have never been asked to demonstrate the initiative and expertise that is expected of an Aeroscout. Current UAS operators are steeped in an intelligence gathering, "combat TV," culture where they are assigned to look at a spot on the battlefield, while most Apache pilots are well-versed in attack missions and only attack missions. Now, aviators and operators alike are being asked to exercise the initiative and expertise expected of a Cavalry scout, which can only be developed through technical training of the reconnaissance mission as outlined above and developing the Cavalry mentality in operators and aviators.

Changing UAS operator culture within the HARS can be accomplished over time. Executing the previously described ground, simulation, and live training program to develop the tactical and technical Cavalry skills associated with the platforms of the UAS operator and AH-64 aviator is a critical first step in developing the Cavalry culture. However, the members of the HARS will truly become Aeroscouts only after being educated as to what that means. Aviators and operators must come to understand how scout elements move substantially earlier than other shaping and decisive elements and the unique role that Cavalry scouts play in mission success. This implies providing classes on Cavalry history, creating common cultural touchstones, developing an understanding of the historic role of the Cavalry in battle, and enabling Aeroscouts to draw connections between historic tasks and battles and the missions that they are expected to accomplish. The other symbolic trappings of the Cavalry—the Stetsons and the Spurs earned through

An RQ-7B Shadow tactical unmanned aircraft system, controlled and maintained by Soldiers assigned to Delta Company, 91st Brigade Engineer Battalion, 1st Armored Brigade Combat Team, 1st Cavalry Division, lands at Horsemen Flight Landing Strip in Trzebien, Poland, Nov. 1, 2018. (U.S. Army National Guard photo by SGT Lisa Vines, 382nd Public Affairs Detachment, 1st ABCT, 1st CD)

Back to Table of Contents

combat or successfully completing a spur ride—contribute to creating the unique Cavalry culture that will not naturally develop without immersion and education. Through this or similar training methods, it will be possible to create exceptional Aeroscouts and a fully realized HARS.

LINGERING MUM-T QUESTIONS

In order to complement improvements in doctrine and training, the concept of MUM-T requires a more rigorous definition. FM 3-04 defines MUM-T as "The integrated maneuver of Army Aviation rotary wing and unmanned aircraft systems (UAS) to conduct movement to contact, attack, reconnaissance, and security tasks" (DA, 2015). This definition unnecessarily limits MUM-T to aviation operations while leaving the "integrated maneuver" that constitutes MUM-T very broad. This lack of specificity makes it difficult to categorize when actual MUM-T training has been performed at the unit level, and consequently makes planning and assessing HARS training more difficult. An alternate definition is that MUM-T occurs when an unmanned system influences movement or maneuver through direct communication with a manned asset in real time. This definition is satisfying because it encompasses events like remote Hellfire engagements, laser spot handovers, and forward-positioned UAS confirming the absence of enemy ADA assets for a manned asset in real time. Direct communication is left deliberately broad, as MUM-T can be conducted via radio communication, video downlink, blue force tracking technology, or laser spot handover. The real-time constraint helps limit what can be deemed MUM-T. For example, UAS utilized as an information collection asset prior to an operation would not qualify as MUM-T due to the lack of real-time influence, even though the UAS reconnaissance would still likely influence movement and maneuver at a later time. Overall, this proposed definition improves on the original definition. It applies to the tasks colloquially thought of as MUM-T, narrows the scope of operations that qualify as MUM-T to a range that is useful at the unit level, and remains broad enough to encompass future capabilities in MUM-T beyond aviation.

POTENTIAL FUTURE APPLICATIONS

While the training, education, and indoctrination of aviators and operators will maximize the abilities of the HARS, UAS, and MUM-T also have potential future applications beyond working solely with AH-64s. Air Cavalry Troops equipped with UAS can already be used to augment ground maneuver. Current doctrine depicts how UAS can utilize their communications relay systems to provide communications to a ground force that would otherwise be out of line of sight in an urban or mountainous environment. Unmanned aircraft systems could also integrate with a ground scout troop and provide them with the ability to gain enemy contact through UAS and then develop the situation with their mounted or dismounted scouts. As another example, a tank platoon in a defensive posture could use UAS to gain improved situational awareness of the composition and disposition of an approaching enemy unit without coming out of defilade.

The next step is direct UAS teaming with ground vehicles by providing organic UAS systems to ground maneuver forces, eliminating the need to assign an Air Cavalry Troop to augment ground maneuver. This direct UAS and ground vehicle teaming would provide the ground vehicle with the same advantages that UAS currently provide the Apache, namely enabling reconnaissance missions, improving survivability, and increasing communications capabilities while allowing the HARS to complete other complementary missions without the need to detach or task its organic UAS assets to a ground force. With this expansion of the use of UAS to organically support air and ground maneuver, the Army could gain a major advantage in a decisive action fight.

CONCLUSION

The U.S. Army must train to fight and win a decisive action fight. Over time, as aircrews and UAS Aeroscouts train with more repetition and as doctrine and technology improve system interoperability, the HARS will grow and achieve its full potential. Ground force commanders will begin to entrust the HARS and other potential MUM-T units with more complex maneuver tasks, thus providing those commanders and the U.S. Army as a whole, a significantly increased capability to succeed in a decisive action fight.

Consequently, ensuring the development of MUM-T tactics and technologies in the HARS and across the Army will create a fighting force with the maximum ability to provide lethal fires at the decisive point while increasing the survivability of the manned platform. These organizations, with the HARS as the current trailblazer for MUM-T, will soon realize their full potential as the most lethal, capable, and dynamic formations in a division's force structure.

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OPTIMIZING TASK ORGANIZATION FOR AVIATION COMBAT READINESS

By 1LT Jacob T. Medeiros

During the past few years, the Army and the United States have begun shifting their focus to state-level actors and threats. Throughout this process, many previously effective techniques, practices, and systems have become obsolete. In Army aviation, one of the most egregious of these is the heterogeneous structure of the Combat Aviation Brigade (CAB). In their current form, CABs segregate their air assets into several different, specialized types of battalions. In order for these battalions to be successful during deployments and Combat Training Center (CTC) rotations, they must task organize into Aviation Battalion Task Forces (ABTFs), shuffling and trading personnel, equipment, and supplies, often only a few months prior to undertaking major movements. Rather than having battalions repeatedly undergo this cumbersome realignment process, CABs should permanently reorganize each of their battalions into modular components containing lift, assault, medical evacuation (MEDEVAC), and attack platforms. By doing so, CABs would create combat-ready battalions that would have improved unit cohesion, shared understanding, and leader development. More importantly, they would be able to mobilize more rapidly to respond to urgent threats on the global battlefield.

During the past few years, the official discourse regarding U.S. military strategy has markedly shifted focus. While units continue to fight in counterinsurgency (COIN) missions around the world, the threat of facing a near-peer adversary in a decisive action fight has begun to loom large on the horizon. Remarking on the recent revision of Field Manual (FM) 3-0 "Operations," Army LTG Michael Lundy, commander of the Combined Arms Center at Fort Leavenworth, Kansas, speculated that, "The need for the United States to fight…a near-peer adversary is now more likely than at any time since the Cold War" (Dickstein, 2017). Former Chairman of the Joint Chiefs of Staff, Martin Dempsey, reflected on the dangers of a near-peer threat during his 2017 address at the Danish Military Academy (Garamone, 2015). Even the Trump Administration's 2018 edition of the National Defense Strategy lists, "Long-term strategic competitions with China and Russia" as the "principal priorities" for the Department of Defense (Department of Defense [DoD], 2018). The unspoken (and occasionally spoken) implication of these various sources is clear: American leaders believe the Armed Forces will have to make significant strategic and operational changes to remain competitive in the coming century.

The modifications these leaders have recommended

Exercise Pegasus Forge III at the National Training Center, California, Oct. 2, 2018. The exercise tested the readiness of the 1st Cavalry Division's 3rd Brigade Combat Team. (U.S. Army photo by SGT Jessica DuVernay)

Back to Table of Contents

for the decisive action fight have been wide-ranging, spanning from air defense, to cyberspace, to the implementation of a space force (DoD, 2018). However, one recurring theme has been the need for the capability to respond to a short-notice outbreak of all-out war. At the August 2018 U.S. Army Forces Command (FORSCOM) Senior Leader Orientation (FSLO), General Robert Abrams, FORSCOM commander, explained the relationship between the Sustainable Readiness model and the need to be, "Ready Now" to "fight tonight" (Boyce, 2017). The Sustainable Readiness model is designed to replace the Armed Forces Generation (ARFORGEN) model. Under the ARFORGEN model, units trained to build readiness for a known mission and would consume that readiness over the course of each deployment, going over a proverbial "readiness cliff" in the process (Walker, 2016). This model worked for the COIN mission set but allowed key skills to atrophy, especially with regard to the decisive action fight. The Sustainable Readiness model improves upon the ARFORGEN cycle by focusing on units that are, "surge-ready but rotationally focused" (Walker, 2016). The transition is multifaceted, with special emphasis on various aspects of maintenance, training, and logistics (Walker, 2016). However, the overarching goal is that units will remain competent at the COIN mission set, while gradually preparing for a short-notice surge in the event of a decisive action fight.

Army aviation is not exempt from this push toward readiness. At the 2018 Worldwide Aviation Logistics Conference (WALC), senior Army and Civilian leaders convened to discuss how to streamline aviation maintenance and sustainment in the 21st century (Frederick, 2018). The purpose of the 2018 conference was to discuss strategic and operational changes that would improve expeditionary operations (Frederick, 2018). While the changes discussed at this conference focused mainly on maintenance and sustainment, Army aviation could significantly improve upon operations for very little relative cost by changing the internal structure of its units.

Field Manual 3-04, "Army Aviation," outlines the structure and purpose of the CAB (Figure). Consisting of a headquarters company, an Attack Reconnaissance Squadron (ARS), Attack Reconnaissance Battalion (ARB), Assault Helicopter Battalion (AHB), a General Support Aviation Battalion (GSAB), and an Aviation Support Battalion (ASB), the CAB is designed to be, "modular and tailorable" (Department of the Army [DA], 2015).

Each of these smaller components provides a specialized function. The ARB and ARS' mission sets revolve around attack, reconnaissance, and security, with the ARS having slightly more reconnaissance capability (DA, 2015). The AHB has the primary mission set of moving troops, supplies, and equipment, and consists mainly of UH-60 Black Hawks (DA, 2015). The GSAB has a similar mission set to the AHB, but has expanded lift and MEDEVAC capabilities provided by CH-47 and HH-60 assets (DA, 2015). As a whole, a CAB is capable of performing air movement, MEDEVAC, attack, reconnaissance, and several other missions. A CAB can do just about anything an Army unit would need Army aviation to do. The only problem is, CABs rarely conduct operations as a singular unit.

In recent years, the ABTF or Aviation Task Force (TF) has become the standard for aviation support. One of the above-mentioned types of battalions becomes an ABTF when it receives augmentation from the other battalions within a CAB, allowing the augmented battalion to perform missions outside of its doctrinal mission set. For example, an AHB that task organized into an ABTF would receive companies of Apaches, Chinooks, and HH-60s, and would be responsible for planning missions that included some (or frequently all) of those airframes' mission sets. This allows a specialized aviation battalion to provide a Brigade Combat Team (BCT) with all of the complementary roles available within a CAB.

These ABTFs, while effective, are often problematic. In their article, "Force Protection and the Aviation Task Force," CPT Daniel Liebetreu

Soldiers participate in Exercise Pegasus Forge III at the National Training Center, California, Oct. 2, 2018. The exercise tested the readiness of the 1st Cavalry Division's 3rd Brigade Combat Team. (U.S. Army photo by SGT Jessica DuVernay)

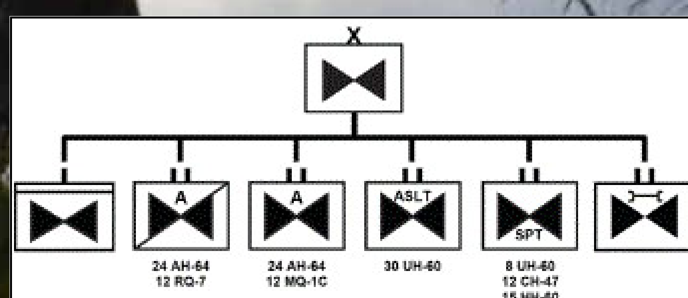

Figure. Organization of the standardized CAB (DA, 2015).

and MSG Edward Keopuhiwa outline some of the pitfalls of the ABTF. One major pitfall is that units not accustomed to working together will often fail to include each other in the planning process (Liebetreu & Keopuhiwa, 2018). Another pitfall occurs when the planners within the commanding unit of the ABTF do not fully understand the mission set of the task-organized air platforms, and those task-organized resources end up under-utilized. Organic units can mitigate this risk by task organizing early, but the potential for units in this configuration to end up out-of-step with each other is still high. Even the most knowledgeable ABTFs will undergo the simple growing pains, like updating email distribution lists, synchronizing battle rhythm events, and all the other unique transaction costs associated with disseminating information to a large, unfamiliar group of people. One only need attend a post-exercise after action review (AAR) to hear about these shortfalls ad nauseam.

In the Army, it is common practice for units to strive to train how they fight. If aviation units deploy and fight as ABTFs, then they should permanently task organize that way during all day-to-day operations. If every organic aviation battalion modularized by including CH-47s, UH-60s, HH-60s, AH-64s, and unmanned aircraft systems (UAS), it would streamline operations, putting units in a better position to successfully mobilize in a decisive action scenario. Over the long term, it would allow leaders at every level of the chain of command to focus more on readiness and less on reinventing the administrative wheel at the start of every training exercise.

Permanently reorganizing the battalions within every CAB would not come without potential drawbacks. For example, for reorganization to work, it would involve battalion commanders supervising company commanders in different airframes and would require training multiple mission sets across each individual battalion. However, CAB commanders already accomplish the mission this way at the brigade level. If the doctrinally sound way to deploy in aviation is with a mixed mission-design series ABTF, then it doesn't make sense to wait for CTC rotations and deployments for everyone to start working together.

Despite these drawbacks, permanent modularization would most likely be a net gain to readiness. Under the current CAB task organization, an ABTF commander may not meet all of his augmented company commanders until a meeting 2 months prior to their CTC rotation. If that company commander had already been part of the battalion, mutual trust and shared understanding between battalion and company commanders would be ongoing. Furthermore, officers would become more comfortable with each other's mission sets early on in their careers. AH-64 Lieutenants could learn the attack mission while simultaneously developing an understanding of the air assault planning process, which would prepare them for the broader understanding of the aviation mission set required later in their careers. Similarly, UH-60 pilots could become more accustomed to the doctrinal mission set of attack aviation. Deployment-related staff functions would also become more efficient. Battalion S1 sections, for example, would have complete visibility on the administrative deployability across all of their supported units. Under the current system, they must still rely on the staffs of their sister battalions to take care of readiness for task-organized personnel.

In addition to leader development and administrative readiness, training and evaluation would also improve. Under the current system, some companies will inevitably end up performing their most demanding missions outside of the supervision of their rating chain of command. Companies that task organize under a different headquarters for CTC rotations miss the opportunity to distinguish themselves in front of their raters.

U.S. Army SPC Gabriel Thibault, a crew chief with the New Jersey National Guard's Detachment 2, Charlie Company, 1-171st General Support Aviation Battalion, is lit up by helicopter running lights after landing a simulated casualty during medical evacuation training on Joint Base McGuire-Dix-Lakehurst, New Jersey, Nov. 14, 2018. (U.S. Air National Guard photo by Master Sergeant Matt Hecht)

Back to Table of Contents

Conversely, the current system also deprives battalion commanders of the opportunity to observe their teams in action. This forces battalion commanders to rely on reports from outside sources to assess what areas their units need to focus on for improvement.

From the perspective of higher headquarters, modularizing task organization would lessen the workload for brigade staffs. Under the current task organization, battalions contain only one or two different airframe types. This means that nearly every air mission request requires coordination from brigade headquarters, since a normal air assault mission often requires support from CH-47s, UH-60s, AH-64s, and UAS. If every battalion included aircraft from each airframe, this would no longer be the case. Instead of having to worry about parceling assets of each battalion out every time a mission came around, brigade headquarters could simply task a mission to the modularized battalion, knowing that the battalion already had the organic resources to complete it. Routine missions like static displays would become simpler as all the planning could happen at the battalion level, and larger-scale operations like the Joint Readiness Training Center and National Training Center could receive more planning attention by avoiding the inefficiency of reorganization.

None of this would have to happen at the expense of the normal advantages to keeping each airframe type in separate battalions. For example, AH-64 units could still all participate in the same aerial gunneries. These types of missions may require slightly more coordination than before, but with the strong professional networks that exist within each community, the infrastructure already exists for successful collaboration. Maintenance functions could also remain the same, and brigades could choose to continue segregating hangars by airframe. Even now, battalions spread their daily operations across several buildings, so the increased marginal cost of spreading them out a bit more would likely be low.

With fewer resources dedicated to coordinating missions for individual units, brigade headquarters could focus more on large-scale operational capabilities. One beneficial change that would complement modular task organization is expansion of brigade current operations centers. In a conventional CAB, each battalion runs its own flight operations headquarters where pilots can file flight plans and risk assessments. These flight operations headquarters typically open several hours before the first flight of the day and stay open until the last flight has landed and reported "mission complete." This essential service can often cause 15P flight operations specialists in certain units to work more weekends and off-duty hours than the average service member. This especially holds true for MEDEVAC units, where flight operations centers need to be operational 24–7. If brigade current operations centers expanded, they could consolidate flight operations at one central point on weekends, rotating through different battalions from which to source aviation operations specialists. Flight operations centers have a very scalable mission, so two to three Soldiers could easily track flights for the brigade during weekend operations. This would alleviate the disproportionate burden that falls on MEDEVAC units to run 24-hour weekend operations, as well as giving brigade headquarters a heightened level of situational

An AH-64 Apache assigned to 3rd Squadron, 6th Cavalry Regiment, Combat Aviation Brigade, 1st Armored Division takes off during gunnery training at Doña Ana Range, New Mexico, Oct. 11, 2018. (U.S. Army photo by Winifred Brown) awareness and operational capability. Further, units would never need to worry about scheduling flight tracking for weekend training; they would be able to plan high-priority, no-fail flights on weekends if necessary, knowing that flight tracking services would be available at brigade headquarters without additional coordination. During the normal work week, battalions could run their own flight operation centers to maintain their readiness and self-sufficiency. The brigade operations center could also consolidate cold refuel operations from the forward support companies across the brigade, similarly preventing redundant utilization of troops and resources during off-duty hours while simultaneously guaranteeing surge-capacity and ubiquitous availability.

Convenience is nice, and change is certainly not convenient. Further, keeping each battalion homogenous may serve to streamline some administrative functions, particularly on the standardization and maintenance sides of the house. However, the goal of Army aviation is to maintain deployment readiness. Training, leader development, and mobility would all be stronger if battalions task organized the way they fought. The modern operating environment calls for an integrated aviation TF to provide mobility and freedom of maneuver to the ground force. Aviation owes it to the ground troops to structure itself in the most effective way possible to facilitate operational success.

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The 82nd Combat Aviation Brigade conducts combined arms live-fire exercise. (U.S. Army photo by SSG Sharon Matthias)

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Back to Table of Contents

Aviation to Healthcare: Adopting Best Practices for Safety

"THERE IS A VERY INTERESTING TOGETHERNESS BETWEEN MEDICINE AND AVIATION WITH WHICH I HAVE BEEN FASCINATED OVER THE YEARS."

—MAJOR GENERAL (RET.) SPURGEON NEEL

By COL Steven Gaydos, COL Mark McPherson, and LTC(P) Nicole Powell-Dunford

In October of 1935, on the first flight of what was later to be the iconic World War I B-17 bomber, the aircraft prototype Model 299 crashed. The aircraft stalled shortly after takeoff killing multiple aircrew, including one of the Army's top test pilots. Following the investigation, it was discovered that the pilots had failed to release a locking mechanism prior to takeoff, making the aircraft unresponsive to pitch control. The entire project was nearly scrapped, and some had even deemed the aircraft too complicated to be safe. The crash nearly caused the collapse of The Boeing Company. The result of a think tank of test pilots and engineers addressing the issue was stunningly simple—the aviation checklist was born. Most everyone knows the rest of the story whereby the Army Air Corps went on to purchase thousands of the Flying Fortress and employed them to remarkable success in the war.

Photo by SPC Lisa Crawford

The early days of aviation were inherently dangerous. Recall that it was mere months after Signal Corps Specification No. 486 was issued on December 23, 1907 (ostensibly outlining the military's requirements for the Wright brothers' airplane), that the world witnessed its first airplane fatality, Army Lieutenant Thomas Selfridge. As another example, early Air Mail pilots suffered tremendous casualty rates flying at night and in weather without radios, navigational aids, or instruments. But aviation has an amazing success story: over the next century, it became recognized as a bastion of safety and exemplar of the High Reliability Organization (HRO). Now in the 21st century, despite inherent complexity and risk, aviation is considered among the absolute safest forms of transportation, with some 13.9 deaths per million flights (Chassin & Loeb, 2013). And, despite this success, the industry continues to push for further reductions with targets of 1.6 per million flights over the next decade and a clear industrial goal of zero preventable harm.

Back to Table of Contents

High Reliability Organizations are defined as organizations or enterprises in which catastrophic events could be expected on a routine basis without rigorous control and safety measures. Aviation, space flight, nuclear power, air traffic control, and others are generally considered within this arena. Creating an HRO is a manifold enterprise. Tenets of the HRO include collective mindfulness across the constituency, preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience, and deference to expertise. Much has been written on the topic, and most leaders have some degree of familiarity with the concept.

At the turn of this century, a landmark Institute of Medicine report, ***To Err Is Human: Building a Safer Health System***, rocked the medical field (Kohn, Corrigan, & Donaldson [Eds.], 2000). Extrapolating data from several large studies, the report projected that some 44,000 Americans die each year from medical error, pinning it as the eighth leading cause of death! The report beseeches, "The status quo is not acceptable and cannot be tolerated any longer. Despite the cost pressures, liability constraints, resistance to change and other seemingly insurmountable barriers, it is simply not acceptable for patients to be harmed by the same health care system that is supposed to offer healing and comfort" (Kohn, Corrigan, & Donaldson [Eds.], 2000). The report specifically highlighted aviation as an industry that has been successful in improving high reliability and safety.

What can aviation's culture of safety teach healthcare? Well, as it turns out, a lot. Take the checklist, for example. From the HRO perspective, the checklist embodies deference to expertise and preoccupation with failure. It acknowledges that mistakes and lapses are integral to the human condition; individuals—no matter how capable or experienced—defer to the competence of those who have outlined the right steps for a complicated procedure. This is a risk mitigation practice for which patient safety probably has the best evidence of positive transference from aviation. The medical literature is replete with instances of clinical checklist employment among many venues—intensive care units, surgical suites, ambulances, hospital wards, emergency departments, etc.—with real evidence for lives saved and cost savings (especially for medical procedures, infection control, transitions of care, and surgery). It's not hard to conceive how a complex, tiered, lengthy medical procedure would benefit from adherence to a checklist. But these successes came with an important caveat. Simply creating a checklist was not sufficient; meaningful gains were tied to leadership endorsement, mandatory execution, enterprise-wide stakeholder buy-in, training, and accountability. Those programs that lacked these characteristics, even with a perfectly drafted checklist, did not demonstrate meaningful safety improvements.

Soldiers with the 404th Aviation Support Battalion, 4th Combat Aviation Brigade, 4th Infantry Division, out of Fort Carson, Colorado, work together to refuel CH-47 Chinook helicopters at a temporary forward area refueling point (FARP) during a readiness training exercise at Hohenfels Training Area, Germany, July 12, 2018. Soldiers of the battalion are conducting their first readiness exercise since arriving in Europe for Atlantic Resolve, a U.S. endeavor to fulfill NATO commitments by rotating U.S.-based units throughout the European theater to deter aggression against NATO allies and partners in Europe. (U.S. Army photo SGT Gregory T. Summers / 22nd Mobile Public Affairs Detachment)

Another clear example is that of Crew Resource Management (CRM). Crew Resource Management was developed after identifying that human error remains an important factor in the majority of mishaps. While initially facing resistance as a challenge to pilot authority and autonomy, CRM addressed negative human impact to performance, closed-loop communication, leadership and seniority gradient, and cross-check verification. Crew Resource Management has been demonstrated to be highly effective and in aviation, there have been numerous instances of incidents or accidents averted or prevented due to its employment. Certainly, patient care is a team sport. Multidisciplinary teams, including physicians, nurses, technicians, therapists, pharmacists, and many others must all work together to not only manage longitudinal care, but also work in crisis situations such as a patient in extremis or acute circumstances such as an operation. Basic tenets of CRM (e.g., leadership, clear and intentional

Back to Table of Contents

communication, delegation of tasks and assignment of responsibilities, monitoring/cross-checking, problem assessment, cohesion, erosion of authority gradients with respect to potentially unsafe conditions, etc.) are the same requirements of quality team-based patient care and safety. In fact, intensely applied CRM training to medical teams has been demonstrated to result in significant survival benefit. This has been replicated in many different facilities and types of care with some studies even demonstrating a dose-response relationship.

U.S. Army Soldiers assigned to Task Force Eagle Assault perform maintenance on a UH-60 Black Hawk Helicopter at Camp Dahlke, Afghanistan, Oct. 4. Aircraft maintenance is the first line of defense in aviation safety and ensures correct functioning during flight. By providing regular maintenance service, Soldiers gain the experience to maintain aircraft efficiently and effectively. Photo by SGT Steven Lopez

A final example of medicine imbued with lessons from aviation safety is that of accident investigation. Aviation mishap investigation is executed with a focus on safety and future accident prevention, not to Name, Blame, or Shame those involved. Incident reporting should be available at the lowest levels and be anonymous, standardized, and highly encouraged. Methodical investigation identifies weaknesses, gaps, or problems within the system in order to design safeguards, controls, or regulatory parameters to improve reliability and enhance safety. It is a highly regulated process that addresses all causal or contributing factors and identifies any issues of deficiency for targeted remediation (whether causal or not). Substantiated findings are briefed directly to the key leaders who execute policy and make consequential change, while ensuring the widest dissemination of lessons learned across the entire community.

The human error problem can be viewed in two ways, the person approach or the system approach, giving rise to disparate philosophies or error management. For far too long, medicine has adopted the former, focusing on unsafe acts and procedural violations of individuals at the sharp end. These unsafe acts (forgetfulness, inattention, carelessness, poor motivation, recklessness, etc.) and countermeasures are directed at reducing variability in human behavior of individuals. Virtually every physician or medical staff member can recall witnessing brutal public excoriations among colleagues in morbidity and mortality conferences or peer case review, which too often led to a culture of fear: personal disciplinary measures, threat of litigation, and sometimes an incentivized milieu of hiding or minimizing error. James Reason, Professor Emeritus of Psychology at the University of Manchester, England, put the medical field on notice some 20 years ago that we needed to shift to systems-level thinking with a data-driven tiered approach. The system approach operates from the basic premise that humans are inherently fallible (who hasn't made a mistake?), and errors should be expected from even those among us who are the best within the organization. Errors are consequences of deficient upstream systematic processes with countermeasures based on the expectation that we cannot change the human condition, so the system must operate with error traps to close holes within the cheese. Certainly some unsafe acts may be willful violations or personally egregious, but this is not the norm—quality lapses are often judged as personally blameless.

Accident investigation (including the "near miss") is an area that is currently under industry review within the umbrella of patient safety. Analysis of medical error investigation has revealed gaps and variation on how root cause analysis is conducted, by whom and to whom it is reported, and how lessons learned are disseminated among the enterprise. There are examples of best practices, however, and many organizations and facilities have made great strides to dissolve barriers and enhance a transparent culture of reporting and investigation.

Some experts in patient safety and quality assurance have advocated for an aviation-like mishap archetype, with techniques such as inclusion of human factors experts on investigative staff, centrally trained external investigation teams, and an empowered, independent patient safety organization with analysis expertise and dissemination and feedback loops within the entire system.

Back to Table of Contents

As an example, the United Kingdom has recently mandated a patient safety investigative organization with their National Health Service (NHS) in consultation with the civil Air Accidents Investigation Branch (AAIB) (House of Commons [HC] Report No. 886, 2015; Macrae & Vincent, 2014). In fact, the AAIB Chief Investigator, Crispin Orr, was selected to head the new Healthcare Safety Investigation Branch—the first of its kind nationalized aviation-modeled incident investigation organization. It is funded by the Department of Health and hosted by the NHS, but operates independently and with autonomy. Their organizational tenets include independence, objectivity, transparency, expertise, and learning for improvement. Research is underway to validate the efficacy of such practices that hold great promise.

High Reliability Organizations are examples of embracing systems-level thinking and a systems approach to error and mishap. These organizations anticipate the worst, plan for the human condition, and equip themselves with a robust system to eliminate error and reduce variability at all levels. But organizational change and professional cultural transformation is difficult—especially for medicine, a profession that is thousands, if not tens of thousands of years old. Fortunately, aviation has paved the way in relatively short order (and paid a dear price for those lessons learned). While not a perfect match for the safety challenges of healthcare, the analogous issues of human factors and organizational culture are sufficiently related that medicine should remain humble and keep its eyes wide open to learn from the experiences and success of other disciplines. Application and implementation should be nuanced and mindful rather than broad stroke, bearing in mind significant differences among the specialties. Medicine is an exceedingly human endeavor, and humans are inherently fallible; the checklist, CRM, and mishap investigation are just a few examples of exportable successes (there are others). Medicine can't afford hubris and must continue to learn from the ascendancy of other HRO enterprises.

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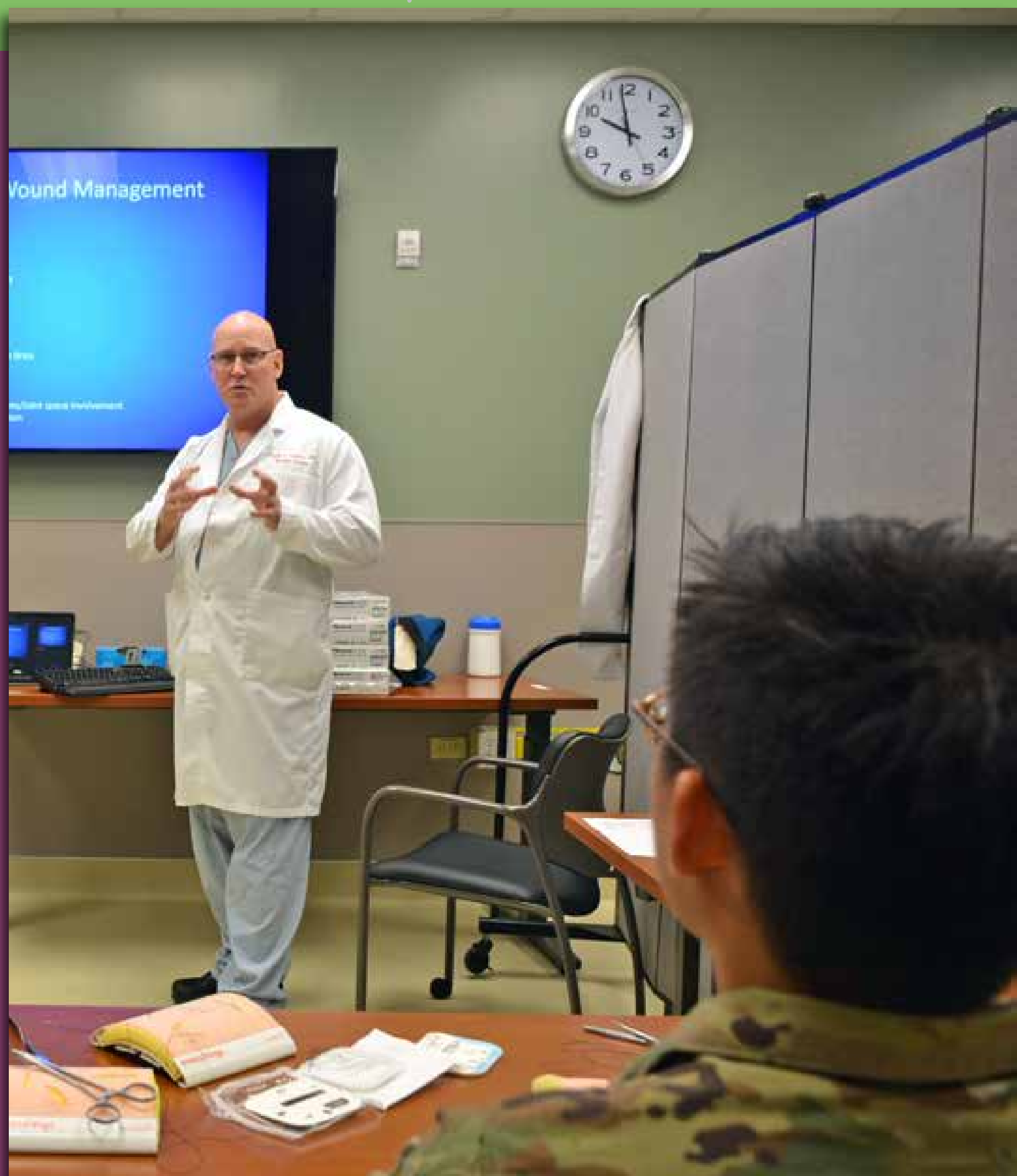
LTC Powell-Dunford serves as the Deputy Chief, Medical Consultant Division, Capability Development Integration Directorate at the Army Medical Department Center and School.



COL Dwight Kellicut, Chief of Vascular Surgery at Tripler Army Medical Center, or TAMC, discusses acute wound management techniques with residents, medical students, and transitional year interns during the course, "Simulation Training for Operational Medicine Providers," or STOMP course, at the TAMC Medical Simulation Center, Honolulu, Hawaii, Apr. 4, 2018. Photo by Leanne Thomas

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Back to Table of Contents

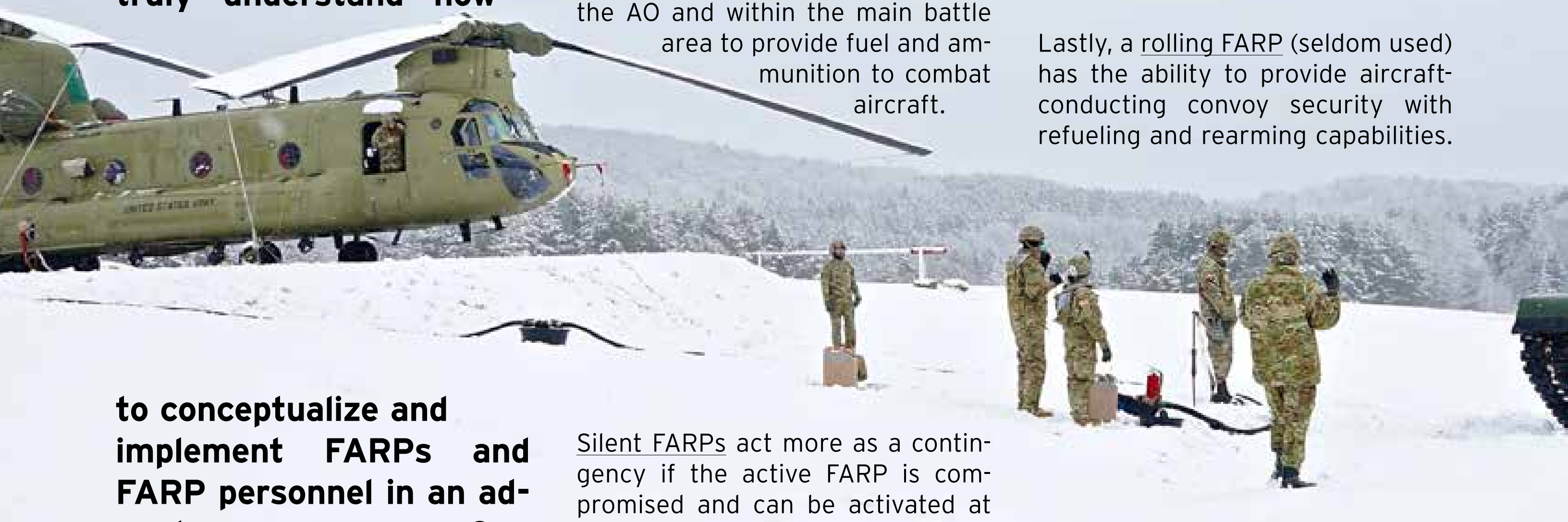
ROLES AND RESPONSIBILITIES OF AVIATION FARP OPERATIONS

By SFC Francis Donnelly

Forward Arming and Refueling Points (FARP) can be an extremely valuable asset to aviation commanders if they understand the actual intent, purpose, and responsibility of those involved in FARP operations. As an Observer, Coach, and Trainer over the past 3 years, it has become evident that platoon sergeants, platoon leaders, and commanders do not truly understand how to conceptualize and implement FARPs and FARP personnel in an advantageous manner. One of the keys to successful FARP operations is understanding the responsibilities of the personnel involved in the process, as well as the functionality of the different types of FARPs.

One of the first things that commanders and FARP personnel must understand are the different intents behind the various types of FARPs that can be employed. A FARP is a Forward, not contained within the original Area of Operations (AO) for the aviation unit, Arming and Refueling Point that "…is a temporary facility organized, equipped, and deployed as far forward, or widely dispersed, as tactically feasible…" (Department of the Army [DA], 2018, 1-1). There are four different types of FARPs: active, silent, jump, and rolling. Personnel and commanders must understand the intent behind each one to effectively employ these assets.

An active FARP is located close to the AO and within the main battle area to provide fuel and ammunition to combat aircraft.



Silent FARPs act more as a contingency if the active FARP is compromised and can be activated at predetermined times or at certain critical decision points. The silent FARP is required to have everything that the active FARP does, to include equipment and personnel, essentially allowing the silent FARP to assume the role of the active FARP with little to no notice.

A jump FARP, which is the most misunderstood, is "…employed for specific missions with limited scope…" (DA, 2018, 2-1). Units are employing jump FARPs without understanding that they are supposed to be for specific missions and ideally should not be treated as a FARP that requires sustainment capabilities. This degrades the meaning of a jump FARP and produces a broader intent where the jump FARP is left in the same location for several days without a specified mission to support. Identifying the need for a jump FARP should be considered when planning aircraft missions that will require further than normal flying, as well as when aircraft are obligated to operate in the same general area for an extended period of time requiring refueling and rearming operations conducted closer to the objective.

Lastly, a rolling FARP (seldom used) has the ability to provide aircraft-conducting convoy security with refueling and rearming capabilities.

Too often, commanders and distribution platoon personnel place "Jump FARPs" out in the battlefield without understanding that it is supposed to be used for a specific mission—not multiple missions.

The roles and responsibilities of battalion staff such as the S-3 (operations staff officer), S-2 (intelligence staff officer), and S-4 (logistics staff officer) are outlined in Chapters 1

CH-47 Chinook helicopter crewmembers of Company B, team up with petroleum supply specialists of Company E, 2nd General Support Aviation Battalion, 227th Aviation Regiment, 1st Air Cavalry Brigade, 1st Cavalry Division, to refuel an M1 Abrams tank from Company C, 1st Battalion, 18th Infantry Regiment, 2nd Armored Brigade Combat Team, 1st Infantry Division, during a jump forward area refueling point (FARP) training exercise at Hohenfels Training Area, Germany, Jan. 21, 2018 (U.S. Army photo by SGT Gregory T. Summers / 22nd Mobile Public Affairs Detachment)

Photo by SFC Francis Donnelly

and 2 of Army Techniques Publication (ATP) 3-04.17, "Techniques for Forward Army and Refueling Points," (DA, 2018), to identify how a FARP can be employed with the best chances for survivability.

The S-3 has a significant responsibility to the officer in charge (OIC) and noncommissioned OIC (NCOIC) of the FARP when considering planning. The S-3 is responsible for formulating the FARP plan in a collaborative effort with forward support company (FSC) commanders. It is important to include the commander, OIC, and NCOIC of a FARP in the planning process, as well as including them in the mission planning for what they will be supporting. The S-3 must use mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC) to identify the best possible location to employ a FARP as far forward and close to the forward line of troops as the tactical situation permits. As stated in ATP 3-04.17, the site selection is a function of the S-3, but should include the pertinent personnel for that mission (DA, 2018, 2-2).

The S-2 also plays an integral role in FARP operations by being able to provide accurate and current intelligence reports on enemy activity along the route and in the operational area of the proposed FARP. Too often, the S-2 is not brought into the planning process to be able to assess the threat level and risk associated with various locations of FARPs.

Sustainment: The S-4 is another crucial piece to successful FARP operations. Without accurate forecasting, a FARP is susceptible to running out of fuel and ammunition. Understanding the higher sustainment echelon's intent, logistics status (LOGSTAT), and capabilities will improve the S-4's ability to project and request timely resupply of fuel and ammunition to prevent the FARP from running out of these items. The S-4 needs to be included in the mission planning process to be able to accurately forecast fuel and ammunition requirements based off number and type of aircraft flying, hours of flight, and the estimated rates of ammunition consumption. If the S-4 understands these key pieces, he will be able to more accurately forecast resupply rates to prevent the FARP going Black of fuel and ammunition (DA, 2018, Chapters 1 & 2).

Defense: The ability to defend the FARP convoy and FARP location is critical to the survivability and aircraft's ability to utilize the FARP. For the past 17 years, the majority of the FARPs have already been established, so their security is often overlooked. Commanders and battalion staff today do not tend to take this lack of security into consideration. The FARP must have enough organic personnel to defend itself against an anticipated threat. Too much security hinders the maneuverability of the FARP, while too little security leaves the FARP vulnerable to enemy activity, while reducing the FARP personnel's ability to protect themselves while moving. If units cannot provide adequate security for their FARPs, an option that seems to work well is coordinating with adjacent units for protection or tying in with forward units' security plans. This means that prior to departing on the convoy to establish a FARP, the personnel need to have a clear understanding of adjacent units and battlespace owners. The collective efforts of the S-3, S-2, and FARP personnel to ensure the FARP can be defended will reduce its chances of being overrun and increase the chances for the aircraft to be resupplied in a timely and safe manner. (DA, 2018, Chapter 2, Section 1)

Location: The location and emplacement of the FARP needs to make sense and benefit the tactical situation. Since the location of the

Photo by LTC Joshua Severs

Back to Table of Contents

Photo by SFC Francis Donnelly

FARP is a function of the S-3, the FSC should not be told to pick a location and just go there. A good practice that aviation units can start utilizing is to have predetermined primary and alternate locations for FARP relocation in case of compromise. This would take a coordinated effort and shared understanding between the FSC and battalion staff to identify the best strategic locations, while providing the best opportunity for survivability.

Intelligence: Important aspects of planning multiple contingent FARP locations are routes, enemy activity, location of friendly forces, and significant acts along the route of travel, as well as at each location. If units identify suitable alternative locations for FARP emplacement while planning for an air assault or attack mission, they will be able to more quickly formulate the best location in which to displace the FARP. Once again, this takes a coordinated effort between the commanders, S-2, S-3, S-4, and FARP personnel. When considering the location of the FARP, all parties involved should not only be thinking of suitability for the aircraft to land, but also the ability for FARP personnel to have natural cover and concealment, if possible. Identifying alternate FARP locations allows the FARP OIC and NCOIC to quickly displace and set up another FARP quickly, efficiently, and with all critical information able to be transmitted in a relatively quick manner without hindering operations. The amount of intelligence from the S-2 should be no different for FARP personnel than for aircraft getting ready to take off on a mission (DA, 2018, Chapter 2, Section 1; Chapter 3).

Critical skills that enhance the employment and survivability of aviation FARPs include protection, night vision device (NVD) training, convoy operations, day and night land navigation, and extensive driver training. Based on tactics, techniques, and procedures (TTPs) in counterinsurgency (COIN) environments such as Afghanistan and Iraq, aviation units have fallen in on established rapid refuel points (RRP). This has led to a decrease in emphasis on the critical skills required to conduct FARP operations, especially convoy operations. Aviation units are not normally known for conducting tactical convoys; however, this is a crucial operation that not only the FSC must be proficient in, but also the downed aircraft recovery team (DART).

There is a difference between tactical convoy operations and administrative convoy operations. Some of the key training for tactical convoy operations can be found in ATP 4-01.45, "Multi-Service Tactics, Techniques, and Procedures for Tac-

Photo by SFC Francis Donnelly

tical Convoy Operations" (DA, 2017). Land navigation is a crucial shortfall that is observed, not only within the aviation community, but Army-wide when units come to the Joint Multinational Readiness Center (JMRC). Oftentimes, units arrive untrained on how to navigate not only during the day, but also at night. Forward support company commanders must ensure that the distribution platoon has the opportunity to train on the critical skills associated with FARP operations including: convoy operations, security, chemical biological, radiological, and nuclear (CBRN) environment, first aid, NVD operations, land navigation, firefighting and rescue procedures, and the definition and intent behind the four types of FARPs. This is also critical for battalion commanders to understand so that they can ensure the FSC is afforded the appropriate time to train, so it can provide the valuable assets of fuel and ammunition to aircraft in the event of another armed conflict (DA, 2018, Chapter 3).

In conclusion, commanders must know and understand the four types of FARPs: active, silent, jump, and rolling. They must ensure that the battalion staff is included in the planning of FARPs and jump FARPs with the S-3 taking the lead in planning. Some components ensuring the success of FARP operations are: sustainment, defense, location, and intelligence. Finally, Soldiers that perform FARP duties must have proper training including these critical skills: protection, NVD training, convoy operations, navigation (day and night–land), and driver training.

SFC Francis Donnelly is currently serving as the primary FARP trainer for Joint Multinational Training Center (JMRC), Hohenfels, Germany. Previous assignments include: Operations NCO, 10th Sustainment Brigade; Senior Small Group Leader, 10th MTN DIV NCO Academy; Platoon Sergeant, 710th BSB; Section Sergeant, 3-101st AVN REGT, Section Sergeant, 7-101st AVEN REGT. SFC Donnelly has an Associate degree in General Studies from University of Maryland University College.

Soldiers of the 2nd General Support Aviation Battalion, 227th Aviation Regiment, 1st Air Cavalry Brigade, 1st Cavalry Division, and 1st Battalion, 18th Infantry Regiment, 2nd Armored Brigade Combat Team, 1st Infantry Division, work together to refuel an M1 Abrams tank during a simulated jump forward area refueling point (FARP) exercise at the Hohenfels Training Area, Germany Jan. 21, 2018. Soldiers are testing their capabilities during Allied Spirit VIII, an exercise to enhance NATO and key partner interoperability, build readiness, and strengthen relationships across warfighting functions. (U.S. Army photo by SGT Gregory T. Summers / 22nd Mobile Public Affairs Detachment)

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Back to Table of Contents

APD | ARMY PUBLISHING DIRECTORATE

AMERICA'S ARMY: SERVICE TO THE NATION STRENGTH FOR THE FUTURE

Below are some recently published aviation doctrine training publications. Download them today from the Army Publishing Directorate (APD) at: https://armypubs.army.mil

- Army techniques publication (ATP) 3-04.17, "Techniques for Forward Arming and Refueling Points"
- Training circular (TC) 3-04.11, "Commander's Aviation Training and Standardization Program, Change 1" (TC 3-04.11 supersedes TC 3-04.8)
- TC 3-04.71, "Aviation Maintenance Training Program"

Other publications now available through the Directorate of Evaluation and Standardization (DES) or the Directorate of Training and Doctrine (DOTD) on Army Knowledge Online (AKO):

- *Army Aviation Handbook*
- *Army Aviation Standard Operating Procedures*
- *Army Aviation Maintenance Standard Operating Procedures*
- *Low Level Training Support Package*

Look for the following doctrine and training publications—available on APD soon:

- Field manual (FM) 3-04, "Army Aviation"
- ATP 3-04.2, "Aviation Combat Tactics and Survivability"
- TC 3-04.3, "Army Aviation Gunnery"
- TC 3-04.9, "Commander's Aviation Mission Survivability Program, Change 1"
- TC 3-04.93, "Aeromedical Training for Flight Personnel, Change 1"

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Back to Table of Contents

The Army, NASA, and Their Shared DNA in Space Exploration

By SFC Tyler Hervey and CW4 Leonard Momeny

There are many today who feel that the National Aeronautics and Space Administration (NASA) has always been an organization that was autonomous in nature, completely civilian, but very few know of its exact origin and military oriented lineage. For those who do know a bit of space history, many see NASA's as being tied primarily to the Air Force more so than any other organization, but I am sure many would be surprised to know that it was the United States Army who would play a pivotal early role in human space-based technology and discoveries. While all of NASA's early work with respect to American space exploration was eventually performed by a tremendous team of people from all across the country, NASA wasn't even established until after the Army's first successful satellite launch. The Army's historical effort in space exploration predates the space shuttle, *Apollo*, *Gemini*, and even the *Mercury* programs. The Army made its first major contribution to space exploration in World War II with Operation Paperclip.

OPERATION PAPERCLIP AND THE ARMY'S BEGINNING IN SPACE

Operation Paperclip was the program name given for the acquisition and transportation of German rocket scientists, most importantly, Wernher Von Braun, back to the United States during the closing moments of World War II. The operation was largely carried out by special agents from the then Joint Intelligence Objectives Agency (JIOA) and special agents from the Army. The German scientists taken back to the United States comprised the heart and soul of Hitler's V-2 weapons program. At the height of World War II, the V-2 (Vergeltungswaffen-2—Vengeance Weapon 2) was the most sophisticated rocket ever built and first launched on December 19 and 20, 1934 (Nelson, 2010, p. 348-9). This weapon was not terribly successful, but the technology it used marked a new capability for man and the birth of a new era in human history, the Rocket Age. Both American and Russian forces were able to lay partial claim to the bounty of German rocket scientists at the conclusion of World War II, but it would seem that Russia applied the expertise of the scientists rather quickly. Under the oversight of chief Russian designer Sergei Pavlovich Korolyov, efforts to build a rocket were maximized in the Soviet Union. This increased effort toward achievement in rocketry was mostly due to Stalin's support for national technological achievement, specifically defense-related

Back to Table of Contents

Wernher von Braun rocket team at Fort Bliss, Texas in March 1946. Photo credits: NASA

technology, in order to provide the Russians with something comparable to the American H-bomb (McDougall, 1997, p. 46-56).

Americans would see the fruits of Korolyov's labor on October 4, 1957 at approximately 10:26 p.m., when a two stage R-7 rocket carried the world's first satellite, Sputnik, into orbit. The two-way transmitter inside the odd-shaped 184-pound ball would send a steady chorus of "meep…meep…meep" for the entire world to hear, immediately casting fear into the hearts of Americans across the nation (Nelson, 2010, p. 120). The shock of Sputnik sent Americans everywhere into a frenzy, especially journalists, and many wondered aloud if the U.S. had anything comparable to the Russian missile/space program. America did have something comparable to the Russian achievement in rocketry, and it was the Von Braun team. This team of Germans represented America's half of the Peenemünde scientists, who until this point had been working and testing rockets under the watchful eye of the United States Army at Fort Bliss, Texas. It was our own White Sands Missile Range that held so many early critical tests for America's early and most successfully propulsion technology that would eventually see space-based application.

Sputnik 1, while unique and the first human-made artificial satellite, was small and quite simple compared to today's satellites, carrying only a radio transmitter consisting of four antennae used for tracking the satellite's location in orbit was placed into an elliptical low-Earth orbit (LEO) by the Soviet Union. However, the data provided Soviet scientists with valuable information. The simple satellite allowed them to study the density of the upper atmosphere, effects of atmospheric drag, and the propagation of its radio signals provided information about the Earth's ionosphere. It was this event, specifically, that fueled the Cold War Space Race, pushing American science to new heights out of necessity. Sputnik was the catalyst for concentrated determination by the U.S. to speed up their space program.

Not to be outdone by the Russians, the United States Department of Defense hastily went into intense rocket testing. Two candidates quickly emerged; Project Orbiter sponsored by the U.S. Army and Project Vanguard sponsored by the U.S. Navy, competed for who would launch the first U.S. satellite. The Navy's Vanguard rocket was hurriedly selected over the Army's Project Orbiter rocket, Juno 1, and American leaders observed with the rest of the world as the Vanguard rocket barely escaped the launch pad before igniting into a plume of fire. Project Orbiter was eventually elected by default due to the Navy's failure to launch a satellite into orbit and in response, Juno 1, a four-stage Redstone rocket designed by ex-German Army officer Wernher Von Braun, was pushed into service. On January 31 1958, America's rocket team, led by Von Braun, managed to launch Explorer I via an amalgam of rocket stages that included a Jupiter booster, a first-stage extended Huntsville Redstone with second- and third-stage jet propulsion laboratory (JPL) Sergeants (Nelson, 2010, p. 125).

Explorer 1's mission payload was engineered by the renowned American astrophysicist, James Van Allen. Van Allen served as a physicist at the University of Iowa and assisted Wernher Von Braun under the U.S. Army's Project Orbiter. The Explorer 1 payload was designed with the primary purpose

Back to Table of Contents

of detecting cosmic rays. Cosmic rays are extremely energetic atomic nuclei and other particles traveling through space nearly at the speed of light. Cosmic rays continuously rain down on the Earth from outside of the solar system and can cause electronics problems in satellites, space stations, etc. Ultimately, Explorer 1 detected much fewer cosmic rays than were expected by James Van Allen. The astrophysicist suggested this might be because radiation in Earth's magnetic field may avert cosmic rays from entering low-earth orbit. Van Allen's suspicions were confirmed by Explorer 3, launched in March 1958. Explorer 3 successfully discovered the proposed magnetic field belts. Today, they are referred to as the Van Allen Belts. Later that summer, NASA would be born after a merger with the National Advisory Committee for Aeronautics (NACA), the Huntsville Army team (led by Von Braun), JPL, and others. Though the official line between NASA and the Army may had been separated at this point, the work, effort, and shared influence of both with respect to a shared history and future in space was only getting stronger.

ADVANTAGEOUS APPLICATIONS IN SPACE

Following the success of the Explorer missions, the U.S. Army went on to contribute to the U.S. space program through efforts such as the Signal Communications by Orbital Relay Equipment (SCORE). Designed by the US Army Signal Corp, the SCORE was successfully launched on 18 December, 1958 aboard an Atlas missile and was the first communications satellite in human history. The Army-led program communications satellite demonstrated that satellites could receive signals from one location on Earth and immediately retransmit to another location, as well as receive a signal, store it on an onboard recorder, and then transmit on command from the ground. The U.S. Army SCORE satellite built the foundation of future communications satellites that would be implemented by all nations. The SCORE satellite also served as another reminder to the world that the United States was a technological superpower. President Eisenhower himself sent a Christmas message of peace and good will through SCORE and beamed it to countries around the globe.

Following the successes of Explorer 1 and SCORE, the Army went on to develop sub-components for the lunar module booster rockets, as well as the concept of the now declassified photo-reconnaissance satellite system, codenamed CORONA. CORONA was ordered to be declassified in 1995 by former U.S. President Bill Clinton. The CORONA project's primary purpose was to collect imagery over strategic locations to provide national-level decision-makers much needed overhead imagery during the Cold War. From 1960 to 1972, the CORONA satellite constellation consisted of 144 satellites, of which 102 returned usable photographs. CORONA adopted a "launch and return" type of system where overhead photographs were taken in low-earth orbit via onboard cameras. In order to retrieve the photographs, the satellite released a pod containing two parachutes and imprinted film.

During its descent, the pod was recovered by an Air Force C-119 that hooked it in mid-air with a relatively low failure rate. In the event that the pod landed in the ocean, the film would be destroyed if it fell into non-American hands. Once successfully recovered, the film was then processed by the Central Intelligence Agency and U.S. Air Force. The intelligence collected by the CORONA constellation was unfathomable. The acquired by the system singlehandedly steered the direction of the Cold War. It was quickly realized that overhead imagery was paramount to mission success. It allowed the U.S. to determine the strengths, capabilities, and limitations of its adversaries and gave birth to a new generation in intelligence gathering. Over the course of its 12 operational years, project CORONA satellites ingested nearly a million photographs in support of the Cold War.

THE FIRST SPACE WAR

With the end of the Cold War, it seemed that Desert Storm/Desert Shield was already underway. What is significant about Desert Storm/Desert Shield is that it's considered to be America's first "space war," in that a notable use in satellite capabilities was leveraged during the execution of the campaign. For example, the Global Positioning System (GPS) was leaned upon heavily by service members that needed to negotiate foreign and barren terrain. During Desert Storm, the U.S. Army also learned some of its first lessons in the use of satellite communications (SATCOM), sparking an even greater interest in space-based capabilities for defense purposes. It would seem that even though faced with countless technological hurdles, the U.S. Army, through sheer perseverance, not only assisted in the development of space-based technologies, but learned valuable lessons as operators and users on the ground. The brief, yet successful, campaign proved once again that space-based capabilities were now to be considered invaluable to the warfighter.

SPACE AND ARMY

The United States Army uses satellites for communications, positioning and navigation (PNT), early warning, environmental monitoring, weather reports, surveillance and reconnoitering, and even targeting. There isn't a Soldier today who isn't using satellite-related products, nor will that change in the foreseeable future. Even in 1775, just over 183 years before the first American satellite was placed into orbit, Sol-

Back to Table of Contents

Anne C. McClain, 2013 Astronaut Candidate. 2013 ASCAN Portraits (NCO-164). McClain.

diers used the stars as a means of navigation in the darkness. Understanding the domain of space and its full impacts on the environment have proven essential to the efficient operations of land, air, and sea-related missions.

Army aviation, like the rest of the military, depends heavily upon the space domain and its assets when conducting operations. Whether it be through utilization of SATCOM, GPS, weather reports, surveillance and reconnaissance, and a number of other advantages, all space-based assets are used routinely in theater today by Soldiers at every level. However, times are changing. As other nations continue to modernize, their desire to prove their space-technology prowess drives a new era that feels eerily like the space and missile race of the Cold War period. Like the constant expansion of megacities, space is becoming increasingly crowded, and the fight to maintain overhead supremacy marches on. The Army is directly tied to the history of space and exploration, and the defense of the space domain and continued advancement in space-based technology is tied to the future success of the Army.

While there are a myriad of ways to interact with space, there are many who feel there is no way to participate in the future success of space-based endeavors, at least while you're in the Army. Well, nothing could be further from the truth. For those who meet the necessary level of curiosity, there is the Space Enabler identifier, or 3Y, which is achieved through attendance and successful completion of the Space 100 course. However, in addition to the opportunity found within the Space 100 course, the more daring souls can apply for the Army Astronaut Candidate Program. Army aviation has **contributed successfully to the ranks of NASA time and again through this program, and the list of astronauts include former International Space Station (ISS) Commander Colonel (Ret.) Robert Kimbrough (AH-64 pilot), former ISS science officer, Colonel (Ret.) Timothy Creamer (AH-64 pilot), and Lieutenant Colonel Anne McClain (OH-58D pilot). In fact, it was Lieutenant Colonel McClain who most recently launched to the ISS in support of *Expedition 58* and *59* as a flight engineer.**

The Army has unquestionably contributed a great deal to NASA and early space exploration, and that contribution continues today through the efforts of our tremendous teammates in the aviation branch. In addition to that, the space domain and all that past, present, and future contributors have and will contribute will continue to make a great deal of impact to the successful future of the Army. The future of the Army seems to rest in the stars, but the question is, will you be a part of the future success as the Army and aviation venture further into the space domain?

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CW4 Leonard Momeny currently serves as a Doctrine Writer and Tactics Analyst with the Directorate of Training and Doctrine, Fort Rucker, Alabama. Prior assignments include Fort Drum, Fort Riley, Fort Rucker, Fort Lewis, and Army Europe. He holds degrees from Southwestern College Kansas, Liberty University, and American Military University and is a graduate of Ranger School.

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Back to Table of Contents

THE AVIATION PLANNER'S P4T3:

A WAY TO ORGANIZE INFORMATION AND STREAMLINE YOUR PLANNING EFFORTS IN THE DECISIVE ACTION ENVIRONMENT

By MAJ Cameron Gallagher. All photos were taken by MAJ Cameron Gallagher

Planning is hard. It's even harder in the decisive action environment when your unit is asked to plan and conduct multiple operations simultaneously in support of different units at echelon, all while synchronizing efforts and building redundancy across the warfighting functions. Also, try and do all of this while the enemy—consisting of both a conventional peer force and irregular forces—is in your decision cycle and in contact with both you and the supported ground force. Even with a robust, seasoned battle staff and competent liaisons with both higher and supported units, conducting the military decisionmaking process (MDMP) for a phase of an operation is difficult in an austere environment. It's even harder when having to conduct MDMP for future operations while executing current operations simultaneously with degraded communications between your supported force and higher headquarters.

Many aviation task forces (TFs) struggle with synchronizing planning efforts and executing current operations for all of the aforementioned reasons. As the wave continues to build in the decisive action environment with multiple operations on the near horizon, compounded by limited or incomplete information from a ground force that is either in contact or preoccupied with its current mission, many aviation TFs resort to focusing their planning effort on the next event (i.e., the 10-meter target) instead of the most important mission. Further, in a time-constrained environment, the future operations to current operations transition is either incomplete or does not occur, and planning and rehearsals go by the wayside when the unit runs out of time prior to execution. When time is limited, many aviation TFs will delegate or push the mission planning down to the company/troop level—sometimes because they are unfamiliar with planning requirements or minimum fighting products necessary to accomplish the particular mission—but mostly because the company/troop has the personnel to plan (i.e., aviators not currently flying or down for fighter management) and the vested interest because they are going to be the ones who fly and execute the mission. This routinely results in air crews executing operations with limited situational understanding of their task and purpose and of the ground scheme of maneuver.

Top: Task Force 3-501 AHB CDR, staff, and aircrews participate in an air assault planning meeting during NTC Rotation 18-08

Middle: Task Force 4-6 CDR issues planning guidance and intent to TF XO and S3 during NTC Rotation 19-02

Bottom: Task Force 1-211 ARB planner briefs staff during NTC Rotation 18-09

Some unit planning standard operating procedures address the HOPE—higher, operational, planning, and enemy—timeline, but it is not codified in our current Army aviation doctrine. HOPELS, or higher, operational, planning, enemy, light/weather, subordinate, is the "a way" method and the planning version of P4T3 (P4-Problem, People, Parts, and Plan; and T3-Time, Tools, and Training). HOPELS provides a visual depiction across time, which allows the commander, staff, and subordinate elements to visualize upcoming operations, identify the greatest periods of risk to place key leaders at the points of friction and transition, and most importantly, offer predictability to the staff and subordinate units for future priorities.

1. **HIGHER.** The higher unit is the one you are working directly for and includes its timeline and upcoming missions. As an example, in the fight for Atropia under the mighty 52 Infantry Division (ID) Desert Warriors, the aviation TF has two higher units—the 52ID and the rotational Brigade Combat Team (BCT)—based on their tactical control (TACON) relationship for an AH-64 platoon and direct support for UH-60/CH-47 aircraft with the BCT. By breaking down the higher category, the aviation TF can balance planning priorities for upcoming missions. This will include everything from a major operation (i.e., Seizure of Razish) to the BCT rehearsal schedule by warfighting functions (i.e., fires/intelligence collection rehearsal).

2. **OPERATIONAL.** The operational section includes all named operations in addition to windows of TACON support (there are many times where the BCT may not give a specific task/purpose but is expecting support). By accounting for these known and unknown missions, the planners can anticipate current and future requirements. This also includes any aviation TF-directed missions to include internal tactical assembly area (TAA) jumps and any tactical road march movements.

3. **PLANNING.** This is where the TF executive officer (XO) and lead planner set the timeline for the MDMP and/or Rapid Decisionmaking and Synchronization Process (RDSP). This includes all MDMP-planning milestones and briefs (to include who is receiving them—i.e., XO if the commander is unavailable), air assault planning meetings and briefs, operations order brief, air mission briefs and most importantly, all rehearsals at echelon. In order to not run out of time, it is essential to allocate enough time to rehearse (i.e., map, terrain model) prior to execution.

4. **ENEMY.** This is where the S2—in conjunction with the higher BCT S2/DIV G2—lays out the conventional and special purpose forces/irregular enemy force timeline. When is (s)he going to attack, defend? When do we expect an attack on the aviation TAA and from what size force? Laying these out events in time allows the commander and protection officer in charge (headquarters and headquarters company/headquarters and headquarters troop [HHC/HHT]) command team, chemical, biological, radiological, and nuclear [CBRN] officer, Sergeant of the Guard) to think about when to elevate force protection.

5. **LIGHT/WEATHER.** Knowing when illumination will be green, amber, or red and when the transition periods between begin morning nautical twilight (BMNT) and sunrise and sunset to end of evening nautical twilight (EENT) well in advance will allow the commander to make decisions based on mission requirements and crew experience to mitigate accidental risk.

6. **SUBORDINATE.** In the last block, you put the crew cycle window for each company/troop/platoon/section. Is that particular element on a 12-hour or 14-hour duty day window? Are you shifting crews for an upcoming mission, and how will that affect future operations? Are you allowing time for any troop leading procedures and rehearsals below the aviation TF level?

Back to Table of Contents

Task Force 1-211 ARB planner briefs staff during NTC Rotation 18-09

Some have joked in the decisive action fight in Atropia that HOPELS will be the planner's version of P4T3. As many in the aviation community know, what started off as GEN (Ret.) Richard Cody's technique for streamlining maintenance troubleshooting while commander of the 1-101 Aviation Regiment in the early 1990s, is now codified in Army aviation doctrine, Army Technique Publication (ATP) 3-04.7, "Army Aviation Maintenance," among many other places (Department of the Army, 2017). It is nearly impossible to go into any combat aviation brigade's aviation maintenance or support company's production control meeting and not see a P4T3 checklist hanging on a clipboard. Whether or not HOPE, HOPELS, or some version of it is codified in future Army aviation doctrine, this acronym, visually depicted on a whiteboard in the aviation TF command post, plans tent, or expando van, will certainly allow the commander, staff, and subordinate units alike to operate off of a common operational picture for information to plan for future operations, and most importantly, to mitigate higher risk missions and periods of transition by placing key leaders with experience at those points of friction. In the end, this will reduce some of the vast amounts of friction in the decisive action environment and allow the aviation TFs to continue to conduct timely air ground operations in support of the ground force.

MAJ Cameron G. Gallagher is the senior aviation operations trainer for Eagle Team, Operations Group, National Training Center, Fort Irwin, California. He has more than 15 years of service and is a qualified AH-64D aviator.

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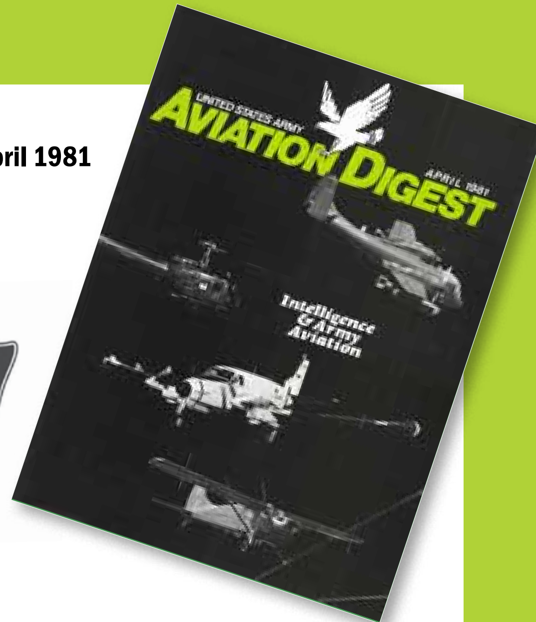
Aviation Digest **Archived Article April 1981**



Aviation Training

Management, Equipment, Resources, Personnel

LTC(P) Gene Grayson and LTC Tom Rountree
Training Directorate, ODCSOPS
Headquarters, Department of the Army

TRAINING ARMY aviators is the most expensive training program in the Army today. Added to the escalating resource costs, aviation training is also one of the lengthiest training courses. Finally, the instructor-student ratio is at a 3:1 level which further exacerbates the careful management required at Department of the Army (DA) level. As a result of several key factors relative to aviation training; training management; equipment and its relationship to training; resources, which drive the train in all areas—and, when adding each of these to the significant role Army Aviation will play on tomorrow's battlefield—careful management at the DA level of aviator training, aviation training and aviation related equipment training is essential.

It is no surprise that the potential enemy on a European or Middle East battlefield will start the war with a vast numerical superiority of Soldiers and fighting equipment such as tanks, artillery and mechanized vehicles. We also can assume that at least today this enemy has developed a technical parity in most areas which closely matches equipment used by U.S. Soldiers. The key is that to overcome numerical superiority and a technical parity, our Soldiers must be better trained, more technically and tactically qualified, and motivated to a higher degree than their adversaries. Just as the Army is training Soldiers in other specialties in order to fully exploit their weapons and equipment, Army aviators must be and are being trained to tactically employ the aircraft and aerial weapons which will play a significant role on the battlefield. In "plain talk," we are talking about **quality training**—ensuring that Army aviators are the most technically and tactically proficient flyers in the world.

The Aviation Training Branch in the Training Directorate is a relatively new organization. Prior to the directorate organizing under its first director, Major General James C. Smith (see "Last Liaison Pilot Retires," February 1981 ***Aviation Digest***), aviation training was in Deputy Chief of Staff for Personnel (DCSPER) as part of the Individual Training Division. Most aviation actions were managed by the Requirements Directorate; Combat Division. With the organization of the Training Directorate, including the Individual Training, Unit Training and Training Support Divisions, aviation training became a full branch. Simultaneously, and of particular significance particularly within the training arena, DA management of P8 training and P2 mission funds was placed under one DA level directorate.

In order to bring all aviation training actions under one directorate, in November 1979, nine functions were transferred from Requirements Directorate to the Training Directorate. These included: individual aviator training; unit aviation training; aviation standardization; SFTS (synthetic flight training systems) use; the Army Flying Hour Program; aircrew training manuals (ATMs); flight records; aviator training waivers; and the DA Specialty 15 monitor. The Aviation Training Branch at DA level assists in the management, development and presentation of high quality training by primarily ensuring DA training strategy is initiated, and ensuring adequate resources are programed and are available to conduct that training. The Army Chief of Staff, during personal addresses to battalion and brigade precommand courses states: "Commanders must know that of all the balls they have in the air at any time, only two are glass—training and maintenance!!" The DA Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), during the Fiscal Year (FY) 1980 Aviation Policy Board, further challenged the aviation community by stating that training must be oriented toward providing the ground commander aviation support 24 hours-a-day, 7 days-a-week, to include during adverse weather. The first DA Director of Training reinforced this challenge during the FY 1981 Aviation Training Symposium, and provided additional guidance on the combat oriented training course we must vigorously pursue during the 1980s.

Following this brief introduction, it is necessary to provide an update on just what the Aviation Training Branch is chartered to accomplish within the Army Staff (ARSTAF), the major commands (MACOMs) and the entire aviation community, and how the process works. Probably the most carefully managed and closely scrutinized program in the Army today is the Flying Hour Program. The Aviation Training Branch is the DA manager, developer and proponent of this program which, as many of you will recall, has been totally revitalized during the past 4 years. The radical cuts by Congress in the past as a result of flying hours not being tied to readiness have been eliminated, and today the Army Flying Hour Program is combat oriented and 100 percent tied to individual/unit readiness. The primary reason for the Office of Management and Budget (OMB), Office of the Secretary of Defense

(OSD) and Congressional turnaround can be tied directly to the aircrew training manuals. The ATMs, for which the service schools within the TRADOC community have proponency, define tasks and iterations which, when accomplished, are tied directly to individual aviator and unit training readiness. Beginning at the lowest levels, the Flying Hour Program and ATMs are the nucleus for developing the program. Subsequent command echelons refine/add/revise, etc., required flying hours until final consolidation at MACOM levels. MACOM flying hours requirements are submitted to DA in the Command Operating Budget. Programs are consolidated by the Aviation Training Branch, further revised as required, and vigorously defended through the ARSTAF, OMB, OSD until inclusion in the annual President's Budget.

To illustrate why this program draws so much attention, the FY 1981 program, for example, has leveled at 1.6 million hours at a cost of more than $324 million. As a result of the ATM, it appears that from FY 1982 through the outyears, the program will stabilize around 1.7 million hours. Because of the close ties between the ATMs and the Flying Hour Program, the Aviation Training Branch is also the DA proponent for the aircrew training manuals. Particular emphasis is given to continually updating the ATMs through revision to ensure tasks and iterations are oriented toward combat mission accomplishment.

As indicated, the primary role is to ensure that DA guidance and directives which develop the Army Aviation training strategy are implemented. During the 1980s this training strategy is oriented toward increased combined arms, nap-of-the-earth, night hawk/night vision goggle, air assault, aerial gunnery and tactical instrument training. Additionally, within budget constraints (people and dollars), programs of instruction at the U.S. Army Aviation Center (USAAVNC), Ft. Rucker, AL, in both undergraduate helicopter pilot training and instructor pilot courses will reflect increased tactical training. Vigorous action is presently ongoing to fund during FY 1983 to 1987 numerous programs at Ft. Rucker in this area.

The capability of individual aviators and units to successfully accomplish combat mission requirements is evaluated through various MACOM aviation resource management survey inspections and by a vital extension of the DA DCSOPS—the Directorate of Evaluation and Standardization (DES) at the Aviation Center. All DES evaluations are forwarded through channels until ultimately reaching the DA Training Directorate. From this report, areas requiring further emphasis are analyzed and on occasion result in DA directions to the field in order to assure command interest is oriented toward a particular training area.

Shortly after the formation of the Training Directorate in 1978, three chapters of AR 95-1, "Army Aviation: General Provisions and Flight Regulations," were transferred from Requirements Directorate to the Training Directorate. As such, the Aviation Training Branch is now the DA proponent for Chapter 2: Training Qualification, and Proponency and Readiness Annual Requirements; Chapter 6: U.S. Army Flight Standardization; and Chapter 7: Individual Flight Records Folder and Individual Flight Records. In each of these areas, there is a close and near daily coordination with USAAVNC-DES, and other directorates, in the management of and responding to issues from the field.

Another key responsibility of the Aviation Training Managers at DA is through coordination with Military Personnel Center (MILPERCEN), Army National Guard and U.S. Army Reserve, to develop the aviation training rates necessary to man force structure requirements. Closely aligned with aviation training rates is the follow-on mission to ensure the aviation training base is sufficiently resourced in people, equipment and dollars to support defined training requirements. Now, how does this system work? The aviator requirements are developed by MILPERCEN and DCSPER through a process which compares the current force with requirements in future years. Obviously close coordination is required with Deputy Chief of Staff for Logistics (DCSLOG) and DCSOPS as a result of the overlap with new equipment and new units. So, although the requirements are developed within the MILPERCEN/DCSPER arena, changes in the aviation unit structures and the addition or reduction of the number of units are the basic factors which drive the Army Aviation training rates and add dollars. In all cases, the first question posed by the analysts is, "How much does it cost?"

Prior to any training rate increase, there are hard questions which must be answered. What is the cost? Can the load be accommodated at the Aviation Center? How many new military and instructor pilots will be required? What construction requirements are necessary (e.g., classrooms, barracks, stagefield, etc.)? Are there sufficient basefields? Is the airspace sufficient? Can the simulators handle the increased load? What about the maintenance contract? How many additional aircraft, etc.? The commanding general of the Aviation Center and his staff develop the answers.

Costs, leadtimes, personnel requirements, numbers of aircraft and simulators are computed and forwarded through TRADOC to the DA Aviation Training Manager. The numbers are verified or adjusted as necessary by the personnel, logistics and budget staffers. A total cost to support the required training rate is developed. Plans to shift personnel and aircraft are formulated. Military construction is examined for cost and feasibility and a total resource package is put together by the Aviation Training Manager. This procedure is completed by the Army staff each February.

Earlier, as a result of many factors, principally a recognized shortfall in warrant officer aviators, it was determined that, beginning in FY 1983, the Army needs to annually train more warrant officer aviators. Previous warrant and commissioned officer increases were developed and programed for FY 1981 to 1986, resulting in a dramatic training rate increase at Ft. Rucker. The Directorate of Resource Management at the Aviation Center, with guidance from DA and TRADOC and in coordination with the other directorates at the Aviation Center, prepared documents to answer all questions relating to the cost associated with that training rate. The resource requirements were "staffed" at TRADOC and DA. Decisionmakers at the DA compared the costs with the cost of other training and procurement and concluded that the cost was justified. Thus, if the increase can be successfully defended, the Army program objective memo will contain a requirement to train at the increased rate and the displays and costs associated with these rates.

The Army's training rate must be approved at DOD level. If it is, the necessary funds will be included in the President's Budget annually. When approved, MILPERCEN will identify and order the added personnel needed to conduct the training at the Aviation Center. The Training Manager "tracks" and coordinates this action throughout. Just as in the Flying Hour Program, he must be able to justify the expenditure of every dollar and be able to explain why the money, people and hours are needed. Decisionmakers normally are interested in the consequences of not funding a program. The Training Manager explains them.

The quality and quantity of aviation training are the Training Manager's principal areas of staff responsibility. Interspersed within those major areas of concern are such diverse things as coordination of Individual Ready Reserve aviation training; planning and programing for UH-60 Black Hawk transitions; ensuring the entire aviation community is aware of training milestones such as the recent tactical instrument program developed and successfully executed in U.S. Army, Europe; representing the Director of Training at major annual standardization/training conferences; primary staff action for coordinating all actions which have resulted from the Department of Defense decision to consolidate helicopter pilot training for all the services at Ft. Rucker; and the airspace management arena, in order to ensure training will enable successful operation within controlled airspace. Because of the high cost of aviation courses at Ft. Rucker, plus the fact that students include U.S. Army, U.S. Air Force and foreign military, the DA Aviation Training Managers closely monitor and often personally manage the undergraduate and graduate programs of instruction in the Army Program of Individual Training, or the ARPRINT. This is accomplished through direct coordination with the Aviation Center's Directorate of Training and Doctrine, TRADOC, MILPERCEN, the DA DCSOPS Security Assistance Division, Headquarters, U.S. Air Force, and on occasion, the State Department. In addition to aviator training, the Aviation Training Branch remains in close contact with MILPERCEN and TRADOC reference aviation MOS (military occupational specialty) producing schools such as recent requirements within the 67T field. As various basis of issue plans change, Soldiers programed into the 67T courses change, and every change requires resources, either personnel or dollars.

A recent DA initiative resulted in the first worldwide Aviation Training Symposium held at Ft. Rucker which preceded the annual DA Policy Board Meeting. This symposium was an unqualified success, and it offered all participants an opportunity to present key training issues, problems, etc., and exchange training highlights. Of particular value, the Aviation Center presented training updates and each directorate was represented in order to assist and respond to questions from the field. As a result of the success of the symposium, the commander of the Aviation Center and DA director of training agreed that it should be held annually and precede the Policy Board.

The Aviation Training Managers have a hefty workload and an exciting challenge. In almost every Army Aviation action, training fits into the issue. As such, constant coordination and staff actions are conducted with Aviation Requirements and Aviation Systems Division, ODCSRDA (Office of the Deputy Chief of Staff for Research, Development and Acquisition); Aviation Logistics Office, ODCSLOG; Aviation Force Development, ODCSOPS; the Aviation Readiness Office within the Force Readiness Division, ODCSOPS; the U.S. Army Safety Center; MILPERCEN and ODCSPER; the Army National Guard and Army Reserve; and of course each MACOM aviation officer and staff. Army Aviation now is fully integrated into the combined arms team, and this vital asset must be trained in order to provide the firepower and mobility required on tomorrow's battlefield. Army training developers have, through meticulous research and thorough development, devised new methods in which to employ aircraft in the high threat environment. These methods are published Armywide, clearly pointing out that through proper training, Army aviators can not only survive on the high threat battlefield, but can and will provide that extra ingredient which may mean the difference between victory and defeat.

Back to Table of Contents

Aviation DIGEST

2018 Article of the Year

We hope that *Aviation Digest* provides you with interesting, relevant, and informative material in each issue. If our authors did not take the time to share their thoughts, personal experiences, and advice, *Aviation Digest* would not exist as Army Aviation's Professional Bulletin.

To show appreciation for each *Aviation Digest* contributor sharing his/her professional opinions and ideas with the Army aviation community, MG William K. Gayler, Commanding General (CG), United States Army Aviation Center of Excellence, acknowledges each contribution with a Certificate of Appreciation and a printed copy of *Aviation Digest* containing the author's article.

At the end of each year, the *Aviation Digest* Editorial Review Board reviews all articles from the year's four issues and recommends one article to the CG for the *Aviation Digest* Annual Writing Award. The author of the selected article will receive a coin from the CG and a Certificate of Appreciation designating his/her article as the *Aviation Digest* Article of the Year.

The *Aviation Digest* Annual Writing Award for 2018 is presented to **COL Joseph Degliuomini** and **CW4 Leonard Momeny** for their contribution in penning, **"Enhancing Warfighter Focus: Aviation Branch's In-Stride Shift to LSCO,"** published in Volume 6/Issue 2 (April–June 2018, pp. 23).

Congratulations, COL Joseph Degliuomini and CW4 Leonard Momeny!!

Read it online by clicking the image below, or find the issue in our archive: https://www.rucker.army.mil/aviationdigest/index.html

*Please note: the author is not required to be a professional writer. The *Aviation Digest* staff extensively collaborates with each author to ensure his or her article is professional and accurately conveyed.

Back to Table of Contents

The *Aviation Digest* Editorial Review Board uses the following criteria to select *Aviation Digest's* Article of the Year.

Does the article have a purpose?

Has the author identified an issue within the aviation branch requiring command attention/action to improve existing procedures or operations?

Has the author recommended revised tactics, techniques, and procedures for commonly accepted operational practices that simplify and increase efficiencies?

Has the author presented an article that improves audience knowledge of doctrine or other established operational procedures?

Has the author related an experience that others may benefit from professionally or that may potentially prevent an aircraft accident?

Does the author present factual and researched information to support the article?

Has the author recommended a realistic solution to remedy or improve those conditions causing a perceived deficiency?

Has the author presented a discussion based on facts and not suppositions, generalizations, or vague innuendos?

Does the author present his/her article as an organized discussion—introduction to the issue, background information, and meaningful presentation of discussion points, summary, and conclusion?

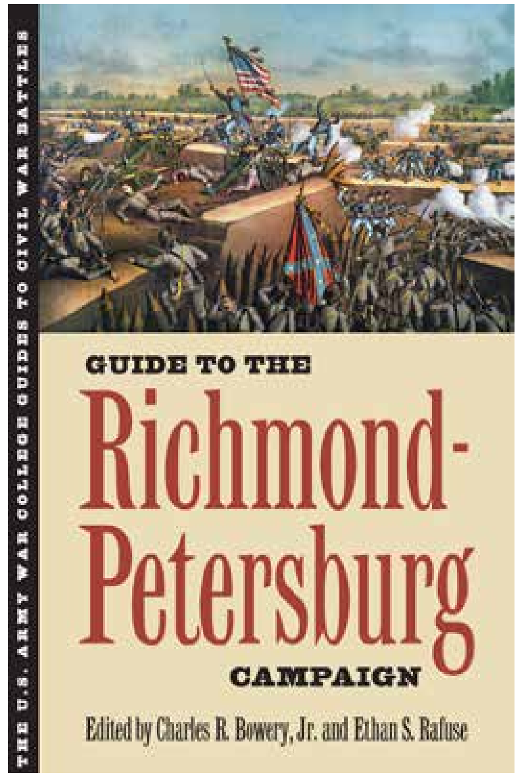
Was the article easy to read and did it follow the discussion points?

Did you understand the author's message?

Guide to the Richmond-Petersburg Campaign

Edited by Charles R. Bowery, Jr. and Ethan S. Rafuse, Published by the University Press of Kansas, 2015, Kansas
512 pages

Book review and photos by Mr. James T. Gallagher



The book, ***Guide to the Richmond-Petersburg Campaign*** is set up like a travel guide. I am familiar with this area, so I know where many of these locations are. Some of the book's diagrams have the present day road system overlaid with the 1864 maps, which is very helpful to put locations in perspective.

My first perception is that if you are a true Civil War historian, this book will appeal to you. All the letters and diaries of Union and Confederate officers and enlisted are fascinating reading. The letters of GEN Ulysses S. Grant, GEN Robert E. Lee, MG Winfield S. Hancock, MG George C. Meade, and other Corps commanders provide the historical setting that is available in other Civil War books; however, I was interested in the regimental commanders' insights. Their writings, in general, indicated situations as they knew them, the actions they took, the gallantry of their men, and the morale of their units. While enlisted diaries/letters are few, they detail their hopes and fears, what they thought of their units, and what they thought of the enemy.

Most are aware that the Siege of Petersburg was the longest of the Civil War, lasting from June 1864–April 1965, and was one of the last campaigns of the war. However, it signaled a change in tactics for the future. There is correlation to the trench warfare of World War I with the Siege of Petersburg.

The book is broken up into a series of vignettes, which constituted the major battles of the Siege. The book is also not in chronological order. It is written generally in the sequence of locations rather than time. For instance, the Battle of Fort Stedman (25 March 1865), is in the front of the book because of its proximity to the Crater (30 July 1864). The National Park Service has four major parks devoted to the Siege of Petersburg; City Point Unit, which I visited last year. Grant's headquarters house is there, but there is not much else that was retained from 1865. The Eastern Front Unit, the Western Front Unit, and Five Forks Unit are the three other major parks devoted to the Siege. Many engagements were fought on what is now private land and may be indicated by historical markers, especially on the east bank of the James River, where the 2nd U.S. Corps was blocked twice on the road to Richmond.

I was disappointed in the tactical maps that were included in the book. The writing was very small, and the maps themselves could have been more detailed

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Back to Table of Contents

and better explained.

Units that were part of the Siege and then withdrawn, like MG Jubal A. Early's Second Corps being sent to the Shenandoah Valley, were briefly explained. There are no letters from these units except for their actions at Petersburg.

The book actually begins after Cold Harbor, where GEN Lee blocked GEN Grant's advance to Richmond. The book details the Union's scheme of maneuver to cross the James River on the longest pontoon bridge built in the war to attack from the east of Petersburg.

A very detailed description of the logistics operation the Union built at City Point after the first offensive failed is one of the greatest operations of any war. The Union effectively built a city full of everything it took to sustain an army. From the field hospital to ammunition storage to repair facilities, building and connecting the railroad to existing railroads; the City Point Wharves, which were located at the confluence of the Appomattox and James River, became the busiest port in the world during that time period. The James River became the most critical line of communication that the Union held during the Siege.

If you visit the Richmond/Petersburg area, the book is very helpful. It will help you locate places that have not been preserved. Most of the Deep Bottom Battles are now private property, and there is only one Battlefield Park in that area on the other side of the James River.

The book ends anticlimactically with GEN Lee's letter to President Jefferson Davis stating that the Army of Northern Virginia was evacuating Petersburg and Richmond and heading to link up with GEN Joseph E. Johnston. It left me wanting much more.

FREE BOOK PROGRAM

To participate in the free book program, you must agree to provide a written review of the book to be used in future issues of *Aviation Digest's* Turning Pages section. We request that the review be one written page (approximately 825 words).

Visit our Book List page on our Web site to see a listing of the program-eligible books. To receive your free book, please contact the *Aviation Digest* editor with your book request. Book review guidelines and examples are available upon request.

Back to Table of Contents

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Look for the April–June 2019 Issue:

Our Featured Focus Will Be
Lethality *... and More*

Write for Aviation Digest!

Scheduled Feature Focus Topics are:

July–September 2019: ***Aviation in Support of Division and Corps Training***

October–December 2019: ***Leadership***

Prepare your articles now on these themes or any other topic related to our profession that you would like to share with the Army Aviation Community.

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Back to Table of Contents