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UNMANNED AIRCRAFT SYSTEMS AND AIRSPACE

IN THIS ISSUE:

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By Order of the Secretary of the Army:

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Soldiers from C Company of the 2D Battalion, The Yorkshire Regiment–the 'Experimental Company,' are working alongside the Infantry Trials and Development Unit during Project Convergence 22. They utilized equipment such as the Skydio unmanned aerial vehicle and variants of the Remote Piloted Vehicles Company. Photo courtesy of the Army Futures Command.

The Command Corner

Unmanned Aircraft System Summits: A Way to Get There

The saber-rattling was over, and your formation deployed to deter and, if necessary, engage and defeat an adversary. The initial deployment went well. Those previous rotations to the National Training Center really paid off. Except for some minor logistics issues getting out of your home port, your unit is ready for its mission.

Overall, your unit arrived in country and deployed to their forward operating base without incident. You dispersed your formation within a geographical swath of terrain, camouflaged, and your communications are up and running. What is that droning sound overhead? It's an unmanned aircraft system (UAS), but it must be one of ours. **Or is it?** While we posit that our first contact with our adversary should be unmanned, this position could—and probably is—the same as our adversary, who also fights their UAS.

This scenario, while fictitious, is something our forces will have to contend with in a hostile theater of operation. The reality is that a UAS continues to grow in its technological growth and employment. The UAS, as a weapon of war, has expanded exponentially in recent conflicts such as the second Nagorno-Karabakh War (Armenia/Azerbaijan) in 2020, the Russia-Ukraine conflict beginning in Crimea in 2014 and expanding to western Ukraine in 2022, and the recent employment of drones by Israel and Hamas and Hamas sympathizers (i.e., Iran-backed Houthis attacks on Israel and commercial ships in the Red Sea).

As the UAS proliferates, Army Aviation must understand this technology's impact and functional implications. The Aviation Center of Excellence (AVCoE) understands this all too well and, as such, has initiated ways to gain insights into emerging UAS development and issues. One way the AVCoE is doing this is by hosting summits for the entirety of our UAS community.

The purpose of the summits is to allow participants with common interests to meet and share information on UAS. The participants are a collaborative group of military, government, and industry stakeholders. In 2024, AVCoE sponsored two UAS summits; another one is on the horizon later this year.

In June 2024, the AVCoE, Aviation Capability Development and Integration Directorate (CDID), Air and Missile Defense Cross-Functional Team, and Fires CDID hosted the first Army-wide Aviation Platform Counter UAS (CUAS) Science, Technology, and Industry Summit at Fort Novosel, Alabama. More than 300 DoD representatives and 30 industry teams attended this event.

The intent of this summit was to gain a mutual understanding of the Army's CUAS requirements and gaps, while identifying innovative capabilities across the science, technology, and industry communities that could be employed on aviation platforms to fulfill the *Whole of Army Approach* for CUAS in the air-ground littoral.

The summit executed a combination of group briefings and one-on-one sessions to exploit the body of knowledge and build an understanding of the issues. Some of the salient points gleaned were updates on the five critical Lines of Effort for the Army's CUAS Strategy and the Whole of Army Approach. This approach included a discussion of how Army Aviation could impact the aerial tier of the CUAS fight. The Fires CDID Director also discussed an upcoming Army C-small UAS (CsUAS) Memorandum of Agreement between stakeholder CoEs (known colloquially as a "Scrum") that frames a holistic approach to delivering a layered, complementary, and redundant CsUAS solution for the Army. Furthermore, the Aviation CDID outlined guidance for leveraging the enduring Army Aviation fleet and existing systems onboard those aircraft to conduct CUAS. This approach will ensure rapid fielding and integration through minimal impact on doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. Finally, the Army Capability Managers briefed their portfolios targeted at the industry representatives in the audience, including the CUAS gaps; requirements to mitigate those gaps; the intended operational employment parameters of their platforms; and the space, weight, and power constraints of their platforms within their portfolios.

These successful summits broaden participants' understanding of UAS capabilities and issues. The AVCoE contributes to the body of knowledge that a UAS brings to the air-ground littoral. In collaboration with other CoEs, the AVCoE will continue to host these critical UAS summits. They allow us to bring together the resident expertise to discuss, update, and plan the ways ahead on issues of great importance to our Army.

Make no mistake: Unmanned aircraft systems are vital to our future fight. We must make first contact with unmanned systems; shame on us if we don't. While we are on a path to autonomy, human-machine teaming will evolve as technology advances. Full Human-Machine Integrated formations are the pinnacle, but we are not there yet.

As we mature the UAS, we must determine the balance of manned and unmanned systems supporting Army Aviation. We are still analyzing what that balance should be, but the equilibrium for the warfighter will govern it. The UAS serves a need and purpose on the future battlefield, but manned assets will certainly always have a role. The crossover point will happen when the unmanned capability can reliably replicate and outpace the manned capability.

As we tackle these issues, we must be "joined at the hip" with our other CoEs, our joint teammates, and industry partners on UAS. We have a clear responsibility to support joint and combined arms forces on the ground. Regarding UAS development and procurement, Army Aviation can only honor this commitment if we understand their requirement and how best to support them. Our close relationship with the other CoEs will help us implement this decisive capability to the combined arms joint fight.

Army Aviation can integrate unmanned and manned capabilities with joint/combined fires and maneuver to penetrate, disrupt, disintegrate, and destroy our adversaries during all combat phases throughout the breadth and depth of the battlefield. We are experimenting with some incredible technology, but the decisive edge is the Army (Aviation) Soldier ensuring our machines execute in accordance with the commander's intent.

We are an Army in transition. The key to success is being ready to adapt to change at the speed of change. Buckle up—it's going to be an exciting future. Fortune favors the bold!

Above the Best!

Fly Army!

Clair A. Gill
Major General, USA
Commanding

TigerShark unmanned aircraft tested at U.S. Army Yuma Proving Ground, Arizona. U.S. Army photo by Mark Schauer.

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Please submit articles via MS Word document format. Articles should not exceed 3500 words. Include a brief biography (50 word maximum) with your article. We invite military authors to include years of military service, significant previous assignments, and aircraft qualifications in their biographies.

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The *Aviation Digest* upcoming article deadline and publication schedule is as follows:

January-March 2025 (published on or around February 15, 2025). Accepting articles now through December 15, 2024.

April-June 2025 (published on or around May 15, 2025). Accepting articles now through February 15, 2025.

July-September 2025 (published on or around August 15, 2025). Accepting articles now through May 15, 2025.

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

Notices to Air Missions (NOTAMs)

Directorate of Training and Doctrine Director (COL Sean C. Keefe):

The Directorate of Training and Doctrine is in the final stages of releasing Field Manual (FM) 3-04, "Army Aviation," a crucial document that provides essential guidance on the role, organization, and employment of Army Aviation forces. The manual has been submitted to the Combined Arms Doctrine Directorate for final review and approval. Once approved, FM 3-04 is expected to be published on the Army Publishing Directorate website by the end of the year, making it accessible to all Army personnel.

At the same time, the companion publication, Army Techniques Publication (ATP) 3-04.1, which focuses on Aviation Tactical Employment, has already gone through a thorough global staffing adjudication process. This involved gathering and addressing feedback from relevant stakeholders across the Army Aviation community to ensure the publication's accuracy and relevance. Army Techniques Publication is now awaiting final U.S. Army aviation Center of Excellence approval. Following the publication of FM 3-04, ATP 3-04.1 is expected to be released a few months later.

Furthermore, the Directorate of Training and Doctrine continues to develop training models for the Future Long Range Assault Aircraft (FLRAA) to shape the overall FLRAA training strategy. We've conducted several site visits with our sister services to learn from their tiltrotor experiences and best practices. We're collaborating with FLRAA stakeholders across the Aviation Enterprise to map out the integration of FLRAA into both operational and institutional forces.

Above the Best!

Training Division Chief (Mr. Bo Thurman):

If you have questions for the Directorate of Training and Doctrine's Training Division, please feel free to contact us at usarmy.novosel.avncoe.mbx.dotd-training-division@army.mil

If you need access to the Aircrew Training Manuals (ATMs), they are located at the following common access card-enabled link: https://armyeitaas.sharepoint-mil.us/:f:/r/sites/TR-ACOE-DOTD/Flight%20Training%20Branch%20Documents/ATMs?csf=1&web=1&e=OoMPRY

The Directorate of Training and Doctrine wants to hear from ALL military occupational specialty (MOS) 151A, 15G, 15T, and 15F Soldiers. We value your opinion, your experience, and your time and would like all of you to complete these surveys.

The Aviation Maintenance Technician MOS 151A survey is now open and will close 17 January 2025. Participants can access the survey using the QR code or the link: https://survey.tradoc.army.mil/EFM/se/0AFDD71A5CD34007

The Aircraft Structural Repairer MOS 15G survey is now open and will close 9 March 2025. Participants can access the survey using the QR code or the link: https://survey.tradoc.army.mil/EFM/se/0AFDD71A51405267

The UH-60 Helicopter Repairer/Aircrew Members, MOS 15T survey is now open and will close 11 May 2025. Participants can access the survey using the QR code or the link: https://survey.tradoc.army.mil/EFM/se/0AFDD71A05D29F0D

The Aircraft Electrician, MOS 15F survey is now open and will close 3 August 2025. Participants can access the survey using the QR code or the link: https://survey.tradoc.army.mil/EFM/se/0AFDD71A191FB67B

Tactics Branch (Branch Chief: MAJ Dustin Ramatowski):

Army Aviation will be updating the force on observations at Combat Training Centers (CTCs) via the "Quick-Fire" Observation tool. The Center for Army Lessons Learned developed a "Quick-Fire" observation tool (See quick response [QR] code below) to provide Soldiers and units a readily accessible method to upload, share, and discuss lessons observed during operations and training. The tool works on any mobile phone and will store observations in a cloud database for further analysis.

We've listed some of the lessons learned observations from National Training Center (NTC) rotation 24-07, with the 1-2 Stryker Brigade Combat Team (SBCT), uploaded to "Quick-Fire" for unmanned aircraft systems (UAS) and small UAS (sUAS).

Observation 1 (14 May 2024)
National Training Center 24-07 was the first collective training event in which 1-2 SBCT was not able to employ Tactical UAS (TUAS) platforms (Raven and Shadow), given the Department of the Army (DA)-mandated divestiture of those systems.

Discussion
The absence of Shadow platforms substantially restricted our ability to answer brigade (BDE) priority intelligence requirements and confirm enemy courses of action through observed indicators. Without those systems—and by extension the Raven platforms at battalion (BN)—we lacked the requisite depth of collection assets to confirm or corroborate threat composition and disposition. Additionally, the frequency of BDE main command post (MCP) jumps created extended periods of intelligence black-out periods for the BDE Main. This necessary, but disruptive, event often placed the MCP S2 node on the back foot in battle tracking the BDE Close/Deep fights on site re-establishment. Additionally, the BDE lacks an organic Counter sUAS (C-sUAS) capability. Given the ubiquitous nature of UAS use on the modern battlefield, BCTs must field a system that allows them to detect and defeat enemy UAS. The BDE contracted a C-sUAS system from Science Applications International Corporation, or SAIC, that covered a 7-kilometer bubble around the BDE MCP, but it could only detect (the BDE was not allowed to use the defeat capability SAIC offered to provide due to exercise rules of engagement).

Recommendation
To mitigate the effects of losing tactical and sUAS, as well as the Cavalry Squadron, we recommend the BDE explore the acquisition, fielding, and use of commercial off-the-shelf UAS platforms in-depth as a stopgap measure for collection. Three-dimensional-printed part replacement and operator training would serve as a sufficient interim solution while DA pursues an eventual future platform for TUAS. Additionally, a rear command post node is an excellent method that 1-2 SBCT tested to mitigate the effects of a total stand down of the Intelligence Warfighting Function during extended tactical operations center displacements. If it is well resourced with the BDE intelligence support element; geospatial intelligence support for full-motion video processing, exploitation, and dissemination/ground moving target indicator; field artillery intelligence others from BDE Fires; and other key information collection/Fires enablers, it can absorb the fight for set periods while the BDE Main re-establishes. The Army should quickly field BCTs as an organic C-sUAS capability.

QUICK-FIRE

https://www.army.mil/CALL

CTC: UAS Integration Observation 2 (02 May 2024)
Brigade combat teams struggled to plan for and integrate TUAS with the scheme of maneuver, resulting in infrequent emergency requests for division UAS support. Similarly, BNs and Companies struggle to effectively plan and synchronize sUAS operations with the Fires and maneuver plan.

Discussion
Planners typically did not forecast TUAS requirements outside of 24 hours or synchronize its operation with fires and maneuver, significantly degrading the BCT's abilities to collect on named areas of interest beyond the forward line of own troops. Maneuver-centric planning efforts lack in subject matter expertise on TUAS employment and synchronization.

Recommendation
Integrate UAS assets into the scheme of maneuver, at echelon, to set conditions for sensors to make contact with the enemy before Soldiers. Build and maintain a deliberate sUAS program within the BN to ensure operator competence and a culture of sUAS employment. Incorporate UAS into training events at echelon to get sets and reps prior to arrival at the CTCs.

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Address Book:

Fort Novosel has gone through several SharePoint migrations in the past year.

As of 4 March 2024, the active DOTD public-facing SharePoint is: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD

Training: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Training-Division.aspx

DTAC: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/DTAC.aspx

Aviation Leader Kit Bag: new address! https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-ALKB

Aviation Training Strategy: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/DOTD%20Documents/Forms/AllItems.aspx?id=%2Fsites%2FTR%2DACOE%2DDOTD%2FDOTD%20Documents%2FArmy%20Aviation%20Training%20Strategy%2Epdf&parent=%2Fsites%2FTR%2DACOE%2DDOTD%2FDOTD%20Documents

Aviation Branch Operations SOP, Annex A (Aviation Handbook), Annex B (Aviation Liaison Officer/Brigade Aviation Element Handbook), Annex C (Risk Common Operating Procedure), and Branch Maintenance SOP: https://armyeitaas.sharepoint-mil.us/:f:/r/sites/TR-ACOE-DOTD/Aviation%20Branch%20SOPs/Aviation%20Branch%20Operations%20SOP?csf=1&web=1&e=M3gYgb

DOTD Education and Technology Branch *(questions regarding the development and/or the development, implementation, and administration of interactive multimedia instruction)*

- Branch Chief: Mr. Chuck Sampson at 334-255-0198 or charles.l.sampson10.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/Educational-Technologies.aspx

DOTD Enlisted Training Branch *(questions regarding NCO professional military education [PME] and AVN Operations/Unmanned Aircraft Systems initial military training [IMT], ATC/UAS Warrant Officer Basic Course, and Aviation Life Support Equipment)*

- Branch Chief: Mr. Morris Anderson at 334-255-1909 or morris.anderson2.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/Enlisted-Training-Branch.aspx

DOTD Flight Training Branch *(questions regarding ATMs, Training Support Packages, SOPs)*

- Branch Chief: CW5 Lucas Abeln at (334) 255-0363 or lucas.k.abeln.mil@army.mil
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DOTD Flight Training Integration Branch *(questions regarding aviation flight programs of instruction [POIs])*

- Branch Chief: Mr. Brian Stewmon at 334-255-3119 or william.b.stewmon.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/Flight-Training-Integration-Branch.aspx

DOTD New Systems Integration Branch *(questions regarding new system training deliverables, e.g., system training plans)*

- Branch Chief: Ms. Kelly Raftery at 334-255-9668 or kelly.a.raftery.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/New-Systems-Integration-Branch.aspx

DOTD Officer Training Branch *(Questions about officer and WO IMT, PME, and non-flight functional courses)*

- Branch Chief: Mr. Arnold Moorman at 334-255-0433 or arnold.r.moorman.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Officer-Training-Branch.aspx

DOTD Maintenance Training Branch *(questions about Joint Base Langley-Eustis/128th Aviation Brigade IMT, PME, and functional courses)*

- Branch Chief: Mr. Philip Bryson at 757-878-6176 or philip.e.bryson.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Maintenance-Training-Branch.aspx

Faculty & Staff Development Branch *(questions regarding USAACE faculty and staff courses and/or questions about Instructor and Developer training and certification)*

- Branch Chief: Ms. Suzanne Vaughan at 334-255-2124 or suzanne.a.vaughan2.civ@army.mil

DOTD Doctrine & Sustainment Branch *(questions regarding Field Manual [FM], ATPs, TCs)*

- Branch Chief: MAJ Ross Skilling at 334-255-1796 or ross.m.skilling.mil@army.mil
- Group Mailbox: usarmy.novosel.avncoe.mbx.doctrine-branch@army.mil
- SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Doctrine-Branch.aspx?csf=1&web=1&e=fFpkxS
- FMs, ATPs, and TCs are published by APD at https://armypubs.army.mil/
- Living Doctrine FM 3-04 (2015) Archive: https://armyeitaas.sharepoint-mil.us/:f:/r/sites/TR-ACOE-DOTD/Doctrine%20Branch%20Documents/ARCHIVE/Living%20Doctrine?csf=1&web=1&e=SYzlcG

DOTD Tactics and Collective Training Branch *(questions regarding Lessons Learned, Unit Mission-Essential Task Lists/Mission-essential tasks/Training & Evaluation Outlines/Task Lists/CATS, or Aviation Digest)*

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- Aviation Digest public site: https://home.army.mil/novosel/index.php/aviationdigest

DOTD Survivability Branch *(questions about all things AMS, Quick Reaction Tests, Computer-Based ASE Training, 2800/2900 Training Support-Packages, Aircraft Survivability Equipment home-station training)*

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- Group Secure Internet Protocol Router (SIPR) Mailbox: usarmy.novosel.avncoe.mbx.ams@mail.smil.mil
- Intelinks NIPR/SIPR: https://intelshare.intelink.gov/sites/army-ams/ and https://intelshare.intelink.sgov.gov/sites/army-ams/

DOTD Gunnery Branch *(questions about all things gunnery, Master Gunner Course, Ranges, Standards in Training Commission)*

- Branch Chief: CW4 Steven Dickson at 334-255-2691 or steven.d.dickson.mil@army.mil
- Group Mailbox: usarmy.novosel.avncoe.mbx.atzq-tdd-g@army.mil
- Intelinks: NIPR/SIPR: https://intelshare.intelink.gov/sites/usaace/gb and https://intelshare.intelink.sgov.gov/sites/GunneryBranch

AVIATION SENIOR AND LEGACY LEADERS!

We are looking for former colored hat wearers to serve as the guest speaker for our current Flight School Color Hat Ceremonies. Fill out the form at the QR code or link below to join our roster.

https://forms.osi.apps.mil/r/pwZgHvDtgs

UNMANNED and UNPREPARED for Large-Scale Combat Operations:

A Tactical Unmanned Aircraft System Perspective

An MQ-1C Gray Eagle unmanned aerial system flies over Division Artillery as they fire during the Mass Fire Mission on Fort Stewart, Georgia. U.S. Army photo by SGT William Begley.

By CW3 Patrick J. Barbier

The title of my favorite lesson to instruct at the Unmanned Aircraft System (UAS) Operations Technician Warrant Officer Basic Course (WOBC), military occupational specialty (MOS) 150U, is *UAS Operational Sites*. The lesson plan can be deceiving, because its content doesn't elaborate on the technical aspects of where UAS equipment must be emplaced, or how to read a chart to determine runway length requirements. The material presented develops the missing tactical expertise our students require by providing them with an opportunity to plan a platoon defense, integrate local security measures, and employ direct-fire weapons with a provided scenario.

This becomes an uncomfortable exercise for most students, many of whom have supported the Global War on Terrorism from safeguarded forward operating bases for the last 2 decades. The severity of this problem is compounded by inadequate training across all domains. These two factors have enabled this lack of proficiency in the execution of warrior tasks and battle drills (WTBDs) to become acceptable. For Tactical UAS (TUAS) formations to be able to effectively fight, survive, and win in large-scale combat operations (LSCO), WTBDs must be actively pursued and integrated to improve the training and development of their Soldiers and leaders. Expertise in WTBDs will become increasingly important as the TUAS community retires the cumbersome, but accomplished, RQ-7B Shadow and inherits small UAS (sUAS) as a stopgap. Many of the leaders that will have direct oversight over this transformation are either grossly overconfident in the tactical knowledge that is commensurate with their rank, or they have accepted this gap as a fault.

The institutional training domain is tasked with establishing a "baseline proficiency of … Warrior Tasks and Battle Drills (WTBDs)" (Department of the Army [DA], 2017, p. 67; U.S. Training and Doctrine Command [TRADOC], 2016, p. 7; TRADOC, n.d.) in our future UAS Soldiers and leaders. This is accomplished through Enlisted Initial Military Training, which consists of Basic Combat Training, Advanced Individual Training (AIT), and the Officer Education System's branch-specific WOBC. The institutional professional military education (PME) that our noncommissioned officers (NCOs) receive through the NCO education system (NCOES) has similar goals in preparing them to "lead and train Soldiers who work and fight under their supervision, and to assist their leaders in executing unit missions" (DA, 2017, p. 69).

What one might assume after reading these descriptions is that future UAS Soldiers and leaders continuously receive or execute training to reinforce the "skills needed by all Soldiers for combat" (TRADOC for STAND-TO, 2010, para. 1). The reality is that the TRADOC Regulation, which exists to integrate these skills into training at WOBC, falls short of achieving its objective, and there is no equivalent to hold our NCOES accountable, leaving a knowledge gap.

The Common Core Task List (CCTL)[1] contains several WTBDs, none of which must be taught, trained, and/or reinforced at WOBC (TRADOC, 2020, pp. 30-35). This results in our defined "combat leader … confident warfighters…" (DA, 2023, p. 29) underdeveloped in the "proficiency of drills necessary to succeed while in contact with the enemy" (TRADOC, 2020, p. 30). Many newly commissioned 150Us will find themselves in a modified table of organization and equipment position of UAS Platoon Leader without ever having led or understood what is required to keep their Soldiers and selves alive.

The NCOES, beginning with the Basic

[1] "The updated CCTL establishes the minimum requirements for IMT [initial military training] junior officers, and will help to develop officers with the character, competence, and commitment to successfully lead Soldiers at their FUA [first unit of assignment]" (TRADOC, 2020, p. 31, para. 4-4a).

Leader Course and branch-specific Advanced and Senior Leader Courses (ALC, SLC), are equally challenged. This curriculum lacks a baseline guiding document equivalent to the CCTL for WOBC to guide how and when WTBDs are integrated. If that's not concerning, consider that the NCOES removed map reading and land navigation from their program of instruction (POI) (DA, 2013). This was the same year that the Center for Army Lessons Learned published, "Operating in a Denied, Degraded, and Disrupted Space Operational Environment," which recognized this skill as important for units to integrate as they plan, prepare, and execute operations with degraded capabilities (Center for Army Lessons Learned, 2018). This appears counterintuitive and passed the responsibility of training map reading and land navigation onto the operational or self-development domain. A review of the current POI for 15E (TUAS Maintainer) and 15W (TUAS Operator) ALC and SLC demonstrates a comparable disregard for the WTBDs.

Training and Doctrine Command develops learning products through the analysis, design, development, implementation, and evaluation, or ADDIE, framework, which exists to provide "relevant, effective, efficient, and current instruction" (TRADOC, 2017, p. 46). This is a critical component to the improvement or creation of POI, which is supposed to receive candid feedback from 15+ recommended sources, such as combat training centers (CTCs), surveys of course graduates, and professional studies. Developers and managers must rely heavily on applying responses to successfully incorporate trends and current observations into existing or new lesson plans. A significant challenge to this process lies with The Army University's posture regarding education and a proclaimed "no-growth budget environment" (The Army University, 2023, p. 3). To effectively bypass this challenge, our training and education developers will need to integrate WTBDs into their existing POI, identify opportunities to generate honest dialogue among students, and facilitate professionals from the operational domain to provide insight for what is to come.

Future TUAS (FTUAS) will transform how our TUAS Soldiers in the military occupational specialties of 15E and 15W conduct their operations. The procurement requirements for FTUAS includes: vertical takeoff and landing, command and control on-the-move capability, simplified logistics, and a reduced acoustical signature (Uncrewed Aircraft Systems Project Management Office, 2023). The selected system will finally be able to live up to the word "tactical" within its title, regardless of whether a unit operates an sUAS or TUAS. This presents a significant challenge in how our UAS Soldiers, leaders, and trainers at-scale are going to prepare to operate from the land and integrate in the air domain. In a Likert[2] survey of 18 15E and 15W NCOs, more than 85 percent of respondents said they're confident in their ability to perform selected WTBDs commensurate with their grade and PME level (or below). At the conclusion of the survey, respondents were prompted to explain the steps of tasks they were confident in performing. Only a select few had quality responses. Most of the leaders surveyed were willing to receive additional training to become more proficient in WTBDs, which can be addressed by choosing to act upon their own core leader competencies (leads, develops, and achieves). If this isn't a red star cluster moment for us as a branch, it's hard to say what is.

"I am disciplined, physically and mentally tough, trained and proficient in my warrior tasks and drills."

(The U.S. Army Soldier's Creed, line 8)

A prevailing concern of mine and other professionals is how to solve the problem of TUAS formations' individual training proficiency in WTBDs. Increased risk acceptance will coincide with the increased tactical mobility that FTUAS provides to our units as our unmanned scouts push out farther away from the support area. One way to mitigate the probability of a hazardous event occurring is training the basics first, while we train our individual tasks within the operational training domain. The reality is that most TUAS units are not observing the Eastern European theater and thinking about how they innovate their training plans. The E43 team lead from the Joint Readiness Training Center Operations Group, CW3 Cody Smith, pointed out that the divestment of Shadow and Raven "begs the question, what is next … 15W/E community will find themselves in more austere conditions when conducting FTUAS operations … in terms of understanding basic Soldiering tasks, it's clear that the tactical UAS community do not get the reps, are not competent, and overall seem to not care" (C. Smith, personal communication, 2024). While he noted that some units are taking an aggressive approach at reinvesting in the basics, a majority remain apathetic and unwilling to accept this challenge. The reality is that without an effective accountability measure to determine a unit's individual proficiency, it's difficult to assess a unit's real readiness.

Army warrior training is the annual training of selected WTBDs and is not optional for E-1 to E-7, W-1 to W-2, and O-1 to O-2, unless waived by an O-8 (active duty) (DA, 2017, p. 207). This training is recognized by both Army Doctrine Publication and Field Manual 7-0, "Training," as being the "foundation to unit-level collective training" and at times, assists commanders in achieving proficiency in their collective live-fire and mission-essential tasks (DA, 2021, p. C-1). Our leaders may be overestimating their training-readiness level in the execution of their collective tasks if they are deficient in the individual Soldier skills. Unfortunately, no clear

[2] "Various kinds of rating scales have been developed to measure attitudes directly (i.e., the person knows their attitude is being studied). The most widely used is the Likert scale (1932)" (Mclead, 2023).

A UAS from Company D, 82D Combat Aviation Brigade, 82D Airborne Division, is prepped for flight operations. U. S. Army photo by SGT Vincent Levelev.

mechanism exists to evaluate a unit's WTBD proficiency or report readiness to our seniormost commanders. While on the surface, a unit can report that it has achieved advanced task proficiency, the remaining underlying issues will not allow us to set the conditions that drive our operations. The consequence is that poorly trained UAS units then become a liability rather than an asset. This means we will fail to honor the sacred trust because we cannot satisfy our commitment to the maneuver forces on the ground (Mangum et al., n.d.).

None of these concepts should be new to any Army Aviation professional, including seniormost leadership. "Mastering the Fundamentals" is what MG Michael McCurry, former Commanding General of the U.S. Army Aviation Center of Excellence, advocated nearly 1 year ago (McCurry, 2023, p. 2). The Chief of Staff of the Army, GEN Randy George, wants every echelon focused on warfighting (Tan, 2023b), while Sergeant Major of the Army, Michael Weimar's message is to be brilliant at the basics (Tan, 2023a). Newly commissioned WOs and future 150Us confirm the criticality of these fundamental skills. In their response to the same Likert survey, they communicated a confidence rate that was half of the NCOs' (41 percent). At this point, they've completed ALCs (at a minimum) and WO Candidate School, but they are still unprepared.

This requires an objective review of TRADOC requirements, or lack thereof. The CCTL is not bringing future WOs up to speed (or resetting them) on the basics, and there is nothing comparable to ensure our NCOES reinforce the WTBDs needed to fight and win in LSCO. Training developers and course managers will need to get creative in how they allocate one of our most vital resources—time—to ensure they give future leaders the chance to successfully develop themselves. Recommending that, "Soldiers **should** [emphasis added] train on the task" throws out any level of accountability when managing the frequency for sustainment training of WTBDs (TRADOC, 2008, p. 2-1). Compounding this issue is our inability to measure individual training readiness and determine how prepared the TUAS Platoon is to conduct their own defense and remain undetected from the enemy, or how effective squads establish their ground and aerial observation posts. Combat training centers are continuing to challenge rotational training units within the decisive action training environment. In response, these CTCs are providing units transforming in contact and learning product developers with the requisite data needed to create tactics, techniques, and procedures to be applied to FTUAS.

With the dynamic future of UAS, the Regulator Battalion remains steadfast in

An RQ-28A short-range reconnaissance quadcopter used during a field training exercise at Fort Indiantown Gap, Pennsylvania, June 6, 2024. U.S. National Guard photo by SPC Aliyah Vivier.

its commitment to the modernization of all institutional training efforts. The 2D Battalion, 13th Aviation Regiment, the home for the 150U WOBC and UAS AIT, continues to seek an advantage through consistent outreach between industry, academia, and our joint partners. This is accomplished by providing our leaders to CTCs as augmentee observer coach/trainers; support to Mission Command Training Program Warfighter Exercises; or involving our CTC Operations Group professionals in POI regularly. The proactive integration of sUAS, counter-UAS, and sUAS Master Trainers into its POI demonstrates the aggressive efforts at Fort Huachuca to remain at the forefront of UAS' transformation in contact. For many AIT students, a rigorous WTBD-focused training exercise named in honor of UAS Operations Officer and Platoon Leader, CW2 Edward Balli,[3] Operation Watchdogs Revenge, prepares them for the beginning of their story as a Soldier. The cost for these initiatives incurred is negligible, but the observation and feedback of training and networking is invaluable to the creation of challenging, LSCO-focused POI. This is the time for our leaders to recognize that we are entrusted with making every effort to protect the sons and daughters of America when our nation calls.

Biography:

CW3 Patrick Barbier currently serves as an Instructor for the 150U WOBC within the 2D Battalion, 13th Aviation Regiment, 1st Aviation Brigade. His previous assignments include: UAS Operations Officer, TUAS Platoon, D/299th Brigade Engineer Battalion, 1st Stryker Brigade Combat Team, 4th Infantry Division; Squadron UAS Operations Officer and TUAS Platoon Leader, Headquarters and Headquarters Troop; and B Troop 1-17th Air Cavalry Squadron, 82D Combat Aviation Brigade.

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[3] CW2 Edward Balli was a Headquarters and Headquarters Troop, 2D Cavalry Regiment Soldier killed in an insurgent attack in southern Afghanistan in support of Operation Enduring Freedom (January 2014) (Combined Task Force Dragoon Public Affairs, 2014).

Unmanned Aircraft Systems: Information Security Threats Within the Cyber Domain

The Aerosonde® Mk. 4.8 Hybrid Quad UAS at Redstone Arsenal, Alabama. Courtesy photo: Program Executive Office, Aviation.

By Company F, 227th Aviation Regiment, "Godfathers"
Fort Cavazos, Texas

Information security (INFOSEC) applies to all information, regardless of its domain. Technological advancements challenge the security of information, especially within the cyber battlefield. Security considerations must be applied based on the protected data's value. Information that should be secured may include proprietary rights, information sent across networks, or system accessibility. The three fundamental tenets of INFOSEC are confidentiality, integrity, and availability (Figure) (LBMC, 2022). Threat nations, especially pacing threats such as China or Iran, will aggravate those security measures to leverage strategic advantage. Since unmanned aircraft systems (UAS) operate exclusively within the cyber domain through network communication, it is imperative to understand the capabilities threatening UAS INFOSEC.

> **"The Advanced Encryption Standard (AES) is a symmetric block cipher chosen by the U.S. government [2001] to protect classified information"**
> **(Awati et al., n.d.).**

Confidentiality of information pertains to the measures emplaced to permit only authorized users access during storage or operational use. Additionally, confidentiality does not include attacks that intend to alter or modify. Exploits to breach confidentiality protocols may include methods that attempt to receive or access information through unauthorized methods. Security protocols that emphasize physical components are the most widely used for retaining confidentiality. "The universal technique for providing confidentiality for transmitted or stored data is symmetric encryption" (Stallings & Brown, 2015, p. 41). Threat actors may breach the confidentiality of information in a variety of schemes. For simplicity and applicability purposes, focusing on threats that take advantage of network infiltration is paramount.

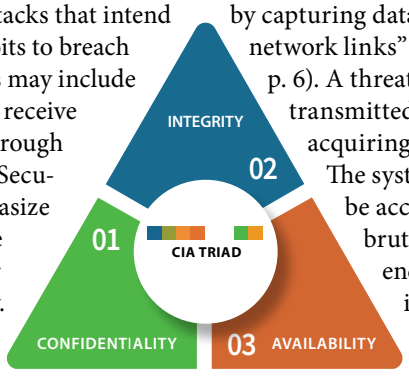

Figure. The three fundamental tenets of INFOSEC. "Together, they are called the CIA Triad" (LBMC, 2022). Triad drawing courtesy of LBMC.

> **The Data Encryption Standard is a symmetric block cipher adopted in 1977 by the National Institute of Standards and Technology. The AES "is intended to replace DES and DES with an algorithm that is more secure and efficient"**
> **(Stallings & Brown, 2015, p. 645).**

Bharat B. Madan, Manoj Banik, and Doina Bein, Department of Modeling, Simulation, & Visualization Engineering professors at Old Dominion University, USA, express concerns with information confidentiality stating, "An attacker can also compromise the confidentiality of an *[sic]* UAS by capturing data communicated over network links" (Madan et al., 2016, p. 6). A threat actor may extract transmitted data packets by acquiring access to the network. The system acquisition may be accomplished through brute force hacking the encryption system or using social engineering methods. Conversely, brute force hacking is infrequent due to the sophistication of the embedded Advanced Encryption Standard.

An additional attack process may entail exploiting human negligence through social engineering (Stallings & Brown, 2015). Phishing e-mails, physical tailgating, or deceptive interviews are all used to retrieve information that can be utilized to gain unauthorized access. Afterward, attackers may install malware to manipulate protocols to create a bypass directed into the system (Madan et al., 2016).

The Data Encryption Standard and

Advanced Encryption Standard are two critical principles that fortify symmetric encryption (Stallings & Brown, 2015, pp. 643-645). These standards utilize block ciphers, which are fundamentally a password-based authentication. However, security protocols are generally irreversible by end-users without authorization from a privileged user. As such, all Soldiers, Department of Defense (DoD) contractors, and DoD Civilians are the first line of enforcement when protecting information. Army Regulation 25-2, "Army Cybersecurity," establishes policies for securing data from unauthorized users (Department of the Army, 2019). First, the enforcement of physical security will deter unwanted threats. Secondly, users must comply with the appropriate handling or storing procedures dependent on the information classification. Lastly, end-users should spread awareness of cybersecurity threats and those measures used to prevent attacks.

The integrity of information involves the accuracy and validity of data during transmission. Security measures used to protect the integrity of information share semblance to those in confidentiality. However, unlike confidentiality, integrity encompasses modifying data or the origin of data provided to the user. The act of altering data can be just as catastrophic as having no data at all. Since viable strategies derive from unerring information, an attack on integrity may lead to poor decisions and judgment. Protecting information integrity ensures that the information retains its authenticity for accurate and timely decisions. In our opinion and combat experience, one of the biggest threats to information integrity of UAS operations is Global Positioning Systems (GPS) spoofing through modification or masquerading.

Global Positioning System spoofing is employed to tamper with the integrity of GPS information. Generally, GPS spoofing transmits broad-ranging signals to deceive GPS receivers within proximity. These transmissions then cause the receivers to display arbitrary locations. However, a new technology developed in China allows GPS spoofing to be used in a calculated method to alter GPS locations into a fixed pattern. The technology, which enables spoofers to deploy GPS attacks deliberately, was inconceivable until now. Todd Humphreys, the head of Radionavigation Laboratory at the University of Texas, states, "To be able to spoof multiple ships simultaneously into a circle is extraordinary technology" (Trevithick, 2019). Global Positioning System spoofing, now coupled with new technology, is a developing threat that sends UAS operations into disarray.

Accurate GPS information is critical in mission planning and execution; therefore, it requires security measures to ensure validity. Successful spoofing entails three components: a transmitter, frequency, and a receiver (McAfee,™ 2020). Identifying the weakness in those components will aid in avoiding deception. The transmitter and frequency are threats based on their locality, and as such, may be avoided through evasive procedures.

The Valiant UAS at Redstone Arsenal, Alabama. Courtesy photo: Program Executive Office, Aviation.

If those threats are unavoidable, the receiver is now an active threat. Typically, receivers have embedded anti-spoofing modules within their encryption systems (e.g., Selective Availability Anti-Spoofing Modules). However, if those modules are compromised, maneuvering through "map to video" correlation is required. Security measures focused on information integrity will help guarantee all information is valid for use in the decision-making process.

Information **availability** consists of the user's ability to perform actions when required. In some cases, denying information availability may permit unauthorized users to breach confidentiality and integrity. Since availability threats indicate a form of system denial, the same security measures designed for the other tenets may not work. Additionally, common system protocols are embedded, and monitoring their effectiveness may be restricted. A common way to combat an availability threat is to develop redundancies into a system. These may include alternate ways to perform actions or a contingency plan to execute during denied service. Unmanned aircraft system operations should be primarily concerned with Denial of Service (DoS) attacks devised to deny communications or seize access and control of the aircraft.

Denial of Service[1] attacks deploy interferences through frequency overflow that overburden the bandwidth or resources (Stallings & Brown, 2015). Denial of Service methods cited within Stallings' & Brown's book express direct concerns for UAS operations. Furthermore, though it may not originate from DoS attacks, commandeering may be a form of availability denial that is utilized. Threats against system unavailability were demonstrated during an incident that involved the hijacking of an RQ-170 stealth drone by Iran in 2011. Iran cyber experts seized control over the aircraft and used reverse engineering to gather proprietary schematics (Opall-Rome, 2018). This event revealed the devastating cause and effects of an attack on system availability.

Military + Aerospace Electronics published an article that inferred the results of the RQ-170 incident caused the Pentagon to advocate the need for higher levels of cybersecurity (Keller, 2016). Keller's article emphasizes how disastrous this attack was on cybersecurity and the Pentagon's determination to make cybersecurity a top priority. The necessity for securing availability presents several concerns. In terms of technology, systems already have internal defense mechanisms to protect against attacks through wireless assaults. However, the DoD emphasizes the importance of the human factor in cybersecurity by analyzing the Navy's nuclear-propulsion program designed by the "Father of the Nuclear Navy," Admiral Hyman Rickover (Winnefeld et al., 2015). The program's cybersecurity process enforces the technical development of all users to provide maximum results. As UAS experts, all users need to understand and apply security methods that the system employs to protect information availability.

Information security is paramount for successful operations against pacing threats that dominate the cyber domain. Decision-makers should consider the three tenets when performing operations or planning engagements. Confidentiality of information must be established to ensure only authorized users have access to confidential information. Information integrity is accomplished by allowing only authorized users to modify data. In our experience, the foundation of information availability is preventing, identifying, and reacting to attacks that may deny system access. However, this is easier said than done. The cyber domain is a vast and unpredictable realm that is hemorrhaged by technological advancements. Human due diligence is essential if technologies were ever to fail. Information security requires attention from all users to prevail against opposing forces.

Biography:

The F/227th is a UAS company assigned to the 1st Air Cavalry Brigade, 1st Cavalry Division, at Fort Cavazos, Texas. The unit's last combat deployment was to Al-Asad, Iraq, in October 2021—June 2022. For composition, the F/227th is comprised of Six Platoons: Headquarters, Ground Vehicle Maintenance, Air Vehicle Maintenance, and three Flight Platoons. There are two commissioned officers, 10 Warrant Officers, 43 noncommissioned officers, and 72 Troopers, totaling 127 service members. The F/227th is currently deployed in support of operation Atlantic Resolve in the European Command area of responsibility.

[1] "A denial-of-service condition is accomplished by flooding the targeted host or network with traffic until the target cannot respond or simply crashes, preventing access for legitimate users" (Cybersecurity & Infrastructure Security Agency, 2021).

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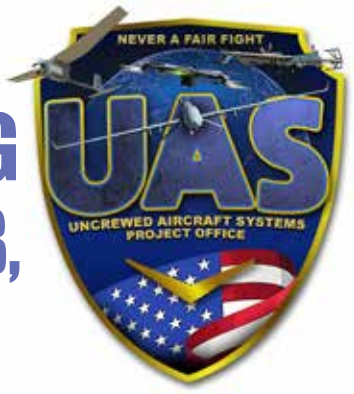
TRANSFORMING THE UNMANNED AIRCRAFT SYSTEMS GENERATING FORCE IN CONTACT: COMPANY B, 2-13TH AVIATION REGIMENT



The Uncrewed Aircraft Systems Project Office is revolutionizing the battlefield by delivering uncrewed weapon systems that extend operational reach. Photo by David Hylton.

By LTC Kent B. Monas and CPT Corbin G. Heard

The Challenge

How does the U.S. Army remain ready to **fight** and **win** on future battlefields dominated by drones, particularly small unmanned aircraft systems (sUAS)? How does our Army outpace our adversaries in the fielding of sUAS in the face of rapidly advancing technologies? How does our Total Army train Soldiers at scale and echelon to employ sUAS in support of their mission-essential tasks? How does the Army transform in contact to ensure that American Soldiers on a future battlefield make enemy contact first with a forward line of robots, not a forward line of own troops? Our challenge is clear; the changing character of war requires our Army to achieve continuous transformation and build UAS Warfighters at scale to defend our nation.

The Vision

Building UAS Warfighters is the mission of the 2D Battalion, 13th Aviation Regiment (2-13th Aviation Regiment), which runs "the largest UAS training center in the world" at Fort Huachuca, Arizona (U.S. Army, 2024). Tactical UAS (TUAS) operator and maintainer training is conducted by Company B, 2-13th Aviation Regiment, who are taking the lead on TUAS transformation "in contact" with an initiative aimed at training Soldiers to operate cost-effective commercial off-the-shelf (COTS) and Army program of record sUAS. Such training will address the insatiable need for sUAS supporting mission in the operational force.

These low cost, attritable systems serve as interim training platforms to develop tactics, techniques, and procedures across maneuver formations, offering new training and innovation opportunities to fill the TUAS role once held by the recently divested RQ-7 Shadow and RQ-11 Raven programs. Recognizing the need for a strategic shift, the Army is focused on maintaining its competitive edge to defeat any adversary across the competition and conflict continuum. This requires the transformation of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) to address new challenges and opportunities. Given fiscal constraints, the Army must rapidly transition from unsustainable systems to invest in transformative technologies for large-scale combat operations (LSCO). Current global conflicts highlight the urgency for rapid UAS adaptation, guiding the transition to future systems with smaller footprints, ease of use, low acoustic signatures, and enhanced mobility.

In line with the Army's ongoing modernization initiatives under the Army 2030 vision, Company B, 2-13th Aviation Regiment, aimed to transition away from the RQ-7 Shadow UAS. This effort included updating the training programs for 15W (TUAS Operators) and 15E (TUAS Maintainers) by applying the analysis, design, development, implementation, and evaluation (ADDIE) instructional design framework to ensure that training aligns with future operational needs.

Small unmanned aircraft systems flight training. Photo provided by the authors.

This framework guides the development of learning products by integrating feedback from various sources to improve instruction and adhere to budgetary constraints. The objective is to prepare Soldiers as force multipliers at the company and platoon levels by

incorporating sUAS flight training and tactics to ensure readiness for future tactical unmanned aircraft systems (FTUAS) fielding. However, this transition created a capability gap that needed to be addressed.

To bridge this gap, the 15W program of instruction (POI) includes 10 sUAS flight days within the first 29 days of the course, emphasizing sUAS tactical operations. The 15E POI mirrors this approach, ensuring consistent training across both programs. Limited aviator-focused instruction in the 15E course is supplemented by the Basic UAS Qualification (BUQ) course provided by the sUAS manager. This joint U.S. Air Force-regulated program enhances aviator knowledge for sUAS tactical flight training, managing sUAS inventory, operator flight logs, and training. Company B, 2-13th Aviation Regiment, uses this platform to track hours, currency, and maintenance for sUAS parts and systems.

Looking ahead, FTUAS is poised to transform operations for 15E and 15W Soldiers with key requirements, including vertical takeoff and landing capabilities and simplified logistics. These performance objectives are well-recognized within Army Aviation and are emphasized by senior leaders who advocate for mastering basic skills and focusing on Warfighting capabilities. As the Army addresses the FTUAS challenges, it is crucial to explore how sUAS can bridge the gap and enhance operational effectiveness (Uncrewed Aircraft Systems Project Office, 2023).

The Process

The transformation of TUAS training at B, 2-13th Aviation Regiment, began with the development and approval of a 2024 deviation memo, allowing training beyond the 15W and 15E Critical Task Lists (CTLs). Approved by the U.S. Army Aviation Center of Excellence (USAACE) Commandant, this memo enabled innovative training approaches to meet evolving battlefield requirements. The first step involved determining the method for equipment procurement, ensuring compliance with the National Defense Authorization Act for Fiscal Year (FY) 2024. The System Readiness Directorate granted a Comprehensive Lightweight Airworthiness Release to introduce the RQ-28A (quadcopter) and COTS systems, which set the stage for enhanced training and operational capabilities. Some examples of COTS equipment we are experimenting with include the Parrot ANAFI drone, part of the Blue UAS program initiated by the Defense Innovation Unit, Department of Defense (Murison, 2019).

The 2-13th Aviation Regiment collaborated with Libby Army Airfield (Arizona) to establish local airspace procedures ensuring safe and efficient sUAS operations. A New Equipment Training Team was deployed to Fort Huachuca, providing initial RQ-28A qualifications for instructors. This training enabled the regiment to integrate sUAS systems effectively and expeditiously.

U.S. Cavalry Scouts train with the Puma UAS at Grafenwoehr Training Area, Bavaria, Germany. U.S. Army photo by SPC Orion Magnuson.

A 2024 waiver from the Directorate of Army Aviation allowed the 2-13th Aviation Regiment Instructor Operators to be designated as Master Trainers (MTs), expediting the qualification process for Soldiers on the RQ-28A and COTS systems. This initiative ensures a consistent and robust training pipeline, preparing Soldiers for real-world operations.

The Aviation Center of Excellence (CoE) is leading the rapid transformation of TUAS training at Fort Novosel, Alabama, and Fort Huachuca. This transformation is not just a change in training methods but a comprehensive alignment with senior leadership objectives. By transitioning our TUAS force, the Aviation CoE ensures that UAS training is standardized across the Army, in concert with the Maneuver CoE, to meet the challenges of modern warfare.

Building on this foundation, the 15W TUAS Operator Training program now includes a combination of simulator and live flight training for sUAS, Federal Aviation Administration (FAA) Part 107 certification (Remote Pilot Certificate), and advanced training in LSCO environments. These enhancements are designed to develop subject-matter experts who can deliver sUAS combat power effectively at echelon, bridging the gap between theoretical knowledge and practical application.

Complementing the operator training, the program for 15E TUAS Maintainers focuses on sUAS training and certification, covering aviation maintenance fundamentals and updates on First Person View (FPV) sUAS fabrication and repair. This comprehensive approach ensures that maintainers are well-prepared for Group 3 tasks, making them operator-qualified and ready for future TUAS deployments.

Equally important is the role of the 150U TUAS WOs, known as the Army's UAS Master Integrators. These officers are trained to manage UAS programs, conduct airspace planning, resolve frequency deconfliction, and lead mission execution. The 150U course incorporates sUAS throughout the curriculum, preparing officers for FTUAS while integrating valuable lessons from the U.S. European Command Area of Responsibility.

In late 2023, Company B initiated preparations for the divestment of legacy TUAS and the integration of emerging sUAS technology into the TUAS operator and maintainer POIs. Collaborating with the Network Enterprise Center and the FAA, Company B, 2-13th Aviation Regiment, transformed an existing classroom into a world-class instruction and testing facility, enabling students to attain the FAA Part 107 certification. Federal Aviation Administration Part 107 refers to the regulations set by the FAA governing the commercial use of sUAS (drones) in the United States. This certification is required for anyone operating drones for commercial purposes and covers essential knowledge areas, such as airspace classification, aviation weather, flight operations, and emergency procedures. Attaining the Part 107 certification demonstrates a drone pilot's understanding of aviation regulations and ensures safe and compliant drone operations (FAA, 2020).

To further emphasize the importance of sUAS training, course managers made a critical decision to reallocate 10 days from Shadow live flight to sUAS training. This change was implemented through a short-term course management plan (CMP) with class 24-007, reflecting a shift in priorities to better meet the Army's evolving needs.

As we moved into 2024, the momentum continued with the development of draft CMPs for sUAS integration by April. This involved reallocating Shadow live flight days to enhance academic instruction, ensuring that the curriculum was aligned with the latest technological advancements. The integration of RQ-28A and COTS systems into the curriculum marked a significant milestone, with pilot classes commencing in June 2024. Feedback from these classes offered valuable insights, driving further updates and continuous improvement to adapt to emerging requirements.

By August, the flight lesson plans were enriched with the inclusion of COTS systems into sUAS training, providing Soldiers with a comprehensive understanding of UAS operations. This iterative approach continuously improves the POI to equip graduates with the skills necessary to effectively adapt to the dynamic conditions of the battlefield and enhance their operational effectiveness.

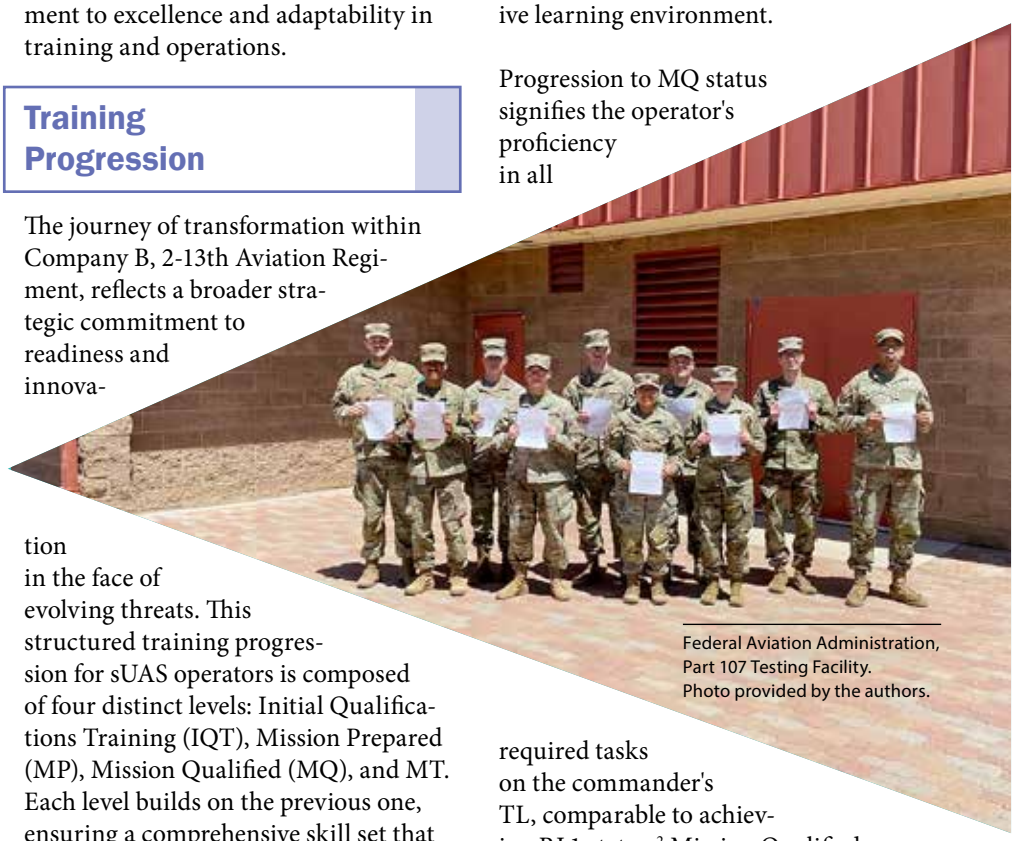
As with any robust operation, it is essential to conclude with an after-action review. Although we have not yet reached this stage, it is crucial to plan how and when the Army will gather feedback on system usage and POI adjustments. Establishing this feedback loop will be vital for refining our processes and ensuring that the transformation of TUAS training continues to meet the operational needs of our forces effectively. This iterative approach underscores our commitment to excellence and adaptability in training and operations.

Training Progression

The journey of transformation within Company B, 2-13th Aviation Regiment, reflects a broader strategic commitment to readiness and innovation in the face of evolving threats. This structured training progression for sUAS operators is composed of four distinct levels: Initial Qualifications Training (IQT), Mission Prepared (MP), Mission Qualified (MQ), and MT. Each level builds on the previous one, ensuring a comprehensive skill set that aligns with the Army's operational goals.

The IQT serves as the foundation, where students receive classroom instruction and hands-on flight training for each system. This phase covers essential skills including assembly, disassembly, preflight and emergency procedures, flight operations, airspace management, weather considerations, and standard operating procedures. Completing the IQT satisfies the BUQ course Level I & II requirements outlined in Chairman of the Joint Chiefs of Staff Instruction 3255.01 (2011), ensuring trainees are well-equipped for subsequent challenges.

Upon completing IQT, operators undergo a commander's evaluation to achieve MP status. This designation is akin to achieving Readiness Level (RL) 3 status[1] in other aviation platforms, marking the beginning of their operational readiness. Operators in the 2-13th Aviation Regiment are automatically designated MP after IQT, requiring them to complete all tasks on the CTLs within 90 days. At the MP level, operators are exempt from semi-annual proficiency and readiness test (S-APART) requirements and can only fly with an MT, fostering a supportive learning environment.



Federal Aviation Administration, Part 107 Testing Facility. Photo provided by the authors.

Progression to MQ status signifies the operator's proficiency in all required tasks on the commander's TL, comparable to achieving RL1 status.[2] Mission Qualified operators must meet S-APART requirements and maintain sUAS currency. In the 2-13th Aviation Regiment, the MQ evaluation flight is conducted by an MT, who assesses all CTL tasks to ensure the highest standards are met.

Progression for sUAS operators culminates with the MT designation, where operators demonstrate proficiency in conducting academic and flight instruction. Thanks to an exception to policy

[1] "RL3, uncertified, involves pilots, accompanied by a senior instructor pilot, doing basic maneuvers and learning to fly in formations with other helicopters" (Thibault, 2013).
[2] "RL1, certified, is where pilots can fly without instructor pilots and are considered ready for missions" (Thibault, 2013).

waiver, 15W and 15C Instructor Operators can be designated MTs without attending the Fort Moore (Georgia) sUAS MT Course, provided they have completed the Instructor Operator Course. This flexibility ensures that training keeps pace with operational demands and personnel readiness.

Strategic Alignment and Future Initiatives

The Joint Small Uncrewed Aircraft Systems Capability Development Document (J-sUAS CDD) (Congressional Research Service, 2024b) FPV Annex is a top-priority effort spearheaded by the Chief of Staff of the Army and the Maneuver CoE Commanding General. This initiative is designed to enhance maneuver forces and support the Department of Defense Army's sUAS/Robotic and Autonomous Systems (RAS) Strategy.[3] The system, intended for deployment at the squad or platoon level, significantly boosts unit lethality. Future applications include arming the system to enhance offensive capabilities, establishing a strong foundation for effective operations by brigade combat teams (Maneuver, Aviation, and Soldier Division, Army Capabilities Integration Center, 2017).

As the TUAS transformation progresses, it exemplifies the Army's commitment to adapting to evolving threats and maintaining readiness for future conflicts. Through innovative training programs, integration of cutting-edge technology, and a focus on mastering fundamental skills, USAACE is preparing Soldiers to excel in a rapidly changing operational environment.

The Army's ongoing transition from legacy systems to new capabilities is informed by the lessons learned from this transformation, guiding broader initiatives across the force. By prioritizing agility, lethality, and adaptability, the Army ensures its UAS operators and maintainers are equipped to deliver decisive combat power in support of ground forces. This unwavering commitment to excellence and innovation in UAS training underscores the Army's resolve to remain a dominant force on the battlefield, capable of meeting the challenges of tomorrow's conflicts with confidence and precision.

End-state

End-state would appear a contradictory term for continuous transformation, but there must be some objective at which to aim. Therefore, an end-state for continuous transformation of TUAS is to move from "In Contact" to "Steady State" transformation that sees the Joint Capabilities Integration and Development System (Chairman of the Joint Chiefs of Staff, 2005) execute rapid and continuous DOTMLPF actions that keep pace with advancing technology. Acquisition of "exquisite," meaning expensive, sUAS programs of record is untenable and would be done at peril to our readiness. Acquisition of sUAS must be conducted as rapidly as an upgrade to the General Service Administration fleet of vehicles or software updates to our computers. The Department of Defense bureaucracy must be incentivized to rapidly adapt and acquire low-cost sUAS for the American Soldier to train and prepare to **fight** and **win** on battlefields of the future. We must adhere to the maxim that "quantity has a quality all of its own" and acquires large numbers of low cost attritable sUAS, then train Soldiers at scale and echelon to employ these systems. The Defense Innovations Unit's 2023 Replicator Initiative is championing this sUAS acquisition effort. The United States manufacturing base for sUAS is beginning to adjust to this new requirement, with the Replicator Initiative stating that it will deliver "all-domain attritable autonomous (ADA2) systems," (Congressional Research Service, 2024a) to Warfighters at a scale of multiple thousands in FY25. In light of these developments, it is imperative that Training and Doctrine Command and USAACE continue to transform the way we train Soldiers to employ these new systems. Company B, 2-13th Aviation Regiment, has initiated this transformation and will continue to innovate and adapt the way we train UAS Warfighters for our Total Army.

Biographies:

CPT Corbin Heard currently commands Company B, 2-13th Aviation Regiment. He has served as a Special Electronic Mission Aircraft pilot, Chinook Company Executive Officer, Platoon Leader, Explosive Ordnance Disposal Platoon Sergeant, and Team Leader. He has been in the Army for 17 years and is a recent University of North Carolina (UNC) Kenan-Flagler Business School graduate (MBA).

LTC Kent Monas is the commander of the 2-13th Aviation Regiment. Kent is an OH-58D Scout and AH-64E Attack pilot with five combat deployments to Iraq, Afghanistan, and Somalia. His assignments include: Air Cavalry Troop and MQ-1C Gray Eagle Company Commander, Operations Officer for an Aviation Task Force in Afghanistan, Executive Officer for an Airfield Operations Battalion in the Horn of Africa, and Professor of Military Science at East Tennessee State University.

[3] This strategy "describes how the Army will integrate new technologies into future organizations to help ensure overmatch against increasingly capable enemies … the RAS Strategy describes how the Army will use human-machine collaboration to meet the JCS Chairman's goal of increasing operational options for Joint Force commanders" (Maneuver, Aviation, and Soldier Division, Army Capabilities Integration Center, 2017, p. i).

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The 101st Airborne Division (Air Assault) in Oxford, Mississippi. They are supporting 2D Mobile Brigade Combat Team "STRIKE," at JRTC rotation 24-10 on Fort Johnson, Louisiana, during a large-scale, long-range air assault. U.S. Army photo by SPC Joseph Enoch.

AIRSPACE COMMAND AND CONTROL: IMPROVING ARMY AVIATION LETHALITY WITHIN LARGE-SCALE COMBAT OPERATIONS

By LTC Nicholas C. Currie

In August 2024, Task Force "No Mercy" deployed to Fort Johnson, Louisiana, in support of the 2D Mobile Brigade Combat Team's (2MBCT) Joint Readiness Training Center (JRTC) rotation 24-10. During the rotation, the aviation task force—as well as 2MBCT—learned valuable lessons regarding the process of updating and applying the Airspace Control Order (ACO) in support of Large-Scale Combat Operations (LSCO). The rotation underscored the importance of educating the force on Airspace Coordinating Measures (ACM) and controlling authorities for various types of airspace outside established ACMs and Fire Support Coordination Measures (FSCM), the need to rehearse the ACO submission/approval process during regular brigade/division level training windows, and the need to enhance the methods subordinate units (i.e., battalion and below) use to submit requests for inclusion into the ACO.

Background Doctrine Information

In accordance with Joint Publication (JP) 3-52, "Joint Airspace Control," the ACO is an order that details approved requests for coordination measures such as ACMs, air defense measures, and FSCMs. It is published either as part of the air tasking order (ATO) or as a separate document. "**The ACO defines and establishes airspace for military operations as coordinated by the Airspace Control Authority**" (Chairman of the Joint Chiefs of Staff, 2010, p. II-5).

Within the ACO, Army Aviators will find ACMs and FSCMs to provide procedural control of a given portion of airspace. Most aviators are familiar with basic ACMs, including standard use Army aircraft flight routes (SAAFR), restricted operating zones, landing/pickup zones, the coordinating altitude, No Fly areas, coordinated fire line, fire support coordination line, phase line, free fire area, and kill boxes. However, few may know that JP 3-52 outlines nearly 100 different types of ACMs that could be included in the ACO (Chairman of the Joint Chiefs of Staff, 2010, Appendix C).

The process for updating the ACO is covered in the region's Airspace Control Plan but generally requires units at echelon to submit requested ACMs and FSCMs to intermediate level airspace managers—usually found at the brigade level and above—who then consolidate, deconflict, and forward the requests to the region's Airspace Control Authority by a specified time each day.

For Army Aviators who often fly below the coordinating altitude within a brigade combat team's (BCT's) area of operations (AO), the airspace outside of established ACMs and FSCMs is generally controlled by the BCT commander and staff in accordance with Field Manual (FM) 3-96, "Brigade Combat Team," and FM 3-52, "Airspace Control" (Department of the Army [DA], 2021; DA, 2016). Control within a BCT's airspace relies upon voice/digital communications between aircraft and airspace control elements to coordinate and integrate the actions of Army airspace users over an AO. Brigade combat team commanders exercise airspace management through control of airspace users, which is inherent in mission command to control assigned or supporting forces in all domains. In accordance with FM 3-52, "All Army airspace users transiting a brigade AO coordinate with the brigade responsible for the AO they are transiting" (DA, 2016, p. 2-9).

Case Study Lessons Learned

During JRTC 24-10, aviation task force leaders noted the average aviator and some BCT planners, as well as brigade aviation element (BAE) members, did not have a full appreciation of the ACO and its associated ACMs and FSCMs—a trend the Senior Aviation trainer and the Aviation Observer Controller (OC) team confirmed is becoming more common across multiple JRTC rotations within the last several years. This issue resulted in a less-than-optimal understanding of how to plan/submit ACMs to support a mission within a BCT's AO—resulting in an ACO that often did not accurately reflect all known ACMs and FSCMs, as well as an inability for aircrews to fly through the BCT's airspace without interfering with active gun target lines. Accordingly, this issue resulted in a lack of understanding among aircrews regarding whom they need to contact, as well as how to safely navigate airspace outside of established ACMs/FSCMs.

To bridge the knowledge gap, the aviation task force met face-to-face with BCT planners and the BAE to discuss the submission process, as well as how to best utilize Army Aviation to support the ground tactical plan. During this meeting, the team identified that the process by which ACO submissions were shared was not conducive to timely and accurate reporting. Due to a lack of an organic Tactical Airspace Integration System (TAIS) (a mobile airspace management system) at the battalion level, the aviation task force submitted ACMs and FSCMs via screenshots of Aviation Mission Planning Software (AMPS)[1] and/or submitted AMPS draw files, which were not initially transferable by the BAE into TAIS. As a result, the BAE tried to replicate the screenshot to the best of their ability, resulting in significant inaccuracies in locations of ACMs and FSCMs, as well as simple omissions.

To rectify the issue of sharing ACM and FSCM submissions, the aviation task force started sharing specific coordinates for definable dimensions of each ACM and FSCM. While this process reduced error, it was time-consuming and overly cumbersome. After some research and troubleshooting, the team figured out how to import AMPS draw files into TAIS, reducing errors and man-hours required to process approvals, while enhancing the overall quality of ACO submissions.

In addition to improving the overall process by which ACO submissions were consolidated at the BCT level, the aviation task force invested heavily into improving integration with the BAE and brigade plans cell. Between forward positioning a liaison officer and conducting multiple face-to-face meetings, the task force helped gradually improve the quality of ACMs and FSCMs utilized by the BCT to maximize aviation freedom of maneuver in the AO without dramatically interfering with known gun target lines. A best practice was developing a series of SAAFR routes, which led to mutually supporting airspace coordination areas (ACA) in close vicinity to the BCT's front line of troops. Each ACA provided enough maneuver space for a team of aircraft to operate at low altitudes, and the ACAs could be activated and deactivated as the team maneuvered throughout the AO to provide responsive aviation support.

One of the more interesting issues identified during the rotation was some confusion regarding the appropriate controlling authority for airspace located outside of established ACMs and FSCMs. Most senior aviators were familiar with the airspace command and control principles outlined in JP 3-52, FM 3-52, and FM 3-96, which identify the BCT AO owner as the airspace control element for any airspace outside of published ACMs and FSCMs. However, junior and mid-level aviators were not familiar with these principles—a trend also noticed by Aviation OC trainers across multiple JRTC rotations over the last few years.

To address this issue, the task force commissioned a group of aviators to study doctrine and develop a simple, yet effective, class to help teach the critical considerations every aviator should know regarding the ACO, ACMs, FSCMs, and coordination requirements for aircrews to operate within a BCT's AO. The class will serve as a basic primer to drive future training and ensure aircrews remain well-prepared to operate effectively within the perceptively complex airspace associated with LSCO.

Going one step further, aviation units must conduct regular training events that incorporate a mock ACO to increase aviator familiarity and to exercise systems and processes necessary to submit updates to the ACO. Ideally, such training would require subordinate commands at the company and battalion level to submit ACO requests through their associated combat aviation brigade or BCT headquarters. In turn, the unit would continue to improve communication between AMPS and TAIS platforms, streamline communication protocols, and reduce the knowledge gap for aviators, as well as the BAE regarding airspace management principles. Once the mock ACO is published, aircrews could conduct training flights utilizing a

Soldiers assigned to 101st Airborne Division (Air Assault) arrive at Oxford, Mississippi on August 13, 2024, en route to JRTC rotation 24-10. U.S. Army photo by SPC Joseph Enoch.

[1] "The AMPS provides Army aviation state-of-the-art interoperability and mission planning tools to enhance situational awareness, command and control, and safety. AMPS automates aviation mission planning tasks, mission rehearsal, and flight planning" (Scott et al., n.d.).

mock SAAFR to reach an objective area, rehearse crossing phase lines or conducting a passage of lines with a BCT airspace manager, and integrating fires with ground-based fires assets.

Airspace management within the construct of LSCO will only get more complex as technology and our advisories continue to evolve. Regular, consistent training of the basic principles surrounding the ACO, its associated ACMs and FSCMs, and the process by which ACO updates are applied will undoubtedly reduce the complexity for aviators and airspace managers alike. If such training is adequately resourced, our force will become more lethal and agile on the future battlefield—able to develop a mutually supportive airspace plan that is capable of delivering the full might and power of the Joint Force's sea, land, and air power to the enemy.

Biography:

LTC Nick Currie is an AH-64D/E aviator and the commander of 1st Battalion, 101st Aviation Regiment, "Expect No Mercy," headquartered at Fort Campbell, Kentucky. He has served in multiple leadership capacities at the platoon, company, and battalion level with the 101st combat aviation brigade (CAB) and 82**D** CAB.

U.S. Soldiers from 5th Battalion, 101st Combat Aviation Brigade, 101st Airborne Division (Air Assault) take off in UH-60 Black Hawk helicopters to begin an L2A2. U.S. Army photo by PFC James Lu.

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RECONNAISSANCE AND SECURITY:

THE AIR CAVALRY SQUADRON, THE COMBAT TRAINING CENTERS, AND THE ETERNAL SEARCH FOR PURPOSE

U.S. Army, Air Force team up to load helicopters at Shaw Air Force Base, South Carolina. U.S. Air Force photo by SSgt Kelsey Owen.

By MAJ Ryan J. Kirkeby

The Air Cavalry Squadron (ACS) is not a new concept within Army Aviation—the Aviation Restructure Initiative, approved in 2014 by former Army Chief of Staff, GEN Raymond T. Odierno, looked to replace aging aerial reconnaissance platforms, specifically the OH-58D Kiowa Warrior, with a combination of AH-64 Apache Helicopters and RQ-7B Shadows (unmanned aircraft systems [UAS]).[1] While the organization and mission-essential tasks have changed in the years since, the ACS' focus (on paper) remains firmly within aerial reconnaissance and aerial security tasks instead of aerial attack missions. While the differences between an ACS and an attack battalion (AB) may seem obvious to some, the ground force commander will ask both organizations to conduct the AH-64's consistent mission—shaping the division or brigade deep area with direct fires against targets on the ground force commander's high payoff target list. The only difference between the organizations is how they go about accomplishing this task.

Regardless of what is being asked of an ACS, it is uniquely able to increase operational depth and the commander's situational awareness, while also minimizing the risk to manned aircraft. As with any piece of equipment or system, you must use it properly if you hope to maximize its effectiveness. Each operational environment is unique and presents multiple dilemmas to any commander. This is easily demonstrated when you consider the Continental United States' combat training centers (CTCs), namely the National Training Center (NTC) and the Joint Readiness Training Center (JRTC). The NTC provides vast, open deserts with significant terrain relief serving as an ideal maneuver space for armor and tracked vehicles, while JRTC features thick, high-canopy forests with minimal terrain relief, ideal for light infantry. Both change the role of an ACS, but the fundamentals of tactical employment remain largely the same.

The National Training Center

The Mojave Desert serves as an ideal location for armored forces to maneuver—vast deserts with minimal vegetation provide an excellent opportunity to focus on the employment of armored forces. When evaluating the operational design of the rotation, there is one clear mismatch the opposing force (OPFOR) has over the rotational unit (RTU): long-range fires. Rotational orders of battle for OPFOR include numerous batteries of 2S19s (Msta-S), which are armored, self-propelled howitzers with an operational range of 24–29 kilometers (km) (Operational Environment Data Integration Network [ODIN], n.d.-a.) and 9A51s (Prima), wheeled multiple rocket launcher system with an operational range of 21 km (ODIN, n.d.-b). Compared with the organic capabilities of an armored brigade combat team (ABCT), specifically the M109A6 Paladin (cannon artillery system), RTUs are unable to regularly match the ranges outlined above. The ACS seems a natural fit to identify and locate these key pieces of equipment through reconnaissance and security missions; however, in a resource-constrained environment, the ACS may be the only organization in an operational environment possessing the organic capability required to identify and destroy these targets. This requires the organization to shift focus to more of an AB, while maximizing the capabilities of an ACS.

[1] **Editor's note:** The RQ-7B Shadow UAS "was officially retired" on March 19, 2024 (Jennings, 2024).

The 6th Squadron, 17th ACS, proved mostly successful during NTC rotation 24-02, serving as an ACS that primarily operated as an AB. The squadron staff regularly set conditions through echelons above brigade (EAB) assets to suppress or defeat enemy air defense systems in the operational environment. Liaison officers proved effective at communicating the ACS's ability to both identify and destroy enemy long-range fires to the task force (TF) Iron (3 ABCT, 4th Infantry Division) staff, who allowed the squadron the freedom of maneuver required to shape the division and brigade deep areas through a permissive series of standard use Army Aviation flight routes and airspace coordination areas. Flight troops facilitated the near-constant employment of the now-retired Shadow UAS, allowing commanders at echelon to maintain maximum situational awareness through zone and area reconnaissance. This allowed the UAS to regularly identify the trigger to launch AH-64s, ensuring the requisite number of targets existed in the operational environment before committing manned assets. The AH-64s would then begin prosecuting targets in an engagement area, while the UAS continued to identify targets that would then be prosecuted through division or brigade fires assets. One battle period saw the UAS responsible for the destruction of key strategic air defense systems and 2x batteries of self-propelled artillery with zero battle damage to the 6-17 ACS aircraft. The 6-17 ACS's efforts resulted in TF Iron receiving little to no effective indirect fire, directly enabling their defense in-depth.

This technique proved particularly successful, given the context of the rotation. However, it is not the only way to employ manned and unmanned assets. Consider if EAB assets were not available at all or to a lesser degree in the scenario outlined above. Manned unmanned teaming (MUM-T), where UAS and AH-64 work as a scout weapons team (SWT), could provide the same survivability to aircrews, while also allowing for similar effects on the battlefield. The UAS would observe targets on the battlefield and communicate observations to AH-64 pilots, who are maintaining standoff. Once targets are acquired and identified, the SWT then completes a remote *Hellfire* engagement, where the UAS provides the laser range finder/designator guidance to an AH-64 *Hellfire* missile. When employed effectively, this allows for an SWT to maintain operational tempo, while also maximizing the survivability of its aircrews.

The Joint Readiness Training Center

The Louisiana swamps prove incredibly challenging for any maneuver force. Thick, high-canopy trees not only limit the maneuverability of ground forces but deny helicopters the look-down angle required to acquire and identify targets while employing flight profiles that maximize the survivability of manned aircrews. This results in multiple dilemmas for the ground force commander and the ABTF commander alike. Ground force commanders are largely reliant on attack aviation to defeat or disrupt OPFOR armored formations, and the ABTF commander has to identify methods that are capable of minimizing the impacts of severely restrictive terrain. As with the NTC scenarios previously described, there are multiple ways to employ an ACS in any operational environment. The 4th Combat Aviation Brigade (CAB) experiences at the JRTC provide one employment technique that stands out as particularly effective.

Many factors shape the employment of an asset or an organization. Effectiveness on the battlefield is measured by your ability to acquire, identify, and engage the enemy, while also maximizing the survivability of aircrews. The JRTC presents a unique challenge to aviation employment due to the relative dimensions of the training area. Focusing primarily on light infantry brigades, the training area lacks the depth of the NTC. Manned unmanned teaming, when employed properly, allows the ACS to minimize the impacts of severely restrictive terrain, while also maximizing the effectiveness of aircrews.

Thorough area and zone reconnaissance by a UAS is essential to identify what avenue of approach OPFOR will utilize when employing its forces. Given the geography of the JRTC, there is minimal time from the UAS' identification of OPFOR until OPFOR makes first contact with rotational force ground reconnaissance. This makes the posture of AH-64 aircrews critical—if they are not at the appropriate readiness condition level, AH-64s will miss the ability to shape the critical point of the battle before the

The photographer watches as an AH-64 Apache attack helicopter fires a *Hellfire* missile at a target that was laser designated by an MQ-1C Gray Eagle UAS at the Multi-Purpose Range Complex on Fort Stewart, Georgia. U.S. Army photo by CW3 Adam Kozel.

preponderance of all forces are engaged in the close fight. At this point, AH-64s are relegated to mere bystanders as they become unable to quickly identify/engage enemy forces without assuming significant tactical risk. The use of ground or air holding areas is a highly effective technique that minimizes tactical risk to aircraft, while also mitigating the tyranny of distance and allowing AH-64s to quickly respond when triggers are identified. This maximizes the standoff between OPFOR and friendly forces, mitigating accidental risk.

Gray Eagle UAS. U.S. Army Dugway Proving Ground photo by Becki Bryant.

Once the UAS queue the AH-64s to a target area, MUM-T is critical to establishing and maintaining OPTEMPO. This mitigates the impact of terrain, as the UAS can maintain a near-vertical look-down angle during the engagement process. Assuming the fire distribution plan is known and understood in the pre-mission briefing and rehearsal, this process can easily disrupt or defeat enemy-tracked vehicle formations, while still maximizing the survivability of manned aircrews.

The Importance of Home Station Training

Home station training is critical to any team's ability to execute MUM-T or queued engagements. Troops must prioritize SWT training in day-to-day continuation flights, aerial gunnery, etc., if they hope to build the proficiency required for a CTC. If all systems work as advertised, the scenarios described are significantly less difficult. However, when was the last time a troop pulled video metadata from a UAS flying overhead during an Aircrew Training Manual continuation flight to conduct simulated MUM-T engagements? Are our UAS operators able to make the communications relay system work? Do they know how to use the tactical satellite radio in their shelter? If they have received the Blue Force Tracking-2 (a force-tracking satellite communications network) upgrade, do they know how to use it? The answers to these questions will be able to drive a troop or a squadron's home station training plan to maximize effectiveness in supporting a ground force commander. As these systems begin to malfunction (or to cease, in some instances), squadrons must know how they can work around these issues to keep the kill chain as streamlined as possible.

The Air Cavalry Squadron—Is it "Big R" Reconnaissance?

The Army sells the ACS as an organization mostly focused on reconnaissance and security tasks as a member of a combined arms team. While our mission-essential task list supports this theory, there is not a distinguishable difference to the ground force commander. Apache pilots (and more importantly, their staff) must remain proficient in aerial attack mission planning and how to incorporate "little R" reconnaissance and "little S" security into their scheme of maneuver, particularly with RQ-7B.[2] Failure to do so denies the ground force commander significant combat power that can rapidly shape the battlefield in their favor and expose manned platforms to increased tactical and accidental risk.

A Note from the Author...

Well, this is slightly awkward. In the time it took to write this article and run it through the revision process, the Army decided to divest itself of the RQ-7B Shadow program. While the small UAS (sUAS) community is going through a transition period, the tactics, techniques, and procedures discussed in this article remain relevant, and leaders must ensure they remain familiar with how to conduct MUM-T with sUAS. In the meantime, the MQ-1C Gray Eagle easily fills the capability gap. However, the challenge is in the command relationship. Small UAS are (were) organic to the ACS, and while Gray Eagle is organic to the CAB, it generally operates in more autonomous environments. When considering that the ACS and Gray Eagle are expected to operate in the division deep area, mixing these assets for a period of time can align with the higher headquarters' convergence window and the massing of effects.

Biography:

MAJ Ryan Kirkeby is an AH-64D pilot stationed at Fort Carson, Colorado. He currently serves as the 4 CAB S3; his previous assignments include 6-17 ACS (S3/XO), JRTC Operations Group (Task Force Aviation), 12th CAB (A/1-3 and D/1-3 Commander), and 1 AD CAB (C/4-501 PL).

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[2] "Little R" reconnaissance and "Little S" security speak to the depth and breadth that these missions are performed within the ACS. Reconnaissance and security missions will be performed, but only to develop situational awareness for the squadron/troop commanders as they execute aerial attack or aerial movement to contact missions. Reconnaissance and security missions will likely still be tasked to an ACS; however, these will mostly be a RQ-7B-specific tasking with AH-64 support only when direct contact is required (R. Kirkeby, personal communication, September 2024).

Attack Helicopters, Modern Tactics, and the Maneuverist Approach

An AH-64E Apache Helicopter takes off from the U.S. Army Airfield at the Baumholder Maneuver Training Area (Germany). U.S. Army photo by Ruediger Hess.

By MAJ Phillip L. Savoie

An aviator observing recent attack helicopter operations—especially those coming out of Ukraine—is likely to come to two opposing conclusions. On one hand, the attack helicopter's future seems questionable, with commentators pointing to high Russian helicopters' losses in Ukraine. On the other hand, Russian attack helicopters played a role in defeating Ukraine's counteroffensive, and their bases are priority targets indicating the Ukrainians view aviation as a significant threat. To make sense of these opposing conclusions, attack aviators should understand two concepts: "Modern System" tactics and the maneuverist approach. This article will explain these concepts and apply them to attack helicopter operations in large-scale combat (LSC).

Modern System Tactics and Aviation

Twentieth-century armies adapted to firepower proliferation with tactics that use cover, concealment, dispersion, small-unit maneuvering, suppression, and combined arms. Shrewd use of terrain could overcome the proliferation of firepower. Stephen Biddle, a historian, called these tactics the Modern System and argued armies' ability to employ Modern Systems has been the key determinant to success in modern conventional wars (Biddle, 2006). While Modern Systems tactics will seem obvious to most military members today, they were revolutionary when developed. Even today, they are often hard to employ and require a high degree of training at low levels.

The Modern System concept sheds insight into how Army Aviation successfully operates in LSC. While Biddle's Modern System describes ground combat, its concepts can also apply to aviation. Conventional adversaries can wield a 'storm of steel' against helicopters with small arms, anti-aircraft guns, anti-tank, radar-guided and infrared-seeking missiles, and more. This threat pushes helicopter operations to terrain flight altitudes where cover and concealment mitigate the threat. However, this comes with a tradeoff. It is more difficult to identify and engage a threat from lower altitudes.

A Maneuverist Approach

Aviation is a maneuver branch, meaning it maneuvers in time and space to gain advantage over the enemy. Most aviators understand maneuvering around enemy strength to gain a spatial advantage, but maneuvering in time is less understood. Military units are in one of three postures at a given time: protected, moving, or striking. Protected units are stationary and in a strong defensive posture, often with deliberately prepared cover and concealment. Moving units are the most vulnerable and exposed while in transit. Striking units are similarly vulnerable, deliberately exposing themselves during their engagement sequence (Leonhard, 2017). A historical and easy to visualize example of these postures is Napoleonic-era infantry shifting formations between line—a strike posture, column—a movement posture, and square—a protected posture. At a given moment, a military unit will tend toward one of those postures.

Aviators must consider both their own posture and their opponent's posture. During an attack helicopter mission, postures change many times. At terrain flight altitudes, an attack helicopter moves and protects itself en route to a battle position. Terrain may not provide complete protection along the route, but movement speed reduces exposure time. Once masked in a battle position, a helicopter is in its most protected posture. When the helicopter unmasks to make direct contact, it moves to a striking posture at the expense of protection. To identify and engage a target, an attack aviator completes the direct fire engagement process (DIDEA—detect, identify, decide, engage, assess) while remaining in the striking posture. After an engagement, the helicopter masks—returning to a protected posture—and moves to subsequent battle positions.

During an attack helicopter mission, enemy ground units are also in different postures. A well-protected enemy unit is concealed under camo nets or in a tree line where attack helicopters' sensors cannot easily acquire it. A striking enemy unit temporarily exposes itself—this exposure may be visual, electronic, or through direct or indirect fires—as it goes through its engagement sequence. A moving enemy unit is most exposed and while still capable of striking, it is less

A U.S. Army AH-64 Apache helicopter conducts a traffic pattern training flight at Katterbach Army Airfield in Ansbach, Bavaria, Germany. U.S. Army photo by Charles Rosemond/released.

AH-64 Apache attack helicopters launch from Katterbach Army Airfield for a battalion attack training mission. U.S. Army photo by MAJ Robert Fellingham.

effective. Air defense coverage is more difficult to provide for a moving force, leading to potential gaps in coverage. Enemy units will try to minimize exposure time by moving rapidly and maneuvering to new protected positions where they can better strike friendly units.

Attack helicopters are most effective against moving targets. Target acquisition is easiest against a moving threat because it minimizes the exposure time needed to complete the direct fire engagement process. Additionally, gaps in air defense coverage while a target is moving further increases attack helicopters' advantages against moving targets. Stationary units are problematic for attack helicopters. Any AH-64 front seater with experience at the combat training centers understands the difficulty of acquiring a target at standoff range hidden in trees or deliberately concealed with camo netting. Target acquisition is possible; however, it is usually accomplished after a more extended time searching from an exposed posture. This places a dilemma on an attack aviator—remain masked without the ability to successfully complete the direct fire engagement process—or adopt a more exposed striking position for a longer period to attempt target acquisition.

Applying the Concepts

Army Aviators should understand these concepts and adopt a maneuverist approach to apply strength against enemy weaknesses. Planning that considers when an enemy is most vulnerable can maximize advantageous situations. Identifying when and where the enemy is moving or in a vulnerable position is key. Intelligence preparation of the operational environment can identify possible avenues of approach and times when the enemy is likely to move. A well-designed information collection plan—potentially incorporating the unmanned aircraft system (UAS) Gray Eagle's moving target indicator capability—can assist attack helicopters in arriving at engagement areas at the same time as the target, minimizing their exposure.

Aviation operations should seek opportunities when friendly ground maneuver compels the enemy to leave its protected posture, achieving the multidomain imperative of imposing multiple dilemmas on the enemy. For example, attack helicopters can remain in reserve until friendly forces capture an objective and then come forward to defeat an enemy counterattack. Similarly, friendly ground maneuver, such as an envelopment or turning movement may compel an enemy to displace setting the stage for a pursuit. Historically, attack aviation finds enemy units exposed and without adequate defense in a pursuit. During the Gulf War, the Highway of Death provides a classic example when aviation units inflicted heavy losses on Iraqi units caught in the open while retreating from Kuwait (Atkinson, 1993). Similarly, during the Normandy campaign, German units hastily retreating through the Falaise gap suffered heavy casualties from Allied aircraft (Atkinson, 2013).

Sometimes, the mission dictates targeting stationary units despite the desirability of attacking moving targets. Aviators must understand the disadvantages of this situation and take mitigating steps. The first disadvantage is the difficulty in finding an enemy in a protected and concealed posture. The multidomain imperative to make initial contact with the smallest element helps mitigate this risk with attack aviators relying on UAS or ground forces to make initial contact. The second disadvantage is that the attack sequence takes longer due to the difficulty in establishing direct contact. Aviators can mitigate this risk through conducting remote *Hellfire* engagements, thus eliminating the attack helicopter's need to conduct the direct fire engagement process.

If the mission still requires attack helicopters to gain initial contact and complete the direct fire engagement process, aviators mitigate risk through fire support coordination and suppression of enemy air defense. Fires enable maneuver and are an imperative for exposed maneuver. In this case, fires are needed to enable attack helicopters to unmask or maneuver in exposed positions to gain contact and complete the engagement sequence successfully.

Evidence in Current Operations

A cursory overview of Russian helicopter operations in Ukraine from open-source media confirms the previous concepts (Bronk et al., 2022, pp. 21-23). The initial air assault on Hostomel airport saw many helicopters operating without the use of terrain called for by the Modern System, with attack helicopters operating in the open shot

U.S. Army AH-64D Apache Longbow helicopters participate in a *Hellfire* Missile Shoot at Greek Karavia, Range Complex, Greece. U.S. Army photo by CPT Gabrielle Hildebrand.

down by man-portable air-defense system teams (WarLeaks-Military Blog, 2022). Adjusting to the lethal conditions, additional videos show attack helicopters firing rockets blindly while masked behind friendly lines. Russian aviators appear to have adapted to the lethal conditions by maximizing protection but with a degraded ability to strike (Newdick, 2022). Likewise, further videos show exposed Russian helicopters attempting to strike Ukrainian positions with anti-tank missiles. The lengthy exposure time while the Russian helicopter attempts to complete its engagement sequence results in its shootdown by a Ukrainian missile team (Retro Foto House, 2023). When Russian helicopters did achieve success during the Ukrainian summer 2023 counteroffensive, they attacked moving Ukrainian vehicles that did not have coordinated air defense coverage (Roblin, 2023).

Conclusion

Modern System tactics and a maneuverist approach provide insight on the opposing conclusions about attack helicopters' viability in LSC. Aviators must be canny about both when and where they are employed. A maneuverist approach allows aviation to fight from an advantageous situation or take deliberate steps to avoid an unfair fight if required to fight at a disadvantage. This means attack helicopter operations in LSC will be more sparing and more deliberate. Preferencing attack helicopter use against moving targets requires commanders to husband them until the enemy moves. If the mission dictates attack helicopters' use against stationary targets, it requires deliberate planning and execution, meaning these operations will be slower-paced and unlikely to result in decisive engagements with high enemy casualties. Understanding the conditions that disadvantage attack aviation allows more deliberate decision-making regarding employment.

The days of operating at altitude with easy battlefield visibility and relative invulnerability from threat systems—as done in Iraq and Afghanistan—are gone. Army Aviation's inherent mobility, speed, range, flexibility, lethality, precision, and persistent reconnaissance capabilities provide the combined arms team with a formidable capability. Even the mere presence of aviation complicates enemy planning and potentially fixes the enemy while friendly ground forces maneuver against it. The current force structure is heavily reliant on manned attack helicopters. Bringing those assets to bear requires dialogue between aviators and ground commanders on how best to utilize attack aviation. Fortunately, tactics involving the Modern System and a maneuverist approach to fighting are the ground forces' language. Aviators better versed in these concepts will be better members of the combined arms team during LSC.

Biography:

MAJ Phillip Savoie is an AH-64D aviator with 11 years of service. Previous assignments include two company commands in Germany and serving as a Cavalry/ATK Observer-Coach/Trainer at the National Training Center. He is currently attending Intermediate Level Education at Fort Leavenworth, Kansas.

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The Future of Army Aviation Logistics Sections Within the Combat Aviation Brigade

Soldiers conduct logistics airlift training on Wright Army Airfield, Georgia. U.S. Army photo by SGT Laurissa Hodges.

By CPT Jake R. Maltz

Without argument, one can easily identify the significance of U.S. Army Aviation in future wars and conflicts for our nation. Army Aviation, through the combat aviation brigade (CAB), supports the ground force commander's intent, providing essential firepower, reconnaissance, aerial movement, and medical evacuation to Soldiers on the ground. Within the CABs currently, each subordinate battalion has Army Aviation officers serving as the battalion logistics officer, or S4. These officers, trained to fly and employ aircraft in the operational environment as aviation officers, are expected to also become logistics professionals rapidly and without any training. Most of the S4s within the CAB will have an understrength section with missing personnel and with noncommissioned officers not familiar with aviation platforms or planning logistic operations. These factors, combined simultaneously, may have disastrous effects in future conflicts and highlight changes that must be made immediately. To ensure Army Aviation's success on future battlefields, S4 sections must have an officer-in-command (OIC) position filled by a logistics officer. Additionally, the S4 must have an assistant S4 position filled by an aviation officer.

The modified table of organization and equipment (MTOE) for battalion S4 officers in command positions within the CAB must change from a 15 series military occupational specialty (aviation and transportation) to a 90 series (multifunctional logistical branch) to ensure logistics are properly planned and controlled by subject matter experts. Additionally, the battalion S4 section must include an assistant 15 series officer to provide aviation experience to the logistics planning cell. This change in MTOE will place aviation units' key leaders in positions to provide continuous logistical support for aviation operations in the austere operational environments of future conflicts.

Former President and Army GEN, Dwight D. Eisenhower, once observed, "You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics." As an abnormally large consumer of logistical support, compared to the average ground unit, Army Aviation heavily relies on fuel and parts

Aviation Center Logistics Command, Fort Novosel, Alabama. Training, doctrine, and testing are all critical parts of the center's mission to develop Army Aviation's capabilities. Photo by Jerry Duenes.

An AH-64E refuels at a forward arming and refueling point on Joint Base Lewis-McChord, Washington. U.S. Army photo by CPT Kyle Abraham.

support to ensure operational reach of friendly forces. In future conflicts, Army Aviation units may be asked to operate far from the flagpole in austere environments that limit communications and support from higher headquarters. This will require logistics professionals, who are trained and possess experience with logistical operations, to run planning efforts for aviation units. An aviation officer with no logistical experience cannot fulfill this responsibility to the successful level required. The future operational environment highlights the necessity for a more robust logistics section within Army Aviation battalions, which will ensure that the capability to support the ground force will not be lost.

For these logistics officers to be successful, an aviation officer must also be placed within the S4 section. This personnel pairing will ensure the battalion is supported by a logistics officer who has the appropriate logistics experience and training. This logistics officer is paired with an aviation officer who has operational aviation expertise. Battalion logistics sections will be more successful in current operations and more adaptable for future conflicts by following these personnel reassignments.

Adding the logistics officer within the battalion logistics section, the aviation officers traditionally filling these positions will flourish. Adding an officer with logistics experience to the logistics planning cell will create an excellent broadening opportunity for that aviation officer. The officer will have opportunities to learn from the OIC, broadening the experience and expertise within the section. The aviation officer will also not be the sole point of failure regarding logistical planning within the organization, ensuring that the aviation officer can fulfill their aviator duties. The aviator can maintain currency and gain essential hours in the development of their aviation career without the anxiety of failing the organization's logistical needs.

> **"The line between disorder and order lies in logistics"**
>
> - Sun Tzu,
> Chinese
> military strategist

Aviation battalion logistics sections must be filled with logistics officers—with an assistant aviation officer—to ensure units are properly prepared for conflicts of the future. These changes in manning will allow for logistics experience to be held at the battalion level, allowing for adaptability, responsiveness, and improvisation needed in future conflicts.

Manning the logistics section with an assistant aviation officer will provide the needed combination of logistics and aviation experience. Finally, the changes in manning will allow for development of the aviation officer traditionally put into the S4 role by allowing them to attain the yearly flight requirements without sacrificing the battalion's logistics section.

Although a small change, the addition of a logistics officer at the battalion level for Army Aviation units will ensure Army Aviation can continue to support friendly ground forces successfully in future conflicts.

Biography:

CPT Jake Maltz is a Reserve Officers' Training Corps graduate from Siena College, New York, with a degree in Accounting and Auditing. Jake graduated from flight school in November 2019, and was assigned to Fort Bliss, Texas, serving in the 2-501st General Support Aviation Battalion as a forward support medical platoon leader, a maintenance company executive officer, and the battalion logistics officer.

The Role of the Aviation Support Battalion in Synchronizing Combat AVIATION BRIGADE SUSTAINMENT

By LTC Steven P. Sevigny and MAJ Garrett C. Chandler

A U.S. Army CH-47 Chinook takes off at Naval Base, Guam. U.S. Army photo by SPC Carlie Lopez.

During World War II, the chaos of battle frequently required rapid task organization changes to reduce complexity of the battlefield for commanders (North, 2013, p. iii). To facilitate this end, the Army designed doctrine with command and support relationships that enabled rapid and effective changes to task organization. The current structure and doctrine of the aviation support battalion (ASB) makes it extremely difficult for the combat aviation brigade (CAB) to fight and effectively train sustainment operations for Large-Scale Combat (LSC). The current modified tables of organization and equipment (MTOE) do not support mission task organization for sustainment; doctrine is almost exclusively focused on brigade combat team (BCT) sustainment structure and operations, and those factors combine to make effective aviation sustainment training difficult.

• The CAB MTOE is not conducive to mission task organization for sustainment operations.

In a CAB, the ASB is designed with an organic headquarters support company, distribution company, aviation maintenance company, and signal company (Figure 1). Unlike the brigade support battalion (BSB) in a BCT, each forward support company (FSC) in the CAB is organic to the flight battalion (i.e., General Support Aviation Battalion [GSAB], Attack Battalion [AB], Air Cavalry Squadron [ACS], Assault Helicopter Battalion [AHB]) they are specifically structured to support. Also unlike the BSB, this means the ASB commander only has direct authority over the main ASB companies and requires authorization to control the remaining sustainment formations while fulfilling the role as the support battalion commander for the CAB.

There is certainly a benefit with an organic relationship between the FSC and the flight battalions. By having the flight battalions directly control their own FSCs, the flight battalion commander directly controls the synchronization of logistics and flight operations. The close relationship also helps create connective sinew between the sustainers and the flight crews, developing mutual trust.

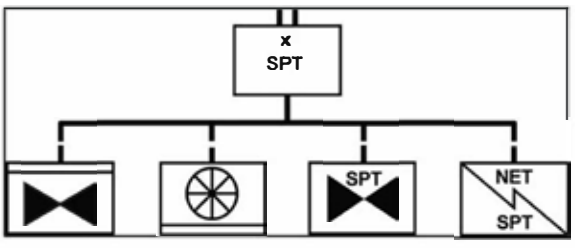


Figure 1. Aviation support battalion (Department of the Army [DA], 2020, p. 2-11).

Additionally, since the structure of each FSC is unique to the supported flight battalion, this specialization in design is extremely useful for the specialized task and purpose of each flight battalion. However, when considering sustainment operations at the **CAB level instead of the battalion level**, this unique structure is very limiting. It means that one FSC is not designed or equipped to support all CAB flight operations. For example, the AHB and GSAB FSCs do not have the trained personnel to conduct AH-64 arming operations (15Y), nor do they have load handling system capability. This is because these FSCs are not designed to support the Class V requirements for the AH-64 like the other FSCs for the ACS and AB. This is a significant limitation for the CAB commander when planning operations, and the ASB commander is unable to rapidly task organize sustainment formations under the current CAB MTOE.

In comparison to the CAB MTOE, the BSB MTOE places the FSC within the BSB and gives it a habitual relationship (either attached or under operational control) with the supported maneuver battalion. This allows the BSB commander to easily task organize and weight support operations more heavily based on brigade priorities without first gaining consensus from maneuver battalion commanders (Figure 2).

Lastly, the individual given this unique and ill-defined task is a career aviator, not a career logistician. This is not an issue in and of itself. The problem lies with the fact that the individual given responsibility of sustaining CAB operations has no command authority over critical sustainment formations and does not usually have the experience necessary to undertake this task. Aviation support battalion commanders are directed (and pressured) to

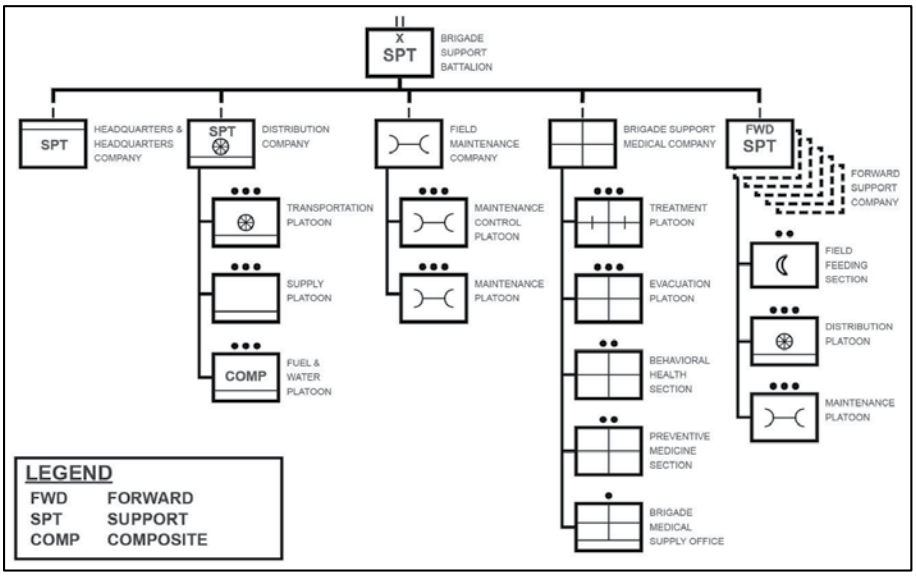


Figure 2. Brigade support battalion (DA, 2021a, p. 9-7).

take unnecessary professional military education (PME) courses like the Aviation Maintenance Operations Course or Maintenance Test Pilot Course, instead of much more relevant PME such as the Support Operations Course or Sustainment Pre-Command Course. The combination of not giving this individual the MTOE authorities to synchronize and task organize brigade-wide sustainment operations, while also not training them more deliberately to manage those operations, places the CAB in a position of significant disadvantage in LSC.

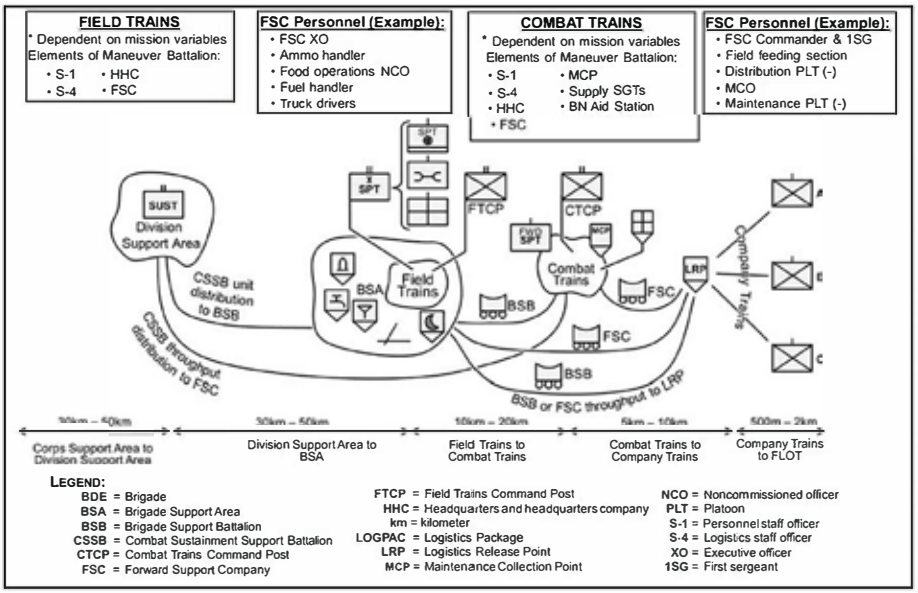
• Doctrine for the ASB and aviation sustainment is limited, with most concepts centered around BCT operations.

Sustainment doctrine is heavily oriented on BCT sustainment operations. For example, Army Techniques Publication (ATP) 4-90 is titled "Brigade Support Battalion" and covers BSB operations in detail. A better description of the doctrine is "Brigade Combat Team Sustainment Operations." This one-stop shop for all things BSB is more than 150 pages covering roles; mission command; operations (including staff); echeloning sustainment; and key components of distribution, maintenance, and medical support operations. When trying to understand relationships, command and control of formations, and battlefield framework, ATP 4-90 provides one main resource for BSB sustainment personnel to get information and speak from common operational terms (DA, 2021b).

There is no publication centered on the ASB. Information on the ASB is found scattered in other doctrine. This includes an 11-paragraph section in ATP 4-90, describing the structure of the ASB, including clarification that the FSC and aviation maintenance companies are organic to the battalions, though in the FSC section of the publication, it implies that the ASB controls the various FSCs in the brigade (2021b, para. 1-100). Field Manual (FM) 3-04, "Army Aviation," provides three paragraphs on the structure of the ASB and includes a chapter on Army Aviation Sustainment covering some unique duty positions; force projection; forward arming and refueling point (FARP) operations; medical; and personnel, legal, and religious service summaries (DA, 2020, pp. 4-1 to 4-11). To find specific information on the bread and butter of aviation sustainment—FARP operations—one must look at ATP 3-04.17, "Techniques for Forward Arming and Refueling Points" (DA, 2018).

Returning to the discussion on the difference in structure between the ASB and the BSB, chapters 4-5 in ATP 4-90 discuss the brigade support area (BSA), echeloning sustainment, and corresponding battalion Field Trains Command Posts (FTCP) and Combat Trains Command Posts (CTCP) (Figure 3).

Aviation doctrine does not allow for the concept of a CTCP or an FTCP. For simplicity's sake, the authors will only discuss the FTCP. Army Techniques Publication 4-90, paragraph 5-7 states, "the FTCP serves as the battalion or squadron commander's primary direct coordination element with the supporting BSB in the BSA" (2021b). This is a very familiar concept to BCTs and BSBs, and it is exercised regularly at combat training center (CTC) rotations. Furthermore, ATP 6-0.5, "Command Post Organization and Operations,"



+ The maneuver battalion HHC commander and the BSB FSC commander alternate presence at the field trains command post (FTCP) and the combat trains command post (CTCP) based on mission variables.

Figure 3. Example of echeloned sustainment using field, combat, and company trains (DA, 2021b, p. 5-2).

Table 1-1, which outlines all types of command posts by echelon, does not specify an FTCP for aviation battalions, and FM 3-04 makes no mention of an FTCP (DA, 2017, p. 1-4; DA, 2020). Since aviation battalion task forces deploy to CTC rotations instead of CABs, CABs are very much untrained in synchronizing sustainment as a CAB instead of a battalion task force. Since this concept is not trained and not specified in aviation doctrine, aviation leaders are unaware of the critical function of the FTCP and how it is absolutely necessary to synchronize sustainment for the CAB in LSC. Figure 4 is a visual depiction of what a CAB distribution network would look like in LSC. It is complex, and when we consider that the ASB commander has zero authority over the FSCs, it creates a critical gap in how CABs conduct and synchronize sustainment operations in LSC.

• To better train for LSC, the Army should look at restructuring the MTOE for CAB sustainment units and expand doctrine to include sustainment formations beyond BCT sustainment organizations.

The current MTOE for the sustainment units within the CAB is clearly designed to support battalion-level operations, and it is too restrictive to support CAB-sized operations without significant and deliberate internal restructuring and coordination. Separating the FSC from the ASB prevents the ASB commander from being able to practice massing and weighting sustainment against brigade priorities without disrupting internally planned battalion operations. Furthermore, to enable an AHB or GSAB to support rearming operations, a brigade must not only provide personnel and equipment from another battalion's FSC to support the operation but must train the leadership on a new, unfamiliar mission set. This is not an impossible task, but training opportunities are more limited when they require multiple battalions to execute effectively. Structuring similar to a BSB enables the ASB to task organize resources and execute training internally to minimize risk. Sending commanders to mandatory training in their new specialty—sustainment—further enables them to identify and execute training to support those skill sets.

In general, the dearth of information in doctrine regarding the ASB and CAB sustainment operations creates a risk in LSC aviation operations. Of specific note here are the lack of details about the unique mission, design, capabilities, and limitations of the ASB and the absence of critical sustainment concepts, such as echeloned sustainment and an FTCP. While doctrine is not necessarily required for step-by-step instructions on execution, it would further educate aviation leaders of all ranks to better understand sustainment operations in LSC. Additionally, given the limited population of Army logisticians exposed to aviation sustainment operations, it provides a reference for individuals unfamiliar when first arriving to an aviation unit or during PME. The combination of these two factors makes it extremely difficult to effectively train how to fight a CAB in LSC. As operations become more dynamic and require more innovation and flexibility to execute, it becomes more important to give commanders the tools and training to succeed. In LSC, having the ability to rapidly change task organization reduces the scope for subordinate commanders to better manage operations. Having a common language and understanding to communicate concepts codified in doctrine helps share intent quicker.

Biographies:

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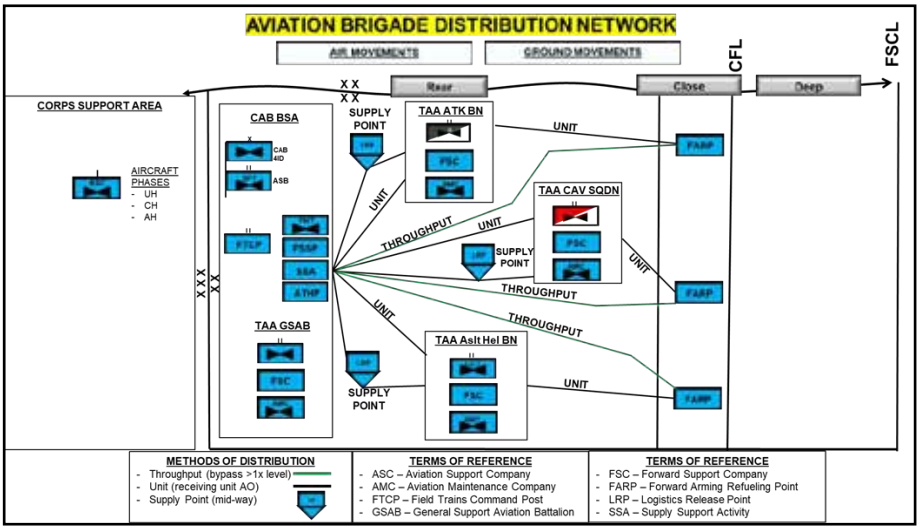

Figure 4. Author depiction of a CAB distribution network (Sevigny, 2024).

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A Critical Analysis of the Aviation Support Battalion's Efficacy in the Operational Environment:

Lessons Learned From 1st Armored Division's National Training Center Rotation 24-03

By CPT Tyler J. Westrick, MAJ Joseph Velez Vidal, LTC Linus D. Wilson, and CPT Ellen L. Schultz

Since 2017, the U.S. Army has been undergoing a transformation of the Total Army's focus from counterinsurgency (COIN) to large-scale combat (LSC). The combat aviation brigade's (CABs) role has been forced to adapt to the rigorous challenges of this unfamiliar environment to meet the demands for the Army of 2030. The ever-growing capabilities of our adversaries will put added stress on our fighting force and place a premium on sustainment operations.

The aviation support battalion (ASB) is the sustainment force of the CAB. Just like the CAB, the ASB will be forced to rapidly adapt to maintain flexibility in this new environment if it wishes to provide uninterrupted logistical support and ensure the CAB maintains its lethality.

In February 2024, the 127th ASB deployed with the 1st Armored Division CAB (1AD CAB) to National Training Center (NTC) 24-03 in support of the 1AD's rotation. The ASB was able to test its mission-essential task list in this large-scale NTC rotation and walk away with critical lessons learned. This article discusses these lessons learned and provides a critical analysis of the ASB's unique capabilities and what it takes for an ASB to be successful in the LSC environment.

The NTC 24-03 Rotation From the ASB Perspective

As our Army transitions from COIN operations to LSC, it is division elements—enabled and supported by the corps—that defeat enemy forces, control land areas, and consolidate gains for the joint force (Department of the Army [DA], 2022b). This requires a paradigm shift, especially in aviation, away from the battalion (BN) task force mentality

engrained after decades of COIN. For the second time in recent history, the NTC provided the Army the opportunity for division-level training during 24-03. The difference between 1AD's rotation at NTC 24-03 and 1ID's rotation at NTC 20-10 was scale. The scale of the 24-03 rotation exceeded all past rotations in terms of participants and physical breadth of the operational environment. In NTC 24-03, the aviation unit executed missions across the entire training area, plus 200 miles outside the Fort Irwin, California (FICA), Training Center at the Nevada Training and Test Range (NTTR).

To facilitate this training, the 1AD CAB deployed the brigade (BDE) headquarters (HQs), 127th ASB, 3-6 Air Cavalry Squadron (ACS), and 1-501 Attack Battalion (AB). This consisted of 29 AH-64 Apaches—five UH-60 Black Hawks; four HH-60 Medical Evacuation Black Hawks; four CH-47 Chinooks; 60,000 gallons worth of CLIII (petroleum, oil, and lubricants) sustainment capabilities; and all the logistical, life support, and HQs equipment and personnel to support such a force. The CAB executed multiple deep attacks, supported by forward arming and refueling points (FARPs) from the forward support companies (FSCs) and the ASB. The most demanding of which, led by the ASB, consisted of a 200-mile convoy from FICA to the NTTR. The FARP at the NTTR was comprised of eight arming and refuel points from the ASB and four points provided by two CH-47s.

The ASB is responsible for a variety of unique tasks to support the CAB's missions. The 127th ASB conducted six very

notable tasks at NTC 24-03: base defense for the ASB and BDE HQs, logistical distribution of all classes of supply to the CAB, FARP operations, Role 1 medical support to the CAB, ground-fleet field maintenance, and signal support.

As the ASB is unique to aviation, it lacks consistent doctrine that indicates how and when an ASB is most effectively utilized. National Training Center rotations, such as 24-03, are therefore essential to validating tactics, techniques, and procedures that may not otherwise be tested and codified. We wanted to share the following lessons learned at NTC 24-03.

Lesson 1: The ASB is not a Brigade Support Battalion (BSB)

The lack of doctrine on the ASB lends to a common misconception that the ASB is the aviation equivalent to the BSB. Even the limited information in Army Doctrine Publication (ADP) 4-0, "Sustainment," would indicate that this is the case (DA, 2019). Understandably, strategic planners with limited aviation experience overestimate the internal capabilities of an ASB if compared with the traditional BSB supporting an armored brigade combat team (ABCT). Though both units serve as the sustainment unit for their BDEs, the differences in their primary customer are reflected in their modified table of organization and equipment (MTOE) and dictates their composition. The ASB consists of a headquarters support company (HSC), a distribution company, an aviation support company (ASC), and a signal support company.

According to ADP 4-0; there are six primary differences between the BSB and the ASB.

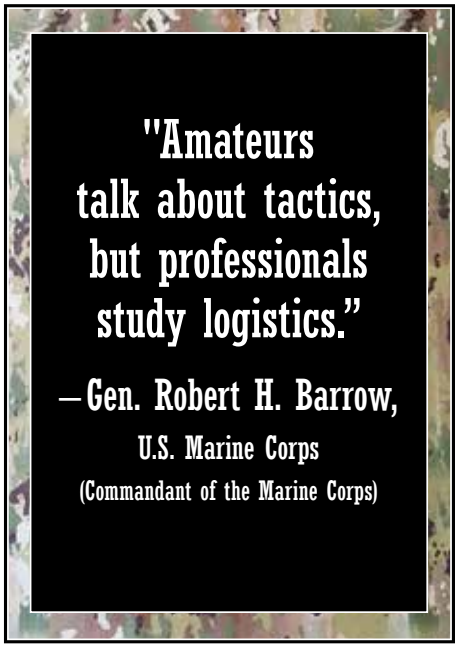
1. "The ASB does not have a brigade support medical company" (DA, 2019a, p. 2-16). Instead, it has a medical platoon within the HSC capable of providing Role 1 level medical support.

2. While the ASB does have a distribution company, it has a significantly smaller CL III distribution capability than a BSB (6 M978s vs. 18 M978s) (127th ASB, 2024). The ASB makes up for the lack of highly mobile CL III systems with its less mobile M969 (5,000 gallons each) tanker trailers and the static fuel system supply point (FSSP) (six 20,000-gallon blivets) (DA, 2022a, p. A-21; 127th ASB, 2024).

3. The aviation BDE's FSCs are not organic to the ASB. Instead, they are distributed and remain organic to each of the four flight BNs within the BDE. The ASB does not innately have tasking authority over any of the FSCs (DA, 2019a, pp. 2-56; Garner, 2013).

4. The ASB does not have a dedicated ground maintenance company. Instead, it has a maintenance platoon that is responsible for maintenance support to the ASB and CAB HQs only (DA, 2022a, pp. 2-32 to 2-33; Garner, 2013).

5. The ASB has an ASC, which the BSB does not (DA, 2022a, p. 2-33). The ASC provides scheduled and unscheduled field-level aviation maintenance support to the flight BNs (Polk & Case, 2020). This is often seen as the ASB's major function and consumes the largest share of its personnel and resources.



6. Similar to a maneuver enhancement BDE, the ASB has a signal company, which the BSB does not. The signal company provides communications support directly to the CAB HQs (Garner, 2013; DA, 2019b, pp. 2-55 to 2-56).

Upon further analysis, more parallels can be drawn between the ASB and the division sustainment support battalion (DSSB) than the BSB. The ASB is just equipped to execute at a smaller scale. The BSB is structured and equipped to be highly mobile in support of the maneuver BDE. The entirety of its asset is designed to be "carried on its back" for distribution. The ASB, on the other hand, is better equipped to serve a static support role, as most of its assets are designed for storage or low-mobility distribution. In comparing the ASB to the DSSB:

1. Both the ASB and the DSSB are equipped with less mobile M969 trailers and static FSSPs to make up for the lack of highly mobile M978 systems (DA, 2022a; DA, 2019a). The BSB has neither M969s nor FSSPs.

2. Both the ASB and DSSB are equipped with Tactical Water Purification Systems and the M105 water tank racks (HIPPOs) to distribute water. The BSB does not have this equipment (Garner, 2013).

The purpose of highlighting these differences and similarities is to critically analyze where the ASB fits into the logistical common operating picture of the division. The NTC 24-03 rotation highlighted that the most common sustainment friction points within the CAB centered around logistical capacity (specifically, CL III) and command and control (C2) of logistical distribution. During offensive operations, both the CAB and the ABCT require large quantities of fuel to operate. The Table (p. 21) shows a CL III capabilities breakdown across 1AD CAB directly compared to an armored BSB and the DSSB.

As shown in the Table, the majority of the CAB's distributable fuel is with the BDE's FSCs. This design, well suited for COIN operations, allows the FSC to provide nearly independent CL III support directly to the end user. The reality of aviation operations requires rapid "truck to aircraft" support from FSC to flight company due to the extreme usage rate and mobility of aviation platforms. The distribution of FSCs down to the BN level facilitates this, while enhancing integration and anticipation of BN

CLIII Capacity in Gallons		
CAB **Distro 263K / Store 120K**	**ABCT** **Distro 201K / Store 0**	**DSB** **Distro 285K / Store 6660M**
Distro Co (ASB) (4)M969 Tanker (5K) (1)120KFSSP (6) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 50K / Store 120K **Petroleum Analysis TM (ASB)** (1) PQAS-E **Aviation SPT Co (ASB)** (2) HEMTT Tanker (2.5K) Defuel 5K. **FSC (GSAB)** (22) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 70K / Store 0 **FSC (AHB)** (11) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 42K / Store 0 **FSC (AB)** (8) HEMTT Tanker (2.5K) (3) Tank Rack Module (2.5K) Distro 27K / Store 0 **FSC (ACS)** (8) HEMTT Tanker (2.5K) (3) Tank Rack Module (2.5K) Distro 27K / Store 0	**Distro Co (BSB)** (18) HEMTT Tanker (2.5K) (18) Tank Rack Module (2.5K) Distro 90K / Store 0 **FSC (BEB)** (3) HEMTT Tanker (2.5K) (3) Tank Rack Module (2.5K) Distro 15K / Store 0 **FSC (CAV)** (6) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 30K / Store 0 **FSC (AR)** (6) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 30K / Store 0 **FSC (AR)** (6) HEMTT Tanker (2.5K) (6) Tank Rack Module (2.5K) Distro 30K / Store 0 **FSC (MECH)** (6) HEMTT Tanker (2.5K) (4) Tank Rack Module (2.5K) Distro 25K / Store 0 **FSC (FA)** (3) HEMTT Tanker (2.5K) (3) Tank Rack Module (2.5K) Distro 15K / Store 0	**Composite SPT Co (DSSB)** (12)M969 Tanker (5K) (2)120KFSSP (1)300K FSSP (6) HEMTT Tanker (2.5K) (20) Tank Rack Module (2.5K) (1) PQAS-E Distro 125K / Store 540K **Petroleum Analysis TM (DSSB)** (1) PQAS-E **Pipeline OPN Co (DSSB)** (2)M969 Tanker (5K) (1)800K FSSP Distro 10K / Store 800K **Petroleum SPT Co (DSSB)** (15)M969 Tanker (5K) (3)120KFSSP (6)300K FSSP Distro 75K / Store 2160M **Petroleum SPT Co (DSSB)** (15)M969 Tanker (5K) (3)120KFSSP (4)300K FSSP (2)800K FSSP Distro 75K / Store 3160M

Table. Class III capacity in gallons (127th ASB, 2024).

sustainment needs. However, it generates a potential shortfall in economy for the BDE. Battalion assets are not easily redirected when operations are planned and prioritized independently. For example, under the current construct, if the BDE's primary mission is to conduct attack operations, the abundant assets in the general support aviation battalion (GSAB) may be left idle and impact the ability of the BDE to sustain operations as a whole.

Lesson 2: Sustainment at Scale

The 24-03 rotation tested the ASB's ability to support the BDE and division on a previously untested scale. "Scale" refers to three inter-related factors of the operations supported at the NTC: size of the supported operations, the operational tempo, and the distances required. As we analyze each factor, it is critical to understand that they must be considered together to fully capture the stress that will be placed on the CAB's sustainment operations in LSC. It is important to note the absence of the attack helicopter BN and the GSAB at NTC 24-03, which would have doubled the CAB's sustainment requirements.

To understand the first factor of supporting at scale is the size of the operations that will be supported in LSC vs. COIN. Operations in COIN focused heavily on platoon- and team-level operations (two to four aircraft formations) flying out of static and consolidated footprints. Prior experience and NTC rotation 24-03 taught us that in LSC, aviation units will be conducting BN and squadron-level attacks (up to 24 aircraft) and BN-level air assaults (up to 30 aircraft), while operating out of constantly moving footprints. This significantly alters the dynamic for sustainment planning, and it can no longer be an afterthought that follows mission planning. Sustainment will inevitably limit mission planning if not employed correctly in LSC.

Supporting BN-level operations at a rapid operating tempo (OPTEMPO) during NTC 24-03 highlighted the limitations of the BN FSC, especially when the FSCs were required to displace forward to support greater operational distances. The OPTEMPO inherent to LSC operations, combined with the high usage rates of aviation platforms, can quickly overwhelm resupply operations. By doctrine, the ASB is required to provide its supported units with 72 hours of supply during high-intensity combat before requiring replenishment from a higher unit like the DSSB (DA, 2019a, p. 5-20). The NTC 24-03 rotation simulated high-intensity operations through alternating nightly BN deep attacks between the ACS and the AB. This requirement was impossible to achieve with the fuel systems operated by each FSC when operated independently. The fuel amounts the CAB will require to maintain around-the-clock operation overwhelms the FSC's internal storage capabilities and capacity to provide constant resupply. The elevated fuel consumption rates (upward of 15,000 gallons in less than 24 hours), combined with the lack of organic bulk fuel distribution capabilities at the ASB's distribution company level, also presented shortfalls in the ability to maintain around-the-clock operations.

The solution utilized at NTC was to combine the resources of both FSCs to support both the ACS and the AB as a larger team. This allowed one FSC to refuel aircraft at the aviation tactical assembly area (TAA) and the other to conduct forward operations in the close area. The ASB utilized stationary storage tanks from the 916th Sustainment BDE to replenish bulk stores, allowing the ASB to focus its distribution assets on pushing fuel to FSCs rather than pulling fuel from division support brigades to minimize the duration of refuel cycles.

Lastly, the distances required of aviation units during LSC present a major hurdle for sustainment operations. Aviation operations in the deep area will require aircraft to refuel and rearm hundreds of miles beyond the aviation TAA. Forward arming and refueling points play a critical part in the success or failure of aviation operations in the deep area. These FARPS are inherently complex due to the risk associated with multiple aircraft landing simultaneously in a congested area, while receiving fuel and ammunition from teams of personnel on the ground. Large-Scale Combat adds a significant level of risk due to enemy forces possessing the capabilities to hunt for and destroy the CAB's FARPs. Beyond survivability, FARP operations are resource intensive. Once a FARP is deployed for an operation, the assets can no longer support the larger BDE mission. In fact, FARPs can further degrade the BDE's sustainment situation when they themselves require resupply.

In the case of NTC 24-03, the requirement to provide CL III refuel at the NTTR in the form of the 12-point FARP decimated the ASB's ability to resupply fuel to the rest of the BDE. The conducted deep attack lasted less than 8 hours, but the assets needed to fuel those aircraft were taken out of the BDE logistical network for about 5 days. The time required for travel, site selection, setup and verification, tear down, and the return movement must all be considered as additional costs associated with the deep fight FARP.

A U.S. Army Reserve Private operates an electric raw water pump during combat support training at Fort McCoy, Wisconsin. U.S. Army photo by SPC John Russell.

A FARP's impact grows exponentially larger if it requires resupply due to the extended distances in which they are displaced from the aviation TAA. In the case of NTC 24-03, the CAB executed a 12-point FARP 200 miles from the aviation TAA in support of a BN deep attack at the NTTR. The logistical requirements for the mission required the support of the ASB, which was assigned C2 of the FARP operation. In this case, the sheer distance made resupply for the FARP impractical. All assets had to be brought forward prior to the deep attack. Ground assets and personnel from the ASB and AB, along with CH-47 Fat Cows (rapidly employed FARP) from the GSAB, were utilized to meet the demanding requirements. The resulting impact left a single FSC to accomplish the BDE's CL III mission in the BDE support area.

Adding to this already complicated picture is that FARP operations are not a core mission-essential task for the ASB. Regular FARP setup, practice, and cross-training of personnel are essential to ensure the safety of operators and aircrew executing FARP operations. Soldiers, regardless of military occupational specialty, need to be cross-trained with a 92F (petroleum supply specialist) and a 15Y (AH-64 Armament/Electrical/Avionic System Repairer) to ensure operational readiness and execution. Additionally, conducting FARP operations in a contested environment stresses the defensive capabilities of sustainment units by requiring a security posture exceeding the organic capabilities of the ASB. Depending on the terrain and threat levels, support from external combat arms units is required to secure the FARP area and maintain security while resupply operations are executed.

Lesson 3: The ASB Must be Integrated in the CAB's Sustainment Operations

The ASB's leadership will face additional planning and synchronization challenges during LSC. The CAB will be expected to conduct larger and more complex missions than those traditionally conducted during COIN. To achieve success, the BDE and BN planners need to be synchronized at all levels. As the senior logisticians in the CAB, the ASB commander, ASB executive officer, and support operations officer should lead the logistical efforts to prioritize and synchronize all classes of supply in time and space across the operational environment. To synchronize the economy of the BDE's logistical assets, we also recommend task organizing the FSCs under the ASB, similar to how the BSB operates. This will allow the ASB to serve as the logistical heart of the CAB and provide accurate and timely recommendations to the BDE commander.

Lessons learned from NTC 24-03 show that independently run sustainment operations at the BN level and synchronized by the BDE operations cell create numerous friction points for the BDE.

Conclusion

The future LSC fight has created new challenges that the ASB should quickly address to ensure continuity of support. Tactics that have been utilized for the last 20 years will no longer be able to carry the battle and achieve victory. Commanders and leaders at all echelons should conduct serious assessments of their formations and current strengths and weaknesses. The ASB, with its current MTOE, may not be able to support four flight BNs with a moderate OPTEMPO. The keys to success will be exhaustive maintenance, prioritized fuel distribution, and a synchronized military decision-making process (MDMP), including subject matter experts from all levels, for an organization whose capabilities and responsibilities fall somewhere between a BSB and a DSSB. Divisions and CABs must continue to stress the sustainment system through rigorous training and evaluations similar to NTC 24-03 to develop sound doctrine for the ASB.

The scale of aviation operations in LSC and the increased burden on sustainment will require higher level commanders to make critical decisions that ensure synchronicity between sustainment and maneuver at the BDE level. At current scale and implementation, the ASB will fail in a LSC fight if used as a BSB. Commanders must either deliberately focus the use of ASB assets or increase the size and breadth of its capabilities to ensure mission success. Using aviation maneuver assets to support the BDE's sustain-

ment goals may be one of these decisions. Additionally, the commander should balance the use of the ASB to conduct FARP operations against the long-term sustainability of the BDE's mission. It is critical for BDE planners to integrate the ASB into the BDE's planning process during the entire MDMP to enhance the commander's decision-making ability. The ASB brings an incredible capability to the table and, if harnessed correctly, can ensure the CAB's success in LSC.

Biographies:

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82D Combat Aviation Brigade Paratroopers conduct FARP operations. U.S. Army photo by SGT Vincent Levelev.

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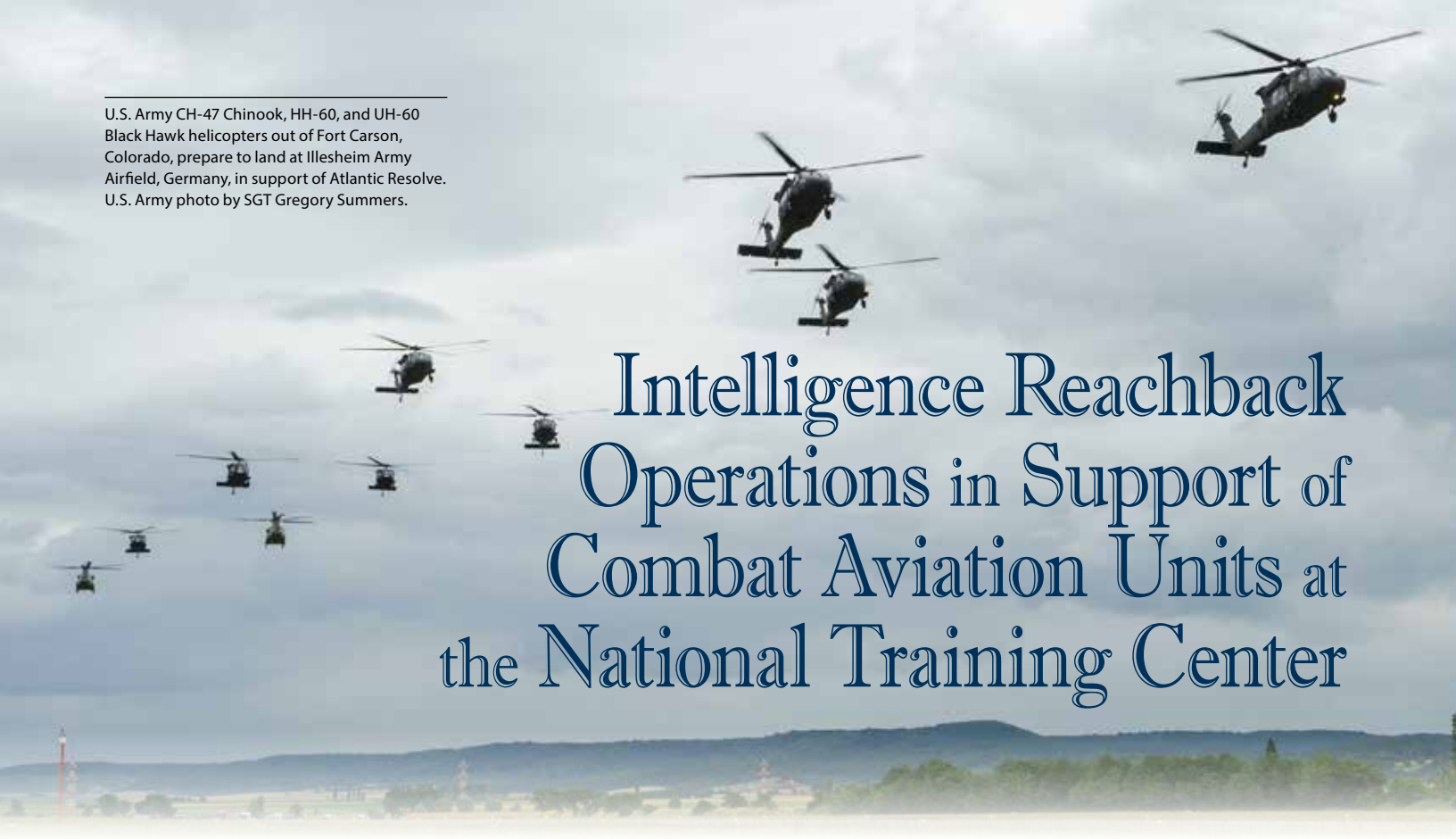

U.S. Army CH-47 Chinook, HH-60, and UH-60 Black Hawk helicopters out of Fort Carson, Colorado, prepare to land at Illesheim Army Airfield, Germany, in support of Atlantic Resolve. U.S. Army photo by SGT Gregory Summers.

Intelligence Reachback Operations in Support of Combat Aviation Units at the National Training Center

By MAJ Luis E. Llaury, CPT Lynne D. Mooradian, MAJ Kyle J. Pare, CPT Brian L. Matiasmuniz, and CW2 Alex M. Lashbrook

Introduction

This article outlines key lessons learned from the 4th Combat Aviation Brigade's (4CAB) Reachback Operations Cell (ROC) in support of Task Force (TF) SABER at the National Training Center (NTC) rotation 24-02. The 4CAB (Ivy Eagles) implemented the ROC concept as a pilot to identify new opportunities best supporting aviation units conducting NTC rotations and reduce critical intelligence (INT) gaps in operations. Ultimately, 4CAB's ROC was vital to the overall success of TF SABER during both China Lake (CL) iterations—CL1 and CLII—greatly enhancing the commander's awareness of the operational environment (OE) and increasing lethal effects against enemy conventional threats.

In the initial stages of an NTC rotation, aviation units are required to execute two essential missions: CLI and CLII. Both iterations require the aviation TF to navigate complex mountainous terrain, identify and destroy enemy Integrated Air Defense Systems (IADS), and provide infiltration/exfiltration for friendly Special Forces. Importantly, CLI and CLII allow NTC Observer Coach/Trainers (OC/Ts) to validate and certify the unit as a multifunctional aviation TF capable of supporting Large-Scale Combat (LSC).

One significant challenge conventional CABs face is the absence of a robust INT warfighting function (IWfF) architecture similar to Army maneuver units. For reference, the modified table of organization and equipment authorizes 4CAB Battalion (BN) S2 (INT) sections to have one O-3 officer-in-charge (OIC), one O-1/O-2 Assistant S2 (AS2), one E-6 Noncommissioned OIC (NCOIC), and two All-source INT Analysts (E-5 and below). The limited manpower significantly impacts the BN S2's ability to maintain a common INT picture and help drive targeting efforts.

Problem Statement

The proliferation of advanced and emerging long-range precision strike capabilities means that IWfF nodes are increasingly vulnerable to enemy long-range fires when positioned forward (FWD) and out of sanctuary (National Intelligence Council, 2021, p. 11). Additionally, the high potential for electronic warfare (EW) in LSC mandates measures to minimize or conceal a unit's electromagnetic footprint (Hofstetter & Wojciechowski, 2020, p. 23). To overcome these survivability challenges, the ROC initiative aimed to bolster TF SABER's capabilities at NTC rotation 24-02 and test new ways to support FWD elements from protected reach sites.

Providing Reachback Support from Fort Carson, Colorado (FCCO) to TF SABER

The Department of Defense defines *reachback* as "the process of obtaining products, services, and applications, or forces, or equipment, or material from organizations that are not forward deployed" (Office of the Chairman of the Joint Chiefs of Staff, 2023, p. 157). Similarly, Field Manual 2-0, "Intelligence," states that "intelligence PED [processing, exploitation, and dissemination] capabilities can perform PED from a deployed location or reach site in theater or the

United States" (Department of the Army, 2023, p. 1-25). The critical components of a successful PED reachback initiative are reliable access to necessary INT resources and robust linkages between the INT architecture and FWD command and control nodes. In this context, Ivy Eagles' leadership strove to test new, innovative ways to support FWD elements from FCCO—resulting in the creation of 4CAB's ROC.

Phase I: Planning and Preparation

During Phase I, the 4CAB's S2 and S3 (Operations) OICs focused on establishing expectations for all participating WfFs—INT, Movement and Maneuver (M2), Mission Command (MC), and Fires. The planning phase was vital to determine training objectives, manpower requirements, shift schedules, and operationalizing the Brigade Operations Center (BOC) for reachback support. Critical to the ROC pilot's success was the 4CAB Commander's decision to commit personnel and resources from across multiple staff sections under the purview of the S2 OIC.

The ROC concept called for two shift schedules—a morning shift from 0700 to 1500—and an evening shift from 1400–2100. The 1-hour overlap (1400–1500) allowed for shift change handovers, discussions on the latest changes in the OE, and synchronizing efforts across all WfFs. Regarding manpower, the plan called for dedicated personnel to support the initiative in order to protect the ROC from conflicting garrison requirements. In this effort, the IWfF allocated one Geospatial Imagery Analyst (35G), one Geospatial Engineer (12Y), and two All-source Analysts (35F) per shift to leverage a full package of INT capabilities for TF SABER. The M2 WfF provided one Aviation Operations Specialist (15P) per shift to monitor the Joint Battle Command-Platform (JBC-P) and maintain a common operating picture. Fires, to include the Cyberspace and Electromagnetic Activities (CEMA) section, provided two Spectrum Managers (17J) per shift to enhance TF SABER's lethal and non-lethal effects against conventional IADS threats (Figure).

One critical task during the planning phase was establishing communications with TF SABER and the 52D Infantry Division (52ID). In this regard, MC played a pivotal role in building the required network infrastructure inside the BOC, thus enabling the ROC to begin reachback operations.

From the early stages, the commander's intent for building the communications architecture was to maximize 4CAB's organic capabilities. Therefore, the 4CAB S6 (signal and communications officer) used the brigade's sole Joint Network Node (used for remote, satellite-based communication) integrated with the Battle Command Common Services[1] to act as the ROC's local access point for engineering and connectivity. Positioned at the 4CAB Headquarters, both sets of stacks facilitated the actual physical transport layer through logical fiber connections from FCCO to Fort Irwin, California, and essential services like email, shared drives, and communication platforms (e.g., Skype and Spark). Ultimately, the network architecture provided access to 52ID's critical services to include SharePoint, ShareDrive, and Enterprise platforms like ChatSurfer that "connects you with people on chat servers across multiple networks" (National Reconnaissance Office, n.d.)—all critical requirements to enable reachback operations.

Notably, the process required establishing a network transport through the Regional Hub Node (RHN) at Camp Roberts, California, leveraging its connection to 4ID's Global Agile Integrated Transport (GAIT) switch.[2] The connection was necessary to enable cross-communication between 4CAB and 52ID. Crucial to this successful integration was a collaborative effort between 4CAB Network Operations (NetOps), 4ID NetOps, and 52ID's network team. Sharing network diagrams and close collaboration allowed both sides to whitelist internal subnets, thus establishing a trust connection between the respective server stacks. The trust relationship enabled user access across both networks, therefore removing the need for new user account creations on the 52ID domain.

As expected, MC faced some challenges during the process—building rules, configuring firewalls, and defining network routes to enable the connection with the RHN and subsequently, 52ID. Overcoming these obstacles demanded increased manpower support, requiring approximately 3 working weeks of focused networking to build the required infrastructure. Importantly, brigade NetOps sections should be aware that division G6 (communications and information technology) support is crucial to enable reachback connectivity with units deployed to combat training centers. Even

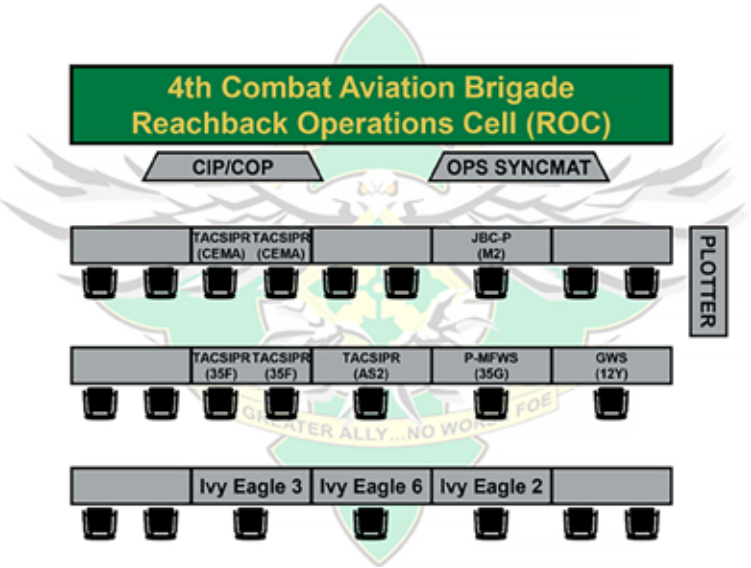

Figure. Reachback operations cell in 4CAB's BOC (Figure provided by 4CAB, 2024).

[1] "Battle Command Common Services and Tactical Server Infrastructure provide a powerful and capable server suite for virtualizing mission command focused applications while ensuring commonality to the command post hardware infrastructure" (U.S. Army, 2018).
[2] "GAIT is essentially a router that allows equipped units the ability to connect point to point with each other across the world without having to go through the enterprise" (Pomerleau, 2020).

A UH-60 Black Hawk helicopter assigned to Task Force Saber makes a banking maneuver in the mountains of Fort Carson, Colorado. U.S. Army photo by SGT Keven Parry.

with extensive support, one limitation remained—MC was unable to establish internet protocol-based voice comms with TF SABER due to conflicting mission configurations and the use of satellite communications. To overcome this challenge, 4CAB established a redundant Primary, Alternate, Contingency, and Emergency (PACE) plan that included JBC-P and tactical satellite communications.

Phase II: Training

The second phase aimed to develop initial products for the ROC pilot, familiarize ROC personnel with the CL scenarios, and train personnel to conduct reachback operations. The IWfF prepared analog/digital maps, consolidated INT products from previous NTC rotations, and drafted a Graphic INT Summary (GRINTSUM) template.

To note, 4CAB prioritized training INT Analysts and CEMA 17Js on the Fusion Analysis and Development Effort/Multi-INT Spatial Temporal (FADE/MIST) Toolsuite—an INT platform developed for "geospatial data visualization and analysis application," (Consolidated Analysis Center [CACI], 2021) to provide battlespace awareness using the detectable signatures associated with enemy radar systems (Flick, 2021). Additional training included INT preparation of the OE, terrain analysis, basics of signals INT (SIGINT), and electromagnetic order of battle (EOB) development.

Phase III: Execution

The Execution Phase consisted of providing dedicated reachback support to TF SABER over the span of 5 days (30 October–03 November 2023) to specifically cover both CLI and CLII iterations. The phase began with a communications exercise, intended to test the PACE plan for successful communications with FWD elements at the NTC.

Secret Internet Protocol Router Network (SIPRNet) ChatSurfer was the primary (PACE) method of communication and INT product exchange between the ROC and TF SABER. In addition, the ROC monitored chat rooms for 52ID G2 (military INT staff), 3D Armored Brigade Combat Team's (3ABCT) Brigade INT Support Element, and 3ABCT INT Collection Manager to maintain situational awareness and access relevant reporting. The NTC Warrior Portal—a SIPRNet SharePoint site dedicated to supporting participating units—acted as the alternate (PACE) method of INT product dissemination. Of note, the NTC Warrior Portal was non-mission-capable throughout most of the operation. Therefore, the ROC relied on the contingency (PACE)—SIPRNet email—to disseminate INT products, since it proved highly reliable and faster than sharing products through ChatSurfer. The ROC rarely used its emergency (PACE) method—JBC-P and SIPR Voice over Internet Protocol.

The ROC concept contained three lines of effort (LOEs)—Geospatial INT (GEOINT), CEMA, and Fusion. Regarding GEOINT, 35Gs and 12Ys provided initial products depicting vertical obstacles, power lines, key terrain, and potential helicopter landing zones (Erskine et al., 2022). Subsequent products concentrated on identifying known enemy radars, surface-to-air missile systems, and jammers within the OE. Importantly, GEOINT Analysts worked closely with All-source Analysts to determine the composition, disposition, and capabilities of enemy IADS.

The second LOE—CEMA—consisted of 17Js drafting Joint Tactical Air Strike Requests (JTARs) for TF SABER, synchronizing information on enemy radars and jammers with the All-source Analysts, and conducting frequency spectrum analysis. During the execution of CLI and CLII, JTARs played a pivotal role in ensuring TF SABER had convergence windows to enable lethal and non-lethal effects against enemy radars. Moreover, CEMA analysis provided valuable contributions to the IWfF in determin-

An AH-64 hovers while acquiring targets during aerial gunnery training at Fort Carson, Colorado. U.S. Army photo by SSG Jeremy Ganz.

ing what simulated enemy systems were associated with real emitters present in the CL training area.

As the third LOE, the Fusion Cell synchronized and analyzed all received INT from GEOINT, Electronic INT (ELINT), and CEMA. In this effort, All-source Analysts worked closely with the 17Js to monitor FADE/MIST, "which detects patterns of life and anomalies within large volumes of geospatial data" (CACI, Inc., 2021). All-source Analysts then used various tools and known enemy doctrine to assess the composition and disposition of the enemy's IADS architecture and most importantly, determine the most likely enemy unit emitting the signals. The Fusion Cell provided its overall assessment—derived from fused ELINT, communications INT, and open-source INT—to TF SABER through bi-daily GRINTSUMs. During execution, the ROC also maximized FCCO's Foundry platform (INT training readiness program) on multiple occasions. The 4CAB S2 submitted requests for information to the Foundry cadre for items falling outside of the unit's organic capabilities, particularly SIGINT and ELINT.

In general, ROC workflow began with the ROC OIC establishing communications with the TF SABER S2 OIC/NCOIC via ChatSurfer to determine priorities and product requirements. Discussions focused on identifying INT cutoff times for GRINTSUMs, GEOINT requirements, and any changes in the OE. Throughout the execution of CLI and CLII, All-source Analysts provided near-real time (NRT) support to TF SABER via ChatSurfer, to identify enemy electronic emissions, radar/jammer types, and associated weapons systems (Flick, 2021). To emphasize, monitoring FADE/MIST for TF SABER became the ROC's most significant contribution during this phase, since TF SABER experienced limited SIPRNet connectivity and inconsistent FADE/MIST access.

Phase IV: Recovery and Assessment

Key tasks during this phase included staging and preparing equipment for future operations, conducting after-action reviews (AARs), and updating standard operating procedures. Measures of Performance and Effectiveness for the ROC pilot derived directly from the 4CAB and TF SABER AARs.

Key Successes

- Establishing early communications with OC/T personnel at NTC proved vital during the planning phase, particularly in identifying requirements and developing the architecture for reach-back support.

- Providing TF SABER with bi-daily GRINTSUMs, EOB updates, and Radar Smart Cards (pocket card/instruction aid) proved highly valuable during planning cycles. Importantly, the additional support allowed TF SABER's IWfF to spend more time enabling targeting efforts and advising the commander.

- Developing a detailed PACE plan was crucial to overall mission success. During the planning phase, 4CAB's WfFs—specifically M2, INT, and MC—worked closely to identify the best available platforms and tools for ROC operations.

- Continuous monitoring of FADE/MIST and ChatSurfer directly impacted the overall success of TF SABER, particularly when FWD elements experienced poor network connectivity.

- Maximizing FCCO's Foundry platform enabled in-depth analysis of enemy IADS architecture and expanded the ROC's capabilities, particularly in SIGINT and ELINT.

Lessons Learned

While the ROC pilot generated multiple successes, it also presented some challenges. One of the most significant oversights during the planning phase was not identifying all TF SABER requirements prior to departing for the NTC. This led to ROC leadership predicting requirements, which in some instances, resulted in redundant efforts. Thus, establishing a working group (WG) prior to NTC deployment is necessary to synchronize requirements, set expectations, streamline communications, and identify potential friction points during execution. Ideally, the ROC OIC chairs the WG with representation from all participating brigade WfFs and the supported unit.

Additional lessons learned

- Effective knowledge management is critical to success—from organizing 52ID's operations orders and fragmentary orders to building an effective SharePortal for product repository.

- Prior to execution, the ROC lacked essential INT products like Smart Cards for enemy radars, jamming capabilities, enemy order of battle, and EOB. Ideally, Analysts build these products during Phase II (Training) to ensure ROC personnel have the necessary tools entering

Phase III (Execution).

- Fusion Analysis and Development Effort/MIST training for All-source Analysts and CEMA 17Js is vital to mission success. The Foundry platform offers a 40-hour FADE/MIST course to train analysts in NRT tracking of enemy radar systems and jammers—a critical capability in LSC.

- Mission Command—Aviation brigades planning to conduct similar reachback support must work closely with higher echelons to establish connectivity. Specifically, RHN and G6 support are crucial to build the network architecture required for reachback operations.

Conclusion

The ROC pilot was highly successful in delivering INT, M2, Fires, and CEMA support to TF SABER. Holistically, the initiative added valuable manpower for critical capabilities in LSC—particularly in locating the enemy's IADS architecture and driving targeting efforts. Despite the multiple challenges faced, the ROC proved to be an effective use of a protected sanctuary node, providing valuable INT to FWD deployed units and practicing new methods of command post survivability. Moving ahead, the ROC concept will expand to provide reachback support during entire NTC rotations. While new challenges will arise, particularly in establishing connectivity with the supported BCTs, 4CAB's ROC pilot proved that supporting FWD elements is not only possible but perhaps a necessity in LSC.

Specialists from the Expeditionary Cyber Support Detachment (Fort Eisenhower, Georgia) provide offensive cyber operations during an NTC rotation. U.S. Army photo by Steven Stover.

Biographies:

MAJ Luis Llaury, the 4CAB S2, graduated from Georgetown University with a Master of Arts in Security Studies. He has served in multiple SIGINT positions throughout his career, most recently serving as a Joint Cryptologic Planner and Operations Officer in the 742**D** Military INT BN. Previous assignments include the 743**D** Military INT BN (Buckley Space Force Base, Colorado) and the 2**D** Cavalry Regiment (Vilseck, Germany).

CPT Lynne Mooradian, a Military INT officer, graduated from the United States Military Academy in 2020 with a Bachelor of Science degree in Mechanical Engineering. Following her graduation, she earned a Master of Philosophy degree in Biotechnology from the University of Cambridge and a Master of Science degree in Biosecurity from the University of Edinburgh. She currently serves as the 4CAB AS2.

MAJ Kyle Pare, the 4CAB S6, has served for 11 years in a variety of Signal positions. His most recent assignment was as the S6 for Task Force Sinai, the American contingent of the Multinational Force and Observers in Sinai, Egypt. He has also served as the company commander at the Enterprise Satellite Communications Gateway-Landstuhl, Germany, and as a BN S6 in 4CAB.

CPT Brian Matiasmuniz, the 4CAB S6 NetOps OIC, has served for 12 years in a variety of combat arms and Signal positions. His most recent assignment is a Data Systems Engineer for the 4CAB. He has also served as an Executive Officer and Platoon Leader for a one station unit training BN on Fort Moore, Georgia. Previously, he was stationed in the 2**D** Cavalry Regiment, Germany, where he worked with multiple nations in support of a North American Treaty Organization Multinational Battle Group.

CW2 Alex Lashbrook currently serves as a 350F All-source INT Technician in the 4CAB S2 section. He joined the U.S. Navy in 2014 and served as an Operations INT Analyst with Amphibious Forces, 7th Fleet (Western Pacific) and an Expeditionary Warfare INT Specialist with Theater Special Operations Command, U.S. Southern Command. He was appointed as a U.S. Army WO in 2022 and served as the Brigade INT Support Element Chief for 1st Stryker Brigade, 4th Infantry Division prior to his tenure at 4CAB.

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Overcoming Capability Gaps in the Space Domain: Force Multipliers in Army Combat Aviation Brigades

By MAJ David A. Beaumont

"In the long haul, our safety as a nation may depend on our achieving 'Space Superiority.' Several decades from now, the important battles may not be sea battles or air battles, but space battles…" –Gen. Bernard Schreiver, "Space Superiority" speech at the first Astronautics Symposium, California, 1957.

This quote underscores the critical role of space-based assets in modern warfare, emphasizing the urgency and significance of our mission.

Space Enabler (3Y)

Space is a warfighting domain, and the U.S. military relies heavily on space-based assets to perform its missions in today's technologically advanced military. Space is the ultimate high ground; space-based assets allow U.S. forces to move with precision, communicate with forces anywhere on Earth, see the battlefield with clarity, and defend the homeland and forces abroad. Our adversaries understand our reliance on these assets, are aware of the U.S. military's use of space-enabled equipment, and will try to disrupt those assets. The Army must ensure enough personnel possess the expertise, training, and experience to meet current and future national security space needs. To this end, the U.S. Army established the Army Space Personnel Development Office, or ASPDO, which manages Army personnel attendance at the foundational professional development space courses.

The U.S. Army, "the largest user of space-based capabilities" in the military, formalized an Army space cadre that consists of officers, enlisted, and civilian personnel (Center for Army Lessons Learned, 2023, p. viii). The additional skill identifier (ASI) 3Y, Space Enabler, identifies personnel with specialized skills and experience in space operations. This designation reflects the increasing recognition of the critical role that space and space-based systems play in the future of Army warfare. To remain competitive in the evolving space domain, it is essential for personnel to continually enhance their technical expertise, engage in advanced training, and stay updated on emerging technologies and strategies from strategic levels of thinking down to the tactical force. Collaboration with other military branches and civilian agencies can also foster innovation and ensure readiness to meet the challenges of space warfare. The Office of the Chief of Space and Missile Defense (OCSMD) aligns training and education requirements to operational needs and career professional development. It conducts strategic planning, ensuring cadre billets are identified, created, and tracked to support space-related missions. The OCSMD manages the processing and awarding of the 3Y ASI and Space Badge progression. The Army does not have an enlisted, WO, or civilian space career field. However, OCSMD tracks Army personnel serving in space operations billets, and these cadre members can also attend space training courses that support their professional development.

Space Enablers in Combat Aviation Brigades (CAB)

I believe that intelligence and fires professionals in conventional CABs should be designated as 3Y Space Enablers. Their role is to enhance operational capabilities, decision-making, and force multiplication significantly. These professionals have access to space-based intelligence assets, such as satellite imagery and reconnaissance data, which provide real-time, high-fidelity information critical for anticipating enemy movements, identifying threats, and planning effective operations. Their designation as 3Y Space Enablers ensures they receive the necessary training on space-based programs and capabilities to leverage assets at echelon, fostering better coordination with other units and future-proofing military operations as warfare extends into the space domain. Their understanding and use of space-based data will be crucial for providing accurate and timely intelligence, ultimately enhancing mission success and resilience.

Combat aviation brigades often lack organic signals intelligence (SIGINT) and rarely receive electronic warfare (EW) personnel, necessitating intelligence analysts (35Fs) to act as information collection managers. The Intelligence Warfighting Function (IWfF) plays a crucial role in addressing these shortfalls to fill capability gaps. The IWfF is responsible for coordinating and integrating intelligence and EW into the brigade's operations. Combat

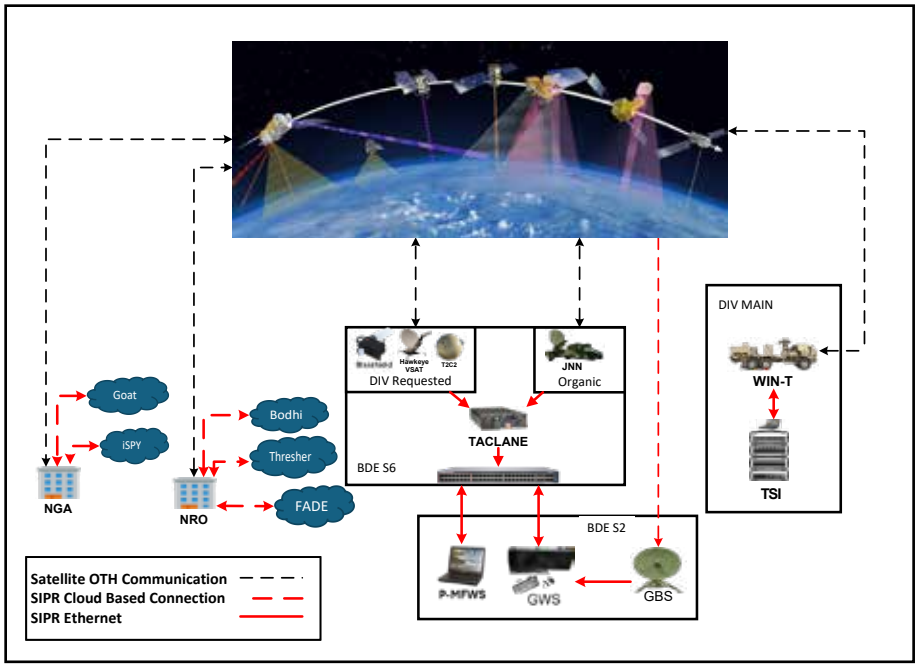

Figure 1. 101 CAB intelligence architecture (Erb, 2024).

aviation brigade military intelligence (MI) Soldiers use Fusion Analysis and Development Effort (FADE)/Multi-INT Spatial-Temporal (MIST) to analyze SIGINT data, enabling 35Fs to build a comprehensive enemy air defense picture, which is crucial to aviator survivability (California Analysis Center, Inc., 2020). Regardless of whether CABs have EW Soldiers on their modified table of organization and equipment (MTOE), 35-series personnel should receive proper training on using Global Navigation Satellite System (GNSS) Operational Awareness Tool (GOAT) and FADE to track effects on the operational environment (Space-Based Positioning Navigation & Timing, 2024). These intelligence programs and software are critical to providing aviators with relevant and actionable information, ultimately leading to mission success and a safe return home (Figure 1).

Intelligence Architecture

Combat aviation brigade space enablers are essential to integrate with and protect air and ground maneuver forces from hostile threats using space-based capabilities, facilitating deep sensing and enabling movement and maneuver. Space professionals play a crucial role in enhancing understanding and integrating joint and coalition space capabilities into operational strategies. The National Geospatial-Intelligence Agency (NGA) and the National Reconnaissance Office (NRO) are key players in this domain, providing cloud-based solutions critical to the Department of Defense (DoD) and the Intelligence Community. These solutions enable real-time intelligence gathering and ensure robust situational awareness and operational planning in an evolving space domain. For example, the 101st Airborne Division, Fort Campbell, Kentucky, has effectively employed Command and Control Fused Information Exchange, or C2FIX, programs like Starshield, "a militarized version of SpaceX's Starlink internet satellites" (Erwin, 2024) for transport and utilized the Tactical Server Infrastructure at the division level through a flat domain to enhance communication and operational effectiveness on today's battlefield. Command and Control Fused Information Exchange takes the entirety of the network portfolio and condenses it to the basics of what a maneuver commander needs to improve decision-making and facilitate seamless communication and collaboration among units during operations. A Tactical Server Infrastructure refers to a network of servers and associated hardware deployed in a military or operational environment, designed to operate in challenging conditions, providing reliable access to information, applications, and services for tactical units. Additionally, it houses the local SharePoint, Command Post Computing Environment, and Data Distribution Service. At present, the DoD "currently buys Starlink's commercial internet service but in the future it also plans to acquire more than 100 'Starshield' satellites that would be government-owned" (Erwin, 2024).

All-Source Intelligence Officer Justification

All-Source Intelligence Officers (35A) utilize space-based intelligence, surveillance, and reconnaissance to enable the core MI competency of Intelligence Preparation of the Operational Environment (IPOE). Combat aviation brigade MI officers work closely with space-based intelligence assets such as FADE/MIST, NRO overhead systems (NOS), formerly known as national technical means imagery, and the Global Broadcast System (GBS). These systems and other SIGINT and geospatial intelligence (GEOINT) platforms are essential for producing robust IPOE products. Providing the best intelligence possible increases efficiency and survivability for aviators, aircraft, and supporting Soldiers. Aviators rely on terrestrial and space weather reports from the S2 officer (intelligence operations and security) during operations to anticipate global positioning system and satellite communications (SATCOM) effects. The CAB operates the MQ-1C Gray Eagle unmanned aircraft system, providing the entire division with an organic ground movement target indicator capability. Although the MTOE authorizes an information collection manager, MI officers often assume this role at their respective echelons, using various space-based assets to inform commanders and pilots. Brigade S2 officers will also manage, train, and employ geospatial imagery analysts (35G) and 12Y sections.

All-Source Intelligence Analyst Justification

All-Source Intelligence Analysts (35F) provide weekly global graphic intelligence summaries In the absence of SIGINT/EW personnel, 35Fs analyze enemy-integrated air defense systems using FADE/MIST,

SPC Tyler Marcoux and SPC Dadrian Black (101 CAB S2 35F All-Source Intelligence Analysts) set up the One System Remote Video Terminal to pull feed from the MC-1C Gray Eagle. U.S. Army photo provided by the author.

maintain the area of operations awareness with Bodhi,[1] assess electromagnetic interference effects on aircraft with GOAT, and establish air orders of battle with the data fusion tool, Thresher. Given the CAB's need for organic collection assets, 35Fs must request support from higher echelons to answer the commander's priority intelligence requirements. Collection can be obtained using space-based capabilities, such as NOS imagery and coordination with echelon collectors. Bodhi, FADE, and Thresher—all programs of record throughout the DoD's Intelligence Community—are critical for building situational awareness and enabling collaboration.

All-Source Intelligence Technician Justification

The All-Source Intelligence Technician (350F) is the senior intelligence analyst and subject matter expert (SME) on all intelligence disciplines and programs. They are responsible for intelligence analysis and synchronization across multiple echelons. The 350Fs integrate information from all sources, including the CAB's organic GEOINT cell and analyst cell, into finished analytical products for the brigade. As experts in intelligence systems integration, they fuse multiple intelligence disciplines across all domains and are expected to be SMEs on space-based programs. They train, coach, mentor, and execute information collection with 35As, 35Fs, 35Gs, and 12Ys using tools identified previously.

Geospatial Intelligence Imagery Analyst Justification

Geospatial Intelligence Imagery Analysts (35G) play a critical role in visualizing the operational environment by delivering a range of essential products, including infrastructure imagery, tactical equipment identification, overhead persistent infrared (OPIR) data, and helicopter landing zone (HLZ) information. These products are generated through space operational software and systems used throughout the DoD Intelligence Community, such as iSpy (web-based, image-viewing application), the Geospatial Intelligence Search and Retrieval Program (GSR), Map of the World, and Web-based Information Dominant Warfare (WIDOW). The GBS antenna is instrumental in receiving data from these systems, which is then processed and disseminated to lower echelons. iSpy and GSR, maintained by NGA, are comprehensive repositories of space-based imagery accessible via the Non-classified Internet Protocol Router Network, Secure Internet Protocol Router Network, and Joint Worldwide Intelligence Communications System networks. Similarly, Map of the World offers a broad collection of GEOINT data, including space-based imagery, terrain data, and maps. Web-based Information Dominant Warfare is utilized to analyze OPIR data, with the GBS antenna playing a critical role in supporting high-volume data operations.

Geospatial Engineer Justification

Geospatial Engineers (12Y) are pivotal in enhancing situational awareness and operational planning by utilizing satellite imagery and elevation data to provide commanders with precise terrain analysis. They leverage data such as Digital Terrain Elevation Data and commercial satellite imagery to produce critical products for both wartime and peacetime operations. These products include detailed HLZs, 3D fly-throughs, line-of-sight analyses, and change detection reports. GlobalVO™ (Global Vertical Obstruction Data), a new program incorporating satellite imagery and artificial intelligence, significantly advances these capabilities by rapidly identifying patterns associated with vertical obstacles and annotating them across large areas

[1] "Bodhi is an application that the National Reconnaissance Office developed for visualization, collaboration, and presentation" (Fanitzi et al., n.d.)

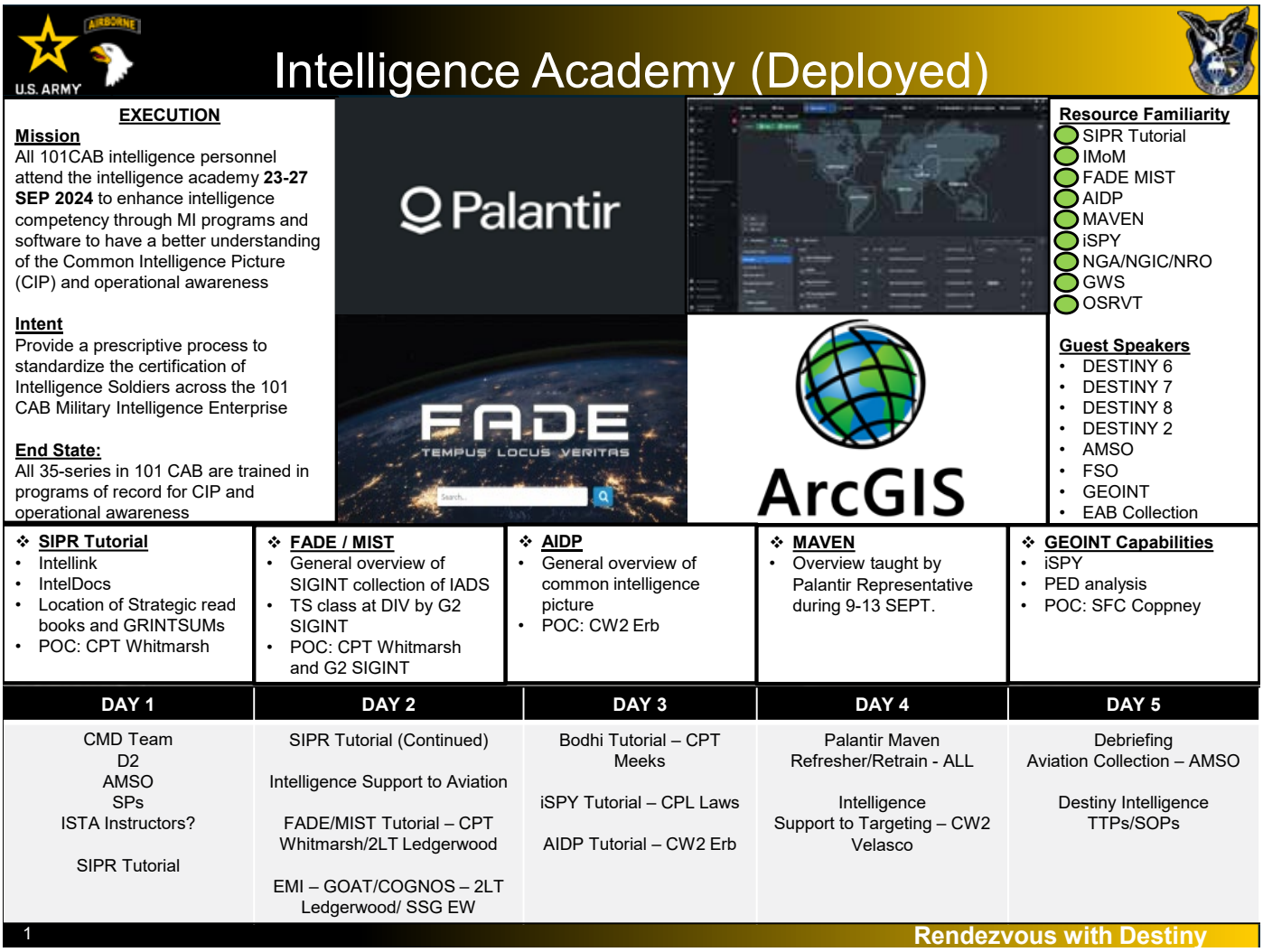

Figure 2. 101 CAB intelligence academy (Beaumont, 2024).

(Foundation Stack AI, 2024). This tool allows for more efficient and comprehensive terrain analysis, crucial for planning and executing operations. 12Ys utilize these data to recommend optimal routes and HLZs based on the terrain's slope and other features, which is essential for rotary-wing and ground vehicle operations. By integrating their analyses with the 35Fs, 12Ys can illustrate how terrain affects troop movement and operational effectiveness for the opposing force. Furthermore, 3D fly-throughs offer a digital preview of the area of operations before physical deployment, enhancing mission planning. Line-of-sight analysis, using digital surface models (3D representation of Earth's surface) and elevation data, helps determine visibility constraints within the environment. At the same time, change detection provides insights into temporal variations, which can be invaluable for post-disaster humanitarian operations.

Targeting Officer and Fire Support Officer Justification

The CAB is authorized one Targeting Officer (131A) who plays a pivotal role in space operations. They conduct vital targeting analysis of space-based assets such as space stations, satellites, and enemy space systems—a responsibility that underscores the importance of their role. They are also instrumental in information collection while identifying enemy space-based communication platforms and other potential threats in space. The 131A's ability to identify, coordinate, engage, and collect battle damage assessment of enemy space capabilities is unmatched within the CAB, further highlighting their unique contribution. The role of the 131A in space operations is crucial for protecting and enhancing the effectiveness of space-based assets, a fact that should not be underestimated. The nomination of the Brigade Fire Support Officer (13A) and Brigade Assistant Fire Support Officer (13A), as a point of redundancy within the Brigade Fire Support Element, would enable a seamless integration of intelligence collection in space-based operations with the Fires Enterprise in the CAB. This is a testament to the Targeting Officer's strategic thinking and planning. Fire Support Officers work extensively within the targeting process at brigade and higher echelons and work with the MI community to conduct space-based targeting analysis and identification of space-based enemy assets. This aids capabilities to use national technical space-based means to detect and target adversary terrestrial capabilities, further underlining the Targeting Officer's comprehensive role.

From Left to Right: CPT Jeffrey Whitmarsh (101 CAB AS2), CPL Joshua Laws and CPL Donovan Espitia (101 CAB 35G Geospatial Intelligence Imagery Analysts), and MAJ David Beaumont (101 CAB S2), were awarded the Army Basic Space Operations Badge. U.S. Army photo provided by the author.

Conclusion

Receiving space training is invaluable for enabling CABs to fully utilize space-based intelligence, surveillance, and reconnaissance capabilities, which are critical for modern warfare in all domains (Figure 2). Space training prepares Intelligence and Fires professionals to anticipate and mitigate the effects of space weather on GPS and SATCOM, which is crucial for mission planning and execution. Despite the absence of organic SIGINT and EW personnel and equipment, integrating advanced intelligence systems and the expertise of the Intelligence and Fires WfF are essential for CABs. These roles and capabilities ensure CABs can leverage space-based and other intelligence assets to create a comprehensive intelligence and operational picture, enhancing situational awareness, operational efficiency, and the survivability of aviators and support personnel. By utilizing tools such as FADE/MIST, Bodhi, GOAT, and Thresher, Intelligence and Fires professionals within CABs can provide actionable intelligence, mitigate risks, and support mission success.

The author wishes to thank the following Army Intelligence Officers for their contributions to this article: CPT Jeffrey Whitmarsh, CW2 Thomas Erb, 1LT Chase Ledgerwood, SFC Phillip Coppney, SGT Frank Norris, and CPL Joshua Laws

Biography:

MAJ David Beaumont is the Brigade S2 in 101st CAB. His previous experience includes Resident Command and General Staff College; Commander, Company A, 304th MI Battalion; MI Captains Career Course Small Group Leader and Instructor; Battalion S2 for 1st Battalion, 27th Infantry Regiment (WOLFHOUNDS); MI Company Commander for 2D Infantry Brigade Combat Team, 25th Infantry Division; Battalion S2 for the 1st Battalion, 94th Field Artillery Regiment (High Mobility Artillery Rocket System), 17th Field Artillery Brigade.

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Book Review and Interview with COL Hugh L. Mills, Jr. (Ret.)

Author of *Low Level Hell: A Scout Pilot in the Big Red One*

By CW5 Charles J. Boehler

COL Hugh L. Mills, Jr., (Ret.) was an armor officer who served two tours in Vietnam as a scout and attack pilot with more than 3,300 combat flight hours. He retired in 1993 after serving for 26 years and was inducted into the Army Aviation Hall of Fame in 2011. He received numerous awards for valor, including several Silver Stars and Distinguished Flying Crosses. He was shot down 16 times in Vietnam and wounded three times. Mills co-wrote a book about his first tour in Vietnam called *Low Level Hell: A Scout Pilot in the Big Red One*. While COL Mills served in Vietnam for three tours, *Low Level Hell* focuses on his first tour. This is certainly one of the best firsthand accounts of a helicopter pilot in Vietnam, if not the best. It is packed full of action and entertaining stories, but more importantly, it contains many lessons for contemporary Army pilots and officers.

Low Level Hell begins with Mills' team providing recon and cover for an Army convoy. The enemy makes contact with the convoy, and a running fight ensues. During the fight, Mills' OH-6 is shot down, and he, along with his crew chief, have to fight their way to a landing zone where they're extracted by a Huey.

This sets the tone for the rest of the book. While the next chapter briefly describes Officer Candidate School (OCS) at Fort Knox, Kentucky, in 1967 and his newfound desire to fly along with his attraction to the OH-6 and the scout mission, Mills doesn't dwell on events prior to his arrival in Vietnam on New Year's Day, 1969. The vast majority of the book contains descriptions about missions that he flew and the people he worked with. Most any chapter in this book could be the basis for an entire book in itself, which speaks to the volume and intensity of flying that scout pilots did on a daily basis.

The writing style used throughout the book is direct but not devoid of emotion. It's clear from the beginning how much COL Mills loves the scout mission and the other pilots and crew chiefs in Troop D, 1st Squadron, 4th Cavalry Regiment. This dedication to the mission is one of the things that makes the book enjoyable to read. His descriptions of the injuries and deaths of his fellow aviators is more emotional than of the times he was shot down or injured, of which there were many occasions of both.

One of the striking things to me in reading this book again, after having read it for the first time over 20 years ago, are the similarities in Vietnam to more recent actions in Iraq and Afghanistan. This shouldn't be a great surprise, as those were all counterinsurgency operations; however, it does help to illuminate why it's important to know and learn from our past. The descriptions Mills gave in *Low Level Hell* helped structure how I flew in Afghanistan and on other deployments. For example, being able to quickly discern the tactical situation on the ground and come up with an ingress and egress plan were invaluable to me as a Medical Evacuation pilot. Perhaps even more importantly, the ability of our predecessors in Vietnam to adapt and innovate help to show us what can be done in the absence of written doctrine and procedures or just when things aren't going according to plan.

I highly recommend this book to anyone in Army Aviation. It's one of those books that falls into the category of required reading for those in our branch. COL Mills remains active in the Army Aviation community and is a true legend. His second tour, as a Cobra pilot this time, is outlined in the Squadron/Signal publication, *Gunslingers in Action*. It's my sincerest hope that he publishes a second book, this time describing his third tour in Vietnam, which he does have plans to do.

Low Level Hell is one of the books that helped shape who I am as an aviator. The OH-6A on display inside the U.S. Army Aviation Museum at Fort Novosel, Alabama, "Miss Clawd IV," is one of the aircraft that COL Mills flew. COL Mills helped develop tactics, techniques, and procedures for aeroscouts in Vietnam and later on, helped write doctrine for it.

I heard COL Mills interviewed on a podcast, suitably named *Low Level Hell*. As a result, when I first started thinking of conducting an interview, COL Mills was the first one who came to mind. He very graciously and quickly agreed to the interview after I reached out to him.

Boehler: What was your main purpose for writing *Low Level Hell*?

Mills: I actually started *Low Level Hell* in 1970. We go back to Germany and then in October, she [wife] was diagnosed with ovarian cancer. And we were very quickly moved to Fort Sam Houston, Texas. Anyway, Margaret was a patient there at Brooke Army Medical Center from October until the first of February, when she passed away. I was sitting at home for months. You know, they moved me out of off-post housing and put me in the Bachelor Officer Quarters. The view out my window was the room where she died. And so to kind of act as a catharsis, I started writing this book. And literally, it was on a yellow legal pad. Until I said, "I can't take this anymore," and I called branch and said, "Would you let me go back to Vietnam?" This was a request that they didn't get a lot of in those days. And branch said, "sure"…I put it [writing the book] away.

And then in 1991, I guess, I was going through some boxes, and I found this thing. And I was talking to a friend of mine here in Kansas City who was a Korean War Veteran and a member of the Civil War roundtable, Bob [Robert] Anderson. And Bob said, "Why don't you do a book?" I said, "You know, I've got probably 150 pages." And we sat down, we coordinated it, and that's how that started. And over the course of about a year, we did *Low Level Hell*. And Presidio Press is who I had worked with, and I called them and said, "I have a book." And what you normally do, most people will send a theory to a publisher and maybe a sample chapter. And they will then work with you over the next year or so to get the book finished. Well, I've already finished the book. When I got ahold of Presidio, they couldn't believe that. They said, "That's not the way you do it." I didn't know…and Presidio accepted it in 1992. And it came out in hardback in 1992, and I'm actually working on the sequel. Bob passed away some years ago, so this one is only me. Now that I'm retired, I hope in the next year to be able to send yet another proposal to Random House to finish up.

Boehler: Were there any books that influenced you throughout your career?

Mills: Well, I'll tell you, *Killer Angels*, a Civil War novel [by] Michael Shaara, has always been one of my favorites. David Chandler's *The Campaigns of Napoleon*. I love that book, and it's like 700 pages. I've got three copies. I've got one in each office I've ever had. I collect. I read military nonfiction, mostly Napoleonic and Civil War and current stuff…and then anything on Stonewall Jackson…any of the cavalrymen from Sheridan to Jackson to Moseby. Any of those guys. I enjoy the history of the cavalry, regardless of which side that we're talking about. But cavalry operations and Napoleonic history are my favorites.

Boehler: Can you describe how important it was to be able to adapt and innovate in Vietnam?

Mills: The situation that we found ourselves in Vietnam, the average guy going through flight school was taught to fly a Huey. You started off in a [TH-]55 or an [OH-]23, and then you were trained to fly a Huey. So you got to Vietnam as a 210-hour Huey pilot. Whether you were [branched] armored cavalry, transportation, infantry, whatever it was, it was a come as you are war based on what you could get your hands on. So, in terms of tactics, some units used three guys and no miniguns [on OH-6s]. Some guys used two guys up front and a minigun. We used one up, one back, and a minigun. Some used one scout and two Cobras. Others used two scouts and two Cobras. In '69, we were one scout and one Cobra. And so in terms of tactics, we were writing the book on the air cavalry troop in combat as we did it. There were no tactical guides at that point in time. And we did what we felt was the right way to do it based on the terrain and the personnel and the equipment that we had.

Boehler: What do you feel are some of the pluses or minuses of being branched armor as an aviator?

Mills: Well, when I'm covering an armored cavalry troop or a tank company in the advance, I've been in those turrets. I understand that you can't tell an infantryman to go really, really fast if he's on foot. And you can't tell a tanker to go over marshes and swamps when he's in a tank. The ability to put yourself in the command cupola of the units you're supporting; I think it's critical. By the time I went back to Germany as an attack helicopter company commander in the 8th Aviation Battalion, we were chopped to the 11th ACR [Armored Cavalry Regiment] in our general defense plan rollout. And our job was to defend the border camps right behind Fulda [Gap]. Well, I've been on the ground as a tank company commander on the border, and I understand what the Fulda Gap is and what it means to armor, where armor can go and can't go and historical approach routes to central Germany or in the Northern Plain, and the Fulda Gap. Knowing that as an aviator, I think, is critical. I believe we lost that. But at the same time, aviation is so much more technical now than it was then. The systems are more complex. We navigated by hand-

held map and time, distance, and heading if it was at night. I think we rightly developed an aviation branch in '84, I guess it was.

Boehler: Can you describe the process to make pilot-in-command in Vietnam?

Mills: Pilot-in-command in the scouts occurred within the first couple of weeks. The transition to the Loach [OH-6] was 10 hours. We did 10 hours at the base [in country] with a unit instructor pilot to learn to fly the airplane and then we flew as an observer with an experienced scout for several missions; five or six, maybe. That could happen in 3 or 4 days. Then, you flew several missions as the door gunner, so you could understand what the door gunners' environment was. And then pretty much, you're left on your own. I learned to scout essentially on my own. I was a southern guy. I was an outdoorsman, and I was an avid hunter and tracker. I had 20/10 vision. Those are the attributes that made me a good scout. I was also very aggressive, and I was single. The Cobra guys would go anywhere from 3 to 6 months before they would become an aircraft commander, and the same for the Hueys. But the scout's a single-pilot airplane. So you learn by doing, and you failed by dying. That's the long and the short. I will tell you the scout pilots didn't have to stay. The scout pilots were told it's volunteer. If you come and fly 3 weeks and you don't want to do this anymore, you go back to Hueys. Rarely did our scout pilots fly more than about 6 or 7 months.

Boehler: What were some things you feel were key to your development as an officer?

Mills: I think having to assume the responsibility at the age I was. I was commissioned at 19. I went from being essentially a Private E-2 to an Officer Candidate Cadet. I was an infantry enlisted man picked for OCS, and OCS had a lot to do with it. I mean, OCS was tough in those days, and then when I got to Vietnam and all of a sudden, I'm now responsible for 10 more officers and myself and another LT. I was in a CPT's position. The platoon leaders were CPT positions. I was the only 1LT platoon leader. So, I was forced at an early age to accept the responsibility of command, and I found that I was good at it. But the stress of command, losing my guys as I did periodically was a call to Jesus on "am I doing it right, did I do anything wrong here?" I think the key to leadership is leading by example. I believed in leading from the front. If it was a rough mission, get out of the way; I'm taking it. That was not for bravado, and that was not seeking fame and recognition. It was what I believed. I don't believe you can push a rope. You can pull it. And you get up in the front and pull that rope. Whatever it's attached to it, it's going to go. And that's just the way I look at command. I commanded that way for the rest of my career.

Boehler: What advice would you give a new officer?

Mills: Never cut a mess line. Don't ever ask your troops to do anything that you're not willing to do, and take a minute to look at the result of your command or order given. You don't have to be their friend, but you do have to earn their respect. It's not given freely. You want to get a guy to follow you, he's got to respect you.

Aircraft on display at the U.S. Army at the Army Aviation Museum, Fort Novosel, Alabama. Photo by SGT Robert Spaulding.

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Our Featured Focus Will Be *Sustainment*

Soldiers from NJARG 2D Battalion, 254th Regiment, launch a PUMA RQ-20A during training at Fort Dix, New Jersey's Training Support Center. U.S. Army photo by Daniel Amburg.

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Focus Topic: Sustainment
January-March 2025
(Articles due 15 December 2024 - published on or about 15 February 2025)

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April-June 2025
(Articles due 15 February 2025 - published on or about 15 May 2025)

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