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AVIATION TRAINING

IN THIS ISSUE:

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By Order of the Secretary of the Army:

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Army Aviation sling load training at Joint Base McGuire-Dix-Lakehurst, New Jersey. U.S. National Guard photo by MSG Matt Hecht.

The Command Corner

Training for Combat

Winning in combat starts with effective training. That may sound simple, but it is as true today as it was during the American Revolutionary War. Much of this training begins at home station. Units routinely plan and resource their training at home, enabling formations to fight successfully across multiple domains. From counterinsurgency to large-scale combat, there is nothing magical about how we train, if done properly. Still, the results can be magical if we correctly harness the principles, processes, and procedures encapsulated in Army Doctrine Publication 7-0, *Training*.

Currently, the challenges to training are twofold. First, the threat offered by our potential adversaries: Units must ensure their training is linked to tough, realistic tactics, techniques, and procedures that address the threat. You've heard it before; train the way we fight. Second, leaders must protect their training from distractions–internal and external: The unit must elevate training conflicts to its next higher commander. This is about risk. Leaders must carefully weigh the impact of essential training before delaying or canceling it.

Leaders first determine their unit's training priorities. The unit's mission and higher headquarters requirements set the training priorities. The unit's leader must know the standards for individual and collective tasks. Once identified, leaders assess their unit's proficiency based on objective evaluations. Commanders, platoon leaders, noncommissioned officers, standardization instructor pilots, instructor pilots, maintenance examiners, and unit training/evaluators all have a stake in assessing their Soldiers' proficiency. Aviation training should focus on mastering individual and aircrew tasks before progressing to company-level collective training. The commander determines whether his unit can meet the training priorities and the status of the training tasks. As such, the unit status report's T-level ratings should accurately reflect the unit's training status to meet its warfighting mission.

Aviation Soldiers are committed to the combined arms fight. That includes attack, air assault, air movement/resupply, or medical evacuation missions. Aviation Soldiers have a critical role for our Army. Units train realistically to perform these missions under dynamic conditions. They closely replicate the battlefield environment. Combined arms training is invaluable; it provides a chance for us to experience and understand the issues impacting our teammates. After all, the more we sweat in training, the less we bleed in war. On the future battlefield, operating as part of the combined arms team, we will present multiple dilemmas to the enemy, enhancing the survivability for the whole team.

Realistic training also stresses our Aviation maintenance and supply systems. Our future adversaries will contest our building up of supply stockpiles and establishing forward operating bases. We know the operational environment will be more translucent, if not transparent, to such operations. We need to build resiliency and redundancy from fort to port. Aviation maintenance training includes operating across widely dispersed areas and in small, well-led maintenance teams with specialized parts/tool packages that can quickly and accurately deploy to generate and maintain readiness.

We are challenged in creating training environments that capture large-scale combat conditions, especially the extended distances formations will have to traverse. Nonetheless, Aviation units should train to make wider use of division, corps, and joint assets without relying on the "luxuries" of home station support (e.g., civilian refueling, contract maintainers, etc.). Training exercises, including the deployment to the Combat Training Centers, can replicate the distances and dimensions of these future combat conditions.

Well-trained, well-led Aviation units capable of fighting and winning in war are not magical but are the product of challenging, realistic, and effective training. Today, our training must ensure units can ***See/Sense, Move, Strike, and Extend*** across the multiple domains of combat in support of our combined arms teams. It is focused, well-planned, well-resourced training, starting at home station, which will allow our Soldiers to be successful on future battlefields. Let's not train for magic, let's train like we fight and win!

Above the Best!

Fly Army!

Clair A. Gill
Major General, USA
Commanding

A U.S. Army Aviation brigade and paratroopers enjoy the view during a training flight over Cyprus. U.S. Army photo by MAJ Robert Fellingham.

Aviation DIGEST

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Author Guidelines

Articles prepared for *Aviation Digest* should relate directly to Army aviation or reflect a subject that directly relates to the aviation professional. Submit the article to the *Aviation Digest* mailbox at usarmy.novosel.avncoe.mbx.aviation-digest@army.mil.

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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.

Aviation Digest editorial style guidelines follow the American Psychological Association Publication Manual, 7th edition; however, Digest staff will incorporate all necessary grammar, syntax, and style corrections to the text to meet publication standards and redesign visual materials for clarity, as necessary. Please limit references to a maximum of 20 per article. These changes may be coordinated with the authors to ensure the content remains accurate and reflects the author's original thoughts and intent.

Visual materials such as photographs, drawings, charts, or graphs supporting the article should be included as separate enclosures. Please include credits with all photographs. All visual materials should be high-resolution images (preferably set at a resolution of 300 ppi) saved in TIFF or JPEG format. For Official Use Only or Classified images will be rejected.

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

October-December 2024 (published on or around November 15, 2024). **Submissions closed.**

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

April-June 2025 (published on or around May 15, 2025). Accepting articles now through February 15, 2024.

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

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Notices to Air Missions (NOTAMs)

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

The Directorate of Training and Doctrine (DOTD) is in the final stages of updating the long-awaited Army Aviation Training Strategy (AATS); it went out for staffing to combat aviation brigades across all components, as well as relevant stakeholders across the Aviation Enterprise, in early August with feedback due back early September. By the next issue of the *Digest*, we will have adjudicated the comments and hope to have the final approved version ready for publishing.

Other major efforts include the final editing of Field Manual (FM) 3-04, "Army Aviation," for submission to the Combined Arms Center this fall. We expect the Army Publishing Directorate will publish it by calendar year's end! The companion book, Army Techniques Publication 3-04.1, "Aviation Tactical Employment," has gone through worldwide staffing adjudication and is now in the queue for command approval; we hope to publish it several months after FM 3-04.

Additionally, DOTD is forging ahead to develop Future Long Range Assault Aircraft (FLRAA) individual and collective training models that will determine the overall FLRAA training implementation strategy. We have executed multiple site visits with our sister services to gather tiltrotor lessons and best practices and are working with FLRAA stakeholders across the Aviation Enterprise to clearly set the path for integrating FLRAA into the operational and institutional force!

Are you an *Aviation Digest* subscriber? Are you missing our issue release notices each quarter? Our distribution list has been updated, so please re-subscribe at https://home.army.mil/novosel/index.php/aviationdigest if you still wish to receive our emails.

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

Doctrine and Tactics (DTAC) Division Chief (LTC Julie MacKnyght):

I am sure y'all are waiting with bated breath for the new Field Manual (FM) 3-04, "Army Aviation": We're almost to the finish line! We finalized adjudication with the USAACE Commanding General just prior to late July's Change of Command. By the time this issue goes to print, it should be well into the final edit. Once we submit it to the Combined Arms Center (CAC) for their series of reviews, we do not control the timeline, but generally, we expect it to publish by calendar year's end. Expect a full outreach campaign starting in quarter 1, fiscal year 2025, to include podcasts, change briefs, and articles.

Two issues ago we published several "big rocks" changes you can expect to see; here are a few more:

Manned Unmanned Teaming (MUM-T) final definition updated to: **"The synchronized employment of Soldiers, manned and unmanned air and ground vehicles, robotics, and sensors to achieve an objective."** This is a little more detailed than the previous suggested update, by design, to more thoroughly describe the concept, especially for other stakeholders that previously did not consider a concept like MUM-T applicable to them. For example, most of the other Army branches have been experimenting with Unmanned Aircraft Systems and how they can serve not just the intelligence, fires, and movement and maneuver warfighting functions, but also sustainment, protection, and command and control.

We expect FM 3-04 to serve as a bridge to the CAC eventually assuming proponency, further streamlining the definition at that time, to account for new and emerging technologies. For those of you who have heard senior leaders refer to the concept of **HMI–Human Machine Integration** – MUM-T is a subset of that, not to be subsumed by it. Human Machine Integration is the wide umbrella Futures Command uses to describe all the different ways **"Soldiers and machines [will work] together to make faster and more effective decisions to improve performance"** (Operational Terms from the Army Combat Capabilities Development Command). Manned Unmanned Teaming is a more kinetic type of HMI, whereas other aspects of HMI will involve artificial intelligence or machine learning to improve staff decision-making, for example.

Forward Arming and Refueling Points (FARPs): A new acronym for an emerging concept: In attempts to increase survivability, various units have validated a new concept at both the National Training Center (see Vol. 12, Issue 1, 2024, p. 23) and homestation (see Vol. 10, Issue 3, 2022, p. 35) that is quite similar, doctrinally, to the fires Position Area for Artillery (PAA).[1] This concept increases FARP equipment maneuverability within a defined area, significantly decreasing the time it takes to set up and tear down. Two commonalities are a lack of fixed fuel hoses and a landing area much larger than a conventional FARP. As the Army continues the pivot from counterinsurgency to large-scale combat operations, aviation sustainment in general needs to focus less on fixed "points" and "facilities"[2] and more on dispersion and rapid displacement.

Though this concept has recently been referred to as the "Forward Arming and Refueling Area (FARA)," it is too soon to recycle that acronym! Thus, FM 3-04 will refer to it as the ***Area for Forward Arming and Refueling (AFAR)***: **"A temporary site deployed as far forward, or widely dispersed, as tactically feasible to provide fuel and ammunition necessary to sustain aviation maneuver units in combat."**

Brigade Aviation Element (BAE) update: The BAE Handbook, formerly the Training Circular (TC) 1-400 (2006), has been rescinded for the past year or two due to CAC's comprehensive DOTMLPF-P[3] analysis on what the Air Defense Airspace Management (ADAM)/BAE cell needs to look like. This analysis was required now that the Division is the primary tactical warfighting echelon. Though final decisions are still ongoing, in general, the ADAM/BAE structure at Brigade is changing, with the air defense side no longer expecting to manage airspace and the aviation side more focused on airspace and UAS with some of the BAE personnel moving up to Division. Thus, the Fires Center of Excellence (COE) plans to rename the ADAM to the **Air Defense Support Element (ADSE)**, and we are renaming the BAE to the **Air-Ground Integration Element (AGIE)**.

The primary reason for our change is so we can better nest with FM 3-0, along with Fires COE, in describing these staff integration elements at echelon. With "Brigade" in the name, BAE was not applicable anywhere else. This paves the way for follow-on doctrine to fully describe what the AGIE does at Brigade, Division (what people currently commonly refer to as the "G3-Air"), and eventually Corps. Field Manual 3-04 will have a very brief reference to the name change, but **expect to see much more description in Army Techniques Publication 3-01.51**, currently "Air Defense and Airspace Management (ADAM) Cell Operation" (last updated in 2013), which will become a collaboration between Fires and us to become ADSE/AGIE Operations (final title to be determined).

Farewell: Lastly, this will be my final NOTAMs section as USAACE's resident doctrine nerd. After almost 3 years in the seat, I am conducting a battle handover with LTC Keith Benoit, fresh out of Squadron Command (scout pilots, unite!). Thus, the contacts section of the NOTAMs now has his info., as he'll be fully in the seat by the time this issue goes to print. It's been an honor leading first, Tactics Division, and then the combined Doctrine and Tactics Division, and all our incredible subject matter experts to generate the most relevant, useful products for the field. Scouts out!

[1]PAA: "An area assigned to an artillery unit where individual artillery systems can maneuver to increase their survivability" (rescinded FM 3-90-1, "Offense and Defense Vol 1" [MAR13 incl C1,2 APR15], pdf p. 233; p. A-17, para. A-65). The new FM 3-90, "Tactics," 2023 definition is reduced to, "an area assigned to an artillery unit to deliver surface to surface fires," with the following description added, making this still relevant to our discussion: A PAA "is not an AO for the artillery unit occupying it. Commanders assign PAAs for terrain management and for locations where individual artillery systems can maneuver to increase their survivability" (pdf p. 385; p. A-11, para. A-34).

[2] Forward Arming and Refueling Point (FARP): "a temporary facility, organized, equipped, and deployed to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat" (Joint Publication 3-09.3, 2019, pdf p. 358; p. GL-10).

[3] Doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy.

Gunnery Branch (Branch Chief: CW4 Steve Dickson):

The PCS season is here, and with it comes a few hails and farewells from the Aviation Gunnery Branch. We would like to welcome CW3 Jon Oldham and CW4 Josh Diel to the team! CW3 Oldham will be our new Joint Operations Officer, and CW4 Josh Diel has taken over as the new Aviation Master Gunner Course Chief. CW4 Max Wannelius will be moving into the Munitions Officer position and assisting CW4 Diel during their transition. Gunnery Branch would like to farewell SFC Kyle Hedden and hail WO1 Kyle Hedden, who graduated Warrant Officer Candidate School with honors on 17 July 2024. WO1 Hedden will continue to serve as the Unmanned Aircraft Systems Master Gunner until the end of the year. He will be missed! Lastly, Gunnery Branch would like to say farewell to CW4 Aaron Assad. CW4 Assad served as the Master Gunner Course Chief for more than 2 years. We appreciate his service to our country and wish Aaron the best of luck in his retirement!

With the changeover of personnel and duty assignments, Gunnery Branch is looking to adapt its Aviation Master Gunner Course to better prepare future Aviation Master Gunners. Current Aviation Master Gunners with access to the Gunnery Branch Microsoft Teams page[1] can find a link to a survey. This survey is designed to gather data from the field and provide us insight as to how we can change and adapt the Aviation Master Gunner Course for the future. I highly encourage everyone to complete the survey, and help us get the information we need. Additionally, look for the Training Circular (TC) 3-04.3 (Aviation Gunnery) revision to be released for world-wide staffing after January 2025. Keep those DA Form 2028s coming! Gunnery Branch hopes to improve the TC 3-04.3 and the Aviation Master Gunner Course so that units have more lethal and efficient gunnery programs and Aviation Master Gunners.

The Gunnery Branch has been very busy over the summer. Branch personnel have been involved with implementation and development of future processes and systems, as well as working with U.S. Army Forces Command to shape our resourcing requirements. Change is coming, and it is not too late to schedule a Site Assistance Visit (SAV) with Gunnery Branch to aid your commanders and their staff in ensuring that gunnery programs are in accordance with Army publications. Who better to assist units than the organization that shapes the requirements in the Aviation Resource Management Survey checklist! We want you to succeed, so don't hesitate to reach out! If you have comments, questions, or would like to schedule a SAV, we can be reached at our organizational email address listed in the phonebook below. As always, stay lethal, stay safe! ATTACK!!!

[1] https://dod.teams.microsoft.us/l/team/19%3Adod%3A99a4c716b0cd449da2db04242f6d89bf%40thread.skype/conversations?groupId=70bf20fe-6a86-4491-b22a-5b11e280505b&tenantId=fae6d70f-954b-4811-92b6-0530d6f84c43

The Harding Project aims to renew lively and professional discourse to help guide the Army through this interwar period. Professional writing helps senior leaders communicate down, serves as an outlet for communication up, breaks down silos through lateral communication, inspires us to find solutions to contemporary challenges from the past, and makes us better communicators.

Four point platform. Renewal requires special attention to modernization, improving archives, updating education, and creative staffing models.

1. Policy and modernization. Update the Army's professional bulletins to web-first, mobile-friendly outlets supported by social media.
2. Improve the archives. Unlock insights from our past with more accessible archives.
3. Creative staffing. Consider how uniformed personnel can augment the Army's expert civilian editors.
4. Educate the force. Ensure the Army understands the role of professional bulletins and feels able to contribute.

Want to learn more? Follow the Harding Project at https://www.hardingproject.com/

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
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/Flight-Training-Branch.aspx

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: CPT Tyler R. Straits at 334-255-0433 or tyler.r.straits.mil@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)*

- Branch Chief: MAJ Dustin Ramatowski at 334-255-1252 or dustin.d.ramatowski.mil@army.mil
- Group Mailbox: usarmy.novosel.avncoe.list.dotd-tactics-division@army.mil
- SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/SitePages/Tactics-&-Lessons-Learned.aspx
- AD Archives: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTD/Aviation%20Digest%20Documents/Forms/AllItems.aspx
- 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)*

- Branch Chief: CW4 Chris Crawford at 334-255-1853 or christopher.p.crawford8.mil@army.mil
- Group Non-Secure Internet Protocol Router (NIPR) Mailbox: usarmy.novosel.avncoe.mbx.ams@army.mil
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- 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
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- Intelinks: NIPR/SIPR: https://intelshare.intelink.gov/sites/usaace/gb and https://intelshare.intelink.sgov.gov/sites/GunneryBranch

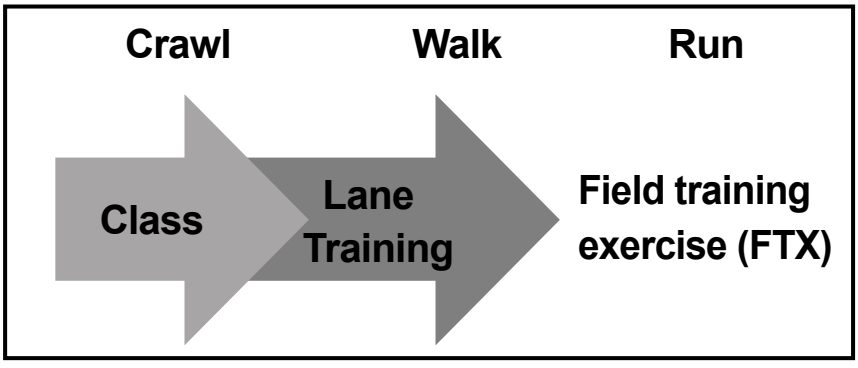
The Low Crawl, High Crawl, Rush Proposed Training Model for Large-Scale Combat

Air Cavalry Brigade, 1st Cavalry Division, provides reconnaissance during an 11-day training exercise focused on Large-Scale Combat Operations, Fort Cavazos, Texas. U.S. Army photo by SGT Brayton Daniel.

By CW3 Jody S. Clark

Author's Note: Troop/company will be represented by company, and squadron/battalion will be battalion for this article

Across the Army, we are changing how we train to fight and win future wars. The Army is also fighting retention and resource constraints. To keep training focused while still taking into account considerations for a more garrison-centered populace, Army Aviation units need to train for large-scale combat in a more compressed timeframe. These compressed planning horizon results are training plans that need to keep Soldiers engaged without taking free time away. In order to accomplish these plans, the training should be concise and concentrate on the units' mission-essential task (MET) list.



Sample crawl-walk-run training events graphic as seen in Field Manual 7-0, p. 3-3.

The holistic idea is to create an environment for training that is easily repeatable, adaptable, and relevant to each unit. It should not be to create an extended field problem, continually adding events and tasks as time allows. Too often, units go to the field for extended periods and fill time with "hip-pocket" training. When training is properly planned for the field, downtime is reduced, missions are accomplished in shorter times, and all involved get the most out of the training conducted. This increases effectiveness and allows for more complicated and integrated training in following iterations.

In a proposed large-scale combat operation, the unit of action becomes the division, and a combat aviation brigade (CAB) will be supporting the entire division. Knowing that the operational environment may be constantly moving, the CAB needs to be expeditionary, and each subordinate unit within the brigade needs to be able to move with minimal assistance from outside entities. Broken down even further, Army Aviators will fight as platoons or sections instead of teams of two. Starting with well-trained teams, aviators will become more effective when training as teams of teams moving into platoon- and company-level missions, integrating into battalion exercises, and finally, creating mixed multiship missions and field exercises.

Moving to large-scale combat-based training is not a new idea, but how we train for the future battlefield should be adjusted to reduce burnout, increase effectiveness, and navigate resource constraints. The idea of going to the field as a brigade or division is great for large, combined, combat training centers (CTCs) but is just not feasible for the rest of the training calendar. Even at the CTCs, training can

have its limitations and complications. Normally known as crawl, walk, run, the proposed training model in this article uses a more tactical name of Low crawl, High crawl, Rush (LcHcR). This model proposes the new idea to use various levels of training that create better and broader opportunities for commanders to have constant training at all levels for all new and experienced pilots, crew, support personnel, and staff. This model allows for individual, collective, and leader training, while still allowing for evaluations and improvements.

The LcHcR's focus is to enable shorter training periods that can be readily repeatable during any regular work week without interfering with the Service-member's (SM) free time or family time, which is one of the largest issues when it comes to quality-of-life complaints regarding retention and morale (Winkie, 2021). Planning for training at each level should be deliberate and detailed until the movement becomes more proficient at the platoon and company level: Low crawl—As the company becomes proficient, integration with the battalion can occur: High crawl—Finally, combining training with other battalions from within the CAB and the division: Rush.

The Lc can begin at the point when a flight platoon meets the satisfactory level of mission training for the MET the commander wishes to train. Going to a field training exercise (FTX) as a platoon is the beginning of the LcHcR training plan, allowing the rest of the company to keep normal operations. Readiness Level (RL) progressions, Annual Proficiency and Readiness Tests (APARTs), pilot-in-command (PC)/air mission commander training, and team missions can continue uninterrupted. Preparing for the exercise the week prior sets the plan in motion. All preparations, mission planning for movement, and the initial day 1 mission should be completed by close of business the last day of the week prior. Monday begins movement by air and ground with aircraft conducting METs in between departure of home station and prior to arrival at the FTX site.

Support and logistics SMs should arrive at the training site prior to the aircraft and prepare what should be readied for the aircraft's arrival. Certain members of the staff—the aviation safety officer (ASO) or aviation mission survivability officer (AMSO), along with the 1SG—should be the first to arrive and set the landing area, parking area, command post (CP), and sleep area. To be as expeditious as possible, the quartering party could consist of a team of aircraft with the ASO, AMSO, or any Pathfinder-qualified individual to set the inverted-Y landing area and parking area. The sleep area, CP, and maintenance areas should be minimal and utilize mobile means and individual sleep tents instead of medium-sized tents.

Once the whole team is on-site, several more days of mission planning and execution can happen, ending on Thursday for recovery back to home station and recovery of what little gear was used the following day. This whole plan can focus on any type of Army Aviation mission across the CAB, reconnaissance, attack,

Soldiers dismount from a Black Hawk helicopter during a training event at Fort Drum, New York. U.S. Army photo by SGT Bruce Daddis.

Soldiers fly in a UH-60M Black Hawk helicopter during an air assault exercise, March 14, 2023. Courtesy photo from 2D Infantry Division/ROK-U.S. Combined Division.

air assault, logistics, etc., and allows the units to ready for the second part of Lc: The jump. The ability to expedite movement and jump to new locations in LSCO will be critical for the unit's survivability in a contested environment. The insertion of a jump in the middle of the week during a secondary or tertiary FTX creates a realistic stressor of having to relocate. Now, the plan will appear as Monday movement and initial mission, Tuesday mission planning, Wednesday jump with another mission, Thursday return to base, and Friday recover. This jump may or may not actually relocate the unit, which means to pack, leave, and return to the same location if land availability is limited.

Next, the unit can Hc. The battalion can now provide command and control (C2), logistics and support, and direct what companies will go where and when. For example, Company Alpha will head out to the initial FTX site and practice as Crawl part 2, readying to jump to another site. After the jump or in the middle of jumping, a battle handover (BHO) will occur between Alpha and Bravo, where personnel will switch places. Bravo will assume the footprint and then prepare to plan and execute missions, as well as ready themselves to jump when needed. This can be accomplished at a single site, multiple sites, or even over an extended timeframe, i.e., Alpha completes on Friday and issues a BHO to Bravo on Monday over the radio or in a brief.

The battalion should push company-level units out and have them be able to jump to new locations rapidly, while their internal focus should be a bit more "steady state." The C2 and higher-level maintenance should be the focal point, as the unit would most likely be disaggregated from the companies during mission execution. The Hc moves toward an R when multiple companies from multiple battalions can all accomplish these tasks and are ready to integrate with each other as small task forces (TFs). This would mimic a larger brigade-sized mission but focus on one small part of the overall mission set. Reconnaissance, attack, and air assault units can only go so far forward without support and security from ground and artillery forces.

As a TF, the new focus would be to work with whatever makeup of aircraft and personnel are required for the brigade's METs. The unit of action would now be the brigade for C2 and task organization or personnel and equipment. As the Army restructures, the need to be ready for any mission set will still exist, meaning that flying with other units for mission training is a key training necessity. One example would be: 1x CH-47, 2x UH-60, and 4x AH-64. The mission sets could include reconnaissance, security, attack, and air assault. As larger missions are planned, multiple TF FTX sites could be utilized, TFs would be reorganized, and units would link up as needed for specific missions.

The last step of the LcHcR process would be to include the customer—the ground force commander and the troops. Integrating all of the players would be the final integration and can actually happen at the end of each stage throughout the process. The goal is to integrate the whole division and have the division be the C2 for at least one yearly FTX. This is not necessarily having the whole division in the field but just utilizing each piece as needed for the planned mission set in accordance with the METs.

In conclusion, large-scale combat training for Army Aviation requires a purposeful, expeditionary focus without compromising morale, sustainability, or the end state of MET training and proficiency. Even with limited time and resources, this training idea can be accomplished at any level, such as while at home station and implementing the same timeline for mission planning and execution but utilizing the mobile CP and mobile maintenance (parking on or near the flight line, hangar, or parking lot). The LcHcR idea is meant to take individual training into company-level MET proficiency through collective training at a rapid pace. It is meant to work toward accomplishing battalion and brigade METs through increased complexity instead of all of the stressors all at once—all while maintaining the regularity of a workweek, RL progressions, APARTs, and air mission requests.

Biography:

CW3 Jody Clark began his career as an Army Air Traffic Controller with some exposure to Pathfinder operations for setting up landing zones and multiple sling-load movements. CW3 Clark is an AH-64D/E pilot and AMSO with a background as an ASO—both positions at the company/troop and battalion/squadron level. CW3 Clark is currently the Squadron AMSO for the 5-17th Air Cavalry Squadron, Camp Humphreys, South Korea.

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LTC Matthias E. Greene looks out of the cockpit of a UH-60M Black Hawk helicopter while conducting a deck landing on the *USS Lewis B. Puller* in the Persian Gulf, Nov. 10, 2022. U.S. Army photo by SSG Samuel De Leon.

REFINING OUR TEACHING METHODS INSIDE THE COCKPIT AND OUT

By CPT Jacob M. Conover

Historically, Army Aviation has been extremely reliant on the use of rote memorization as a fundamental learning method. The concept of memorization through repetition undoubtably works at memorizing raw data such as our limits and emergency procedures; however, as we have found through accident investigations over recent years (*Flightfax*, 2020, p. 1), rote memorization doesn't necessarily ensure understanding. The question now, as our branch continues to look for ways to improve, is how do we promote stronger understanding for Army Aviators in matters of classroom learning all the way up to and including skills while flying? The answer to this question might not be more classes or content in lessons but instead, changing the fundamental way we instruct inside the cockpit and out. We need to instruct through facilitating self-discovery and critical thinking.

In 2020, the U.S Army Aviation Center of Excellence responded to an increase in aviation accidents with the creation of flight reference cards and implementation of Task 1070, the emergency response method "FADEC-F," which was developed to set priorities and have crews think before they respond (Francis, 2020, pp. 4–6). This is part of an ongoing process within our branch at refining multiple facets of processes from emergency procedure response to how we even go about memorizing underlined steps. Future steps can focus on ways to refine the way we instruct.

Self-discovery learning is the process of individuals constructing their own knowledge through a self-directed learning process (Inventionland Education, 2018), or as Dr. Jerome Bruner put it when famously being accredited for the discovery learning method, "learning by doing" (2018). This might sound bizarre when we talk learning through self-discovery and instructing in the same sentence, and that is because the instructor position at this point is more or less serving as a guide. In a self-discovery teaching model, the instructor is there to facilitate the students in their own form of learning and keep them on track based off the desired end state as the instructor. The benefits to this extra work in facilitating such a learning method are—whereby encouraging critical thinking in the student during their self-discovery—the student will develop the strongest form of knowledge, which is understanding.

We put this learning method to the test in the Basic Officer Leadership Course (BOLC) and Warrant Officer Basic Course's culminating exercise at the end of flight school (Fort Novosel, Alabama),

referred to as the Aviation Leadership Exercise (ALE). Prior to ALE, students are briefed on an introduction to aviation mission planning, as well as what basic mission products and planning methods look like in accordance with current doctrine. Once ALE begins, the students of different airframes are placed together and, for the first time in their aviator careers, must work together cross-domain with their partner airframes to plan and then execute their given missions utilizing advanced aircraft simulators. The students go into this with a very basic understanding of mission planning and must "learn by doing."

As a result of this teaching method in the ALE designed around students being forced to figure out how to tackle these tasks on their own with minimal instructor guidance, we have seen extremely positive data over time. Each class generally fits the same mold in where we see exceptional improvement, competency, and confidence in students upon completing their final mission. By allowing the students to make mistakes along the way, they are creating valuable learning points resulting in strong lessons learned to take with them as they graduate and proceed to their first duty assignments as Army Aviators.

Instruction, whether inside the cockpit, or out, should be focused on finding the path to the right answer, not just rote memorization. This is because the strongest form of understanding is knowing the why, which is a pivotal learning point in self-discovery learning. A great way for checks on learning throughout the process is an Instructor Pilot's favorite thing—examinations. Though rather than fives and nines and receiving those rote memorized answers, your goal should often be to evaluate for understanding the "why" behind the content. The way we ask these questions impacts the ability to accurately gauge a student's level of understanding. Avoid leading questions! This can be way harder than you would think. Directed questions result in directed responses, which works for evaluating rote memorization learning, yet it can fail at accurately evaluating true understanding. If the goal is evaluating understanding, then there are better ways to ask questions capable of determining this. One such method is using open-ended questions.

Open-ended questions—questions designed to not have yes, no, or directed answers—are a great resource in evaluating understanding. These questions are designed to get people talking. When asking an open-ended question, ensure that you encourage explanation. I recommend you shut up, make it awkward, and keep them talking. Who knows where these questions can take you sometimes? If the student is able to talk you through explaining a process—or better yet—have them teach you that process, you have then set the conditions for being able to accurately verify their level of understanding for that topic.

As Army Aviation continues to grow and face new threats globally, it is critical for our learning and teaching methods to grow with it. Instructing in the cockpit or in the classroom utilizing methods to promote self-discovery learning and critical thinking will promote stronger understanding in your lesson plans. In doing so, they will promote stronger aviators and a safer force.

Biography:

CPT Jacob Conover is a recently separated Aviation CPT and former senior instructor for the Aviation Center of Excellence on Fort Novosel, Alabama, where he directed BOLC-B phase II and the Aviation Leadership Exercise portion of Flight School. He previously served in the 1st Armored Division Combat Aviation Brigade. He has 2 combat deployments to Afghanistan.

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MAJ John Wlasniewski pilots a Chinook during a battalion training flight in Ansbach, Germany. U.S. Army photo by SGT Justin Ashaw.

Mindfulness for Military Aviation

MAJ Pamela M. Holtz & Maj. Salvador A. Cruz

Introduction

Human factors and error remain a major contributing factor in 60 percent–80 percent of all aviation incidents and accidents, despite improvement in aviation technology and flight safety (Gautam & Mathur, 2018; Krieger, 2005). Due to the risk inherent in military aviation, there is increasing interest in methods for human performance optimization (Meland, 2016). Mindfulness is one skill set that could benefit military aviators. While the research specifically examining mindfulness applications within a military aviation context is still emerging, it suggests that a mindfulness-based practice could give military aviators an edge, particularly in the areas of emotion regulation and attention management.

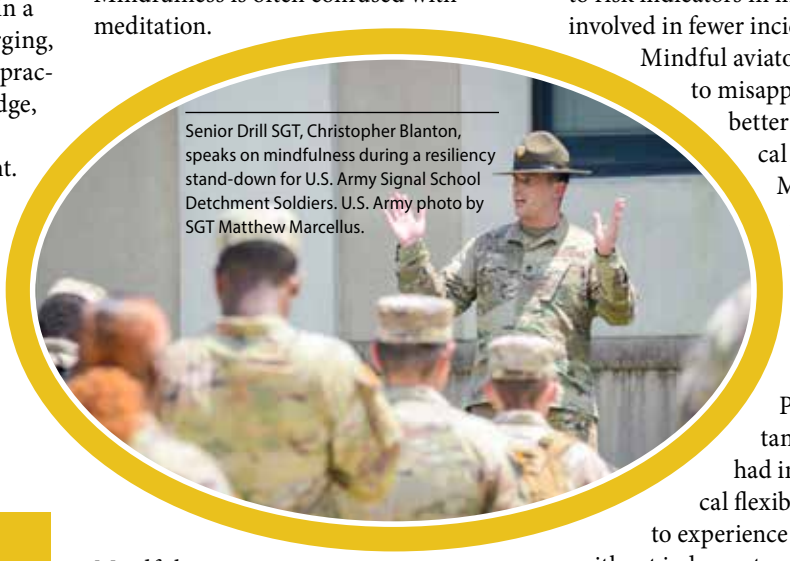
The aim of this paper is to 1) describe mindfulness, 2) outline how it can be of benefit to military aviators, and 3) propose various options for military aviators to incorporate a mindfulness-based practice into their daily routines to optimize their performance, both in and out of the aircraft.

What is mindfulness?

There are broad variations in the definitions for mindfulness, perhaps reflective of how personal and varied a mindfulness practice can be. One of the most popular definitions is proposed by Jon Kabat-Zinn, the founder of Mindfulness-Based Stress Reduction, who defines mindfulness as the awareness that arises from "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994, p. 4). In other words, the aim is to keep one's attention in the here and now rather than drifting to the past (where depression tends to reside) or the future (where anxiety tends to reside). Present-moment awareness is associated with psychological wellness. The non-judgmental component of a mindfulness practice is arguably the most challenging aspect. Instead of sorting one's surroundings into categories of "good" or "bad," one is simply curious about them.

What is mindfulness NOT?

Mindfulness is often confused with meditation.



Senior Drill SGT, Christopher Blanton, speaks on mindfulness during a resiliency stand-down for U.S. Army Signal School Detchment Soldiers. U.S. Army photo by SGT Matthew Marcellus.

Mindfulness is an umbrella term and includes a variety of different mindfulness practices. Mindfulness does not necessarily involve a goal of emptying one's mind or trying to change one's thoughts or feelings (Meland, 2016). Rather, the goal of mindfulness is to improve self-awareness or an awareness of one's mind and the thoughts it generates (Harris, 2009).

How could a mindfulness practice benefit military aviators?

There is evolving research to support the applicability of mindfulness in aviation. Early research suggests that mindful aviators (i.e., aviators who practice mindfulness) reported less anxiety, burnout, and fatigue (Guo et al., 2022; Li et al., 2020; Meland et al., 2015). Mindful aviators also reported improvement in emotion regulation and attention management (Meland et al., 2015). Mindful aviators were less reactive to, and better able to manage, their emotions (Meland et al., 2015). Mindfulness has been shown to decrease the impact of stress without compromising attention (Jha et al., 2015; Meland et al., 2015).

Mindful aviators had improved cognitive performance and stress management (Fornette et al., 2012). Mindful aviators were more likely to conceptualize their stressors as "challenges" vs. "threats," with those who conceptualize stressors as challenges performing better than those who conceptualize stressors as threats (Vine et al., 2014). Mindful aviators were more likely to detect and respond appropriately to risk indicators in flight and were thus involved in fewer incidents (Ji et al, 2018). Mindful aviators were less likely to misappraise situations and better able to tolerate critical feedback (Gautam & Mathur, 2018). Mindful aircrews communicated better and made more effective decisions (Krieger, 2005).

Perhaps most importantly, mindful aviators had increased psychological flexibility, or the ability to experience the present moment without judgment or avoidance and to persist or change actions when it supports chosen goals or values (Gautam & Mathur, 2018; Hayes et al., 2006). This is a critical skill in high-risk, high-reliability work. Essentially, mindful and psychologically flexible people expend less of their limited attentional resources feeling overwhelmed and trying to control or avoid distress. Instead, they are more able to pivot toward safe and effective responses to the task at hand, under conditions of pressure and uncertainty (Bond et al., 2016).

The investigation into mindfulness within a military aviation context is an up-and-coming body of research and much of the existing research does not link mindfulness to objective performance outcome measures (e.g., successful mitigation of in-flight safety incidents). However, these findings are well-nested in the broader mindfulness research of non-aviation military and high-performance cohorts, which links a mindfulness practice to improved psychological well-being and behavioral regulation, improved coping with stress and pressure, reduced psychological distress and emotional reactivity, and improved attention (Keng et al., 2011; Jha et al., 2015; Johnson et al., 2014; Sumantry & Stewart, 2021).

Taken together, this research provides military aviators with an additional tool to support their performance optimization efforts. Aside from the opportunity cost of the time spent practicing mindfulness, there were no risks associated with a mindfulness practice identified in the extant literature, with many potential benefits (Meland, 2016; Meland et al., 2015).

How can I practice mindfulness?

As with most wellness practices, mindfulness is of maximal benefit when incorporated as a daily or regular practice. Fortunately, mindfulness does not have to be practiced as a stand-alone meditation. Mindfulness can be incorporated into an aviator's current routine by continuing what they are already doing, but mindfully. For example, one could practice mindful chores, conversation, or exercise. Instead of increasing the quantity of activities in one's day, one could simply increase the quality of engagement in the activities one already prioritizes and values.

A mindfulness practice may feel awkward or uncomfortable at first but different does not mean it is bad or unhelpful. All new cognitive habits feel clunky as one's brain works to develop new neural networks to support the new cognitive pattern (Lamb, 2019). Given the developing research, aviators may consider it worthwhile to experiment with a mindfulness practice to see if it is beneficial. Presented herein is a selection of mindfulness-based practices thought to be relevant to military aviators. These examples use an integrated method, drawing from the mindfulness-based Acceptance and Commitment approach (Harris, 2009).

Deep breathing. Commonly misunderstood, mindfulness is not synonymous with deep breathing. Deep breathing can be considered a "first step." Slow, deep breathing helps to oxygenate the brain, which serves to slow down one's thinking, reduce physiological tension, and enhance psychological flexibility and emotional control (Vlemincx et al., 2016; Zaccaro et al., 2018). One can practice deep breathing as a mindfulness skill by pausing and taking deep breaths while maintaining attention on their breathing. An aviator may have a particularly stressful evaluative flight. Taking a few minutes to focus on taking deep breaths can calm one's thoughts and help re-cage one's mind onto the present moment.

Present moment awareness. Present moment awareness means consciously connecting with whatever is happening in the moment (Harris, 2009). In other words, it is being psychologically present in the here and now. This entails flexibly paying attention (i.e., narrowing, broadening, shifting, or sustaining one's focus), depending upon what is most useful (Harris, 2009). This practice includes paying attention to the physical world around oneself and the psychological reality within oneself, fully engaging in the experience (Harris, 2009). An often-quoted phrase is "when stirring the pot, just stir the pot" (Pollan, 2013, p. 72). This phrase could be altered to just about any task— "when folding your laundry, just fold your laundry," "when checking your email, just check your email," or "when mission planning, just plan the mission." In effect, one need not dedicate separate time to a mindfulness practice. It can be incorporated into existing habits and routines. As the mind wanders, the mindfulness practitioner notes the shift in attention and returns their attention to the present moment (Lippelt et al., 2014).

Physical engagement. One can practice present moment awareness through physical engagement with the here and now. This can be done through a variety of different physical practices such as mindful movement (e.g., walking, yoga, or one's exercise of choice). One could practice a body scan, moving the focus of their awareness to different parts of their body, possibly from their feet to their head (Gan et al., 2022). Progressive muscle relaxation is a technique in which one actively contracts and then releases muscles, progressing through the body to relieve tension (Toussaint et al., 2021). Aviators can mindfully engage with physical tasks that are often performed with a mindless automaticity, such as sitting or standing. One could practice acknowledging these actions with the thought "I am sitting" or "I am standing," perhaps even tallying how many times in a day one was able to do so. Likewise, aviators can practice the thought "I am getting in the aircraft" to help re-center oneself pre-flight.

Accurate labeling. Mindfulness is not striving to change one's thoughts and feelings, though this could be a helpful tool as well (Hofmann et al., 2009). When using mindfulness, one is simply curious about their experiences. However, it is important to use accurate (i.e., non-judgmental) language to describe one's experiences, as that language influences one's experiences. Indeed, the relationship between language and experience is complex. Thinking and language patterns influence perceptions, which in turn, impact one's assessment of their experiences (Hayes et al., 2001; Ottenheimer, 2009).

Aviators can apply this theory to their profession by examining the language used to describe emotions that arise in difficult situations. For example, an aviator may make a mistake in flight or get critical feedback during a debrief. The aviator has a choice of how they describe this experience (e.g., "I am a horrible pilot" vs. "I made a mistake. How can I avoid making this error again in the future?"). Subtle differences in language can influence how an aviator reacts or responds to this situation.

Acknowledging. Simply acknowledging thoughts and feelings can be beneficial (Torre & Lieberman, 2018). Acknowledgment involves paying attention to one's experience, noticing where attention drifts, and accurately labeling one's thoughts and feelings. One can practice this by paying attention to thoughts and feelings that arise and simply noting if they are positive, negative, or neutral. This exercise can provide data on the mind's patterns and tendencies, perhaps the strength of one's negativity bias, or the tendency to pay more attention to negative information.

For example, perhaps while taxiing, an aviator may have the thought "I could die today" or "This could be the last time I do this." While these thoughts may initially be disconcerting, mindful reflection and considering "How is this thought serving me?" may serve as a reminder to stay humble, focused, and engaged.

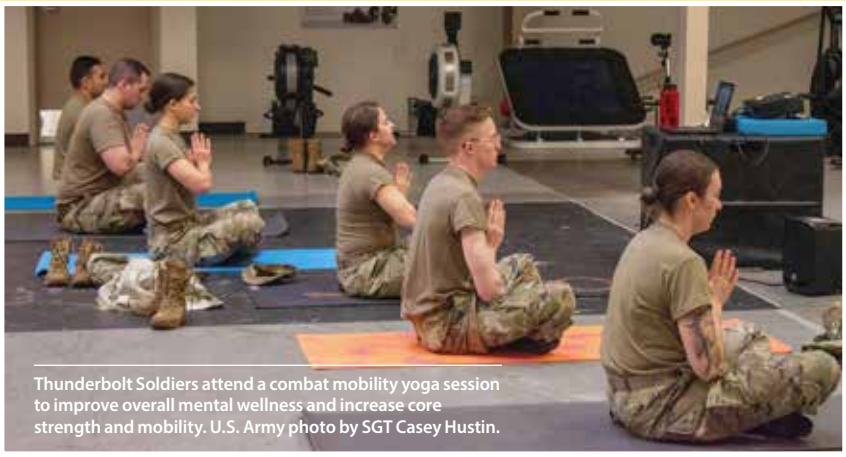
Allowing. As thoughts and feelings arise, aviators can allow space for them. Often, when distressing thoughts and feelings arise, one immediately strives to push them out of mind. Unfortunately, trying to not think about something often, frustratingly leads to one thinking about something more. Allowing, or "non-striving," is accepting an experience as it is without trying to change it. Perhaps seemingly paradoxical, aviators can pause when distressing thoughts and feelings arise and lean in. Instead of fighting or avoiding distress, aviators can allow the experience (e.g., "My mind is racing" or "I am stressed"). After allowing an experience, aviators can pivot toward engaging in values-based action while experiencing distressing thoughts and emotions. Emotions will inevitably arise in flight. Aviators can be stressed and at the same time (i.e., not mutually exclusive), perform in ways that are aligned with their training and values.

For example, if an aviator has an upcoming check ride, the mind may generate thoughts of worry (e.g., "What if I bust my check ride?"). Telling oneself "Stop thinking about that!" often makes the thoughts stickier and harder to dismiss. Instead, aviators can acknowledge worries while shifting their attention to what is important to them (e.g., "Yes, I am stressed and worried. Right now, the most helpful thing I can do is study and mission plan").

Cognitive de-fusion. Cognitive fusion refers to the process by which one responds to their thoughts as if they are literal truths, whereas cognitive de-fusion is the mental process wherein one realizes their thoughts may or may not be true (Bennett & Oliver, 2019). One can remember: "I am a person. I have a mind, and my mind generates thoughts. I am not my thoughts, and my thoughts are not necessarily reflective of objective reality." One can practice cognitive de-fusion through use of phrases such as "I am having the thought that…" or "Thank you for that input, brain" or "What story am I telling myself about this?" (Harris, 2009). Questions such as "How is focusing on this aspect of the flight serving me?" or "Is this making me better?" can also support psychological flexibility.

The wise observer. Aviators could also observe the thoughts their brain generates, adopting the role of the "wise observer." One can imagine they are watching their thoughts as if they are vehicles on a passing road, clouds in the sky, or leaves floating along on a stream (i.e., one's stream of consciousness) (Harris, 2009). In this practice, instead of fusing with one's thoughts and getting stuck in them, the aviator is separate from them, and observing them with a *non-judgmental* curiosity.

Non-judgment. Worth emphasizing is the "non-judgmental" component of curiosity. Minds are naturally judgmental. Imagine that one's inner "wise observer" is a curious scientist seeking to understand and not a judge presiding in a court of law (Harris, 2009). Everyone has vulnerabilities and weaknesses. Instead of judging oneself or others as "bad" in some way, seek to understand with a non-judgmental curiosity. This can increase one's awareness and help to navigate personal and interpersonal stress.



Thunderbolt Soldiers attend a combat mobility yoga session to improve overall mental wellness and increase core strength and mobility. U.S. Army photo by SGT Casey Hustin.

Compassion. Another form of non-judgment is compassion. Aviation is a culture of perfectionism with a small margin of allowable error. This is necessary because aviation can be dangerous, and errors outside of the allowable margins can lead to disastrous results. However, humans are, by nature, imperfect and will inevitably make mistakes. It may benefit aviators to assess whether perfectionism is serving them in specific situations. For example, berating oneself for critical feedback during a pre-flight brief or for an in-flight mistake is unlikely to serve an aviator as they land their aircraft. Aviators can acknowledge the mistake and associated emotion without judging oneself harshly.

Likewise, aviators can practice compassion toward others. Aviators can work from the assumption that their fellow aviators, though imperfect, are trying their best. Aviators can encourage compassion through questions such as "Have I ever made a similar mistake?" or "What was my level of performance at that developmental phase of my career?" If the goal of a debrief is to maximize and solidify learning during the training event, then aviation instructors must consider if the teaching methods used during the debrief are conducive to learning. While debriefs must be data-driven, debrief environments that are overly cold, harsh, hypercritical, or accusatory do not maximize learning.

Appreciation and gratitude. Maintaining a gratitude practice has been associated with psychological wellness (Emmons & Stern, 2013). A simple way to incorporate a gratitude practice is to practice mindful eating or savoring. One can slow down when eating, focus one's attention on their meal, and fully experience their meal with all five senses. Instead of eating lunch at a desk, go to the heritage room and eat lunch with others. It follows with the above technique of "when eating lunch, just eat your lunch." Military aviation is a unique career, with aviators experiencing a range of experiences and emotions that others may not. In calm moments of flight,

aviators may consider taking a moment to fully appreciate the sensation of flying with all five senses, taking a moment to savor the positive and meaningful experiences that arise.

Physicalizing. Another form of cognitive de-fusion is "physicalizing." Physicalizing is imagining unwelcome emotions (e.g., anxiety, fear, anger, disappointment, inadequacy) as a physical object (Harris, 2009). This practice involves making psychological space for an object representing one's emotions. An often-used physicalization is imagining emotions as a beach ball floating in the water (Harris, 2009). One can focus their attention on keeping the "emotional" beach ball pushed under the water's surface, or one could allow the beach ball to float nearby while continuing to enjoy the time in the water. This imagery can help to conceptualize allowing emotion without being controlled by one's emotions both in-flight and on the ground.

Acceptance. Taken a step further, one could imagine this object as an uninvited guest to a party they are hosting (with the party representing the valued activities of one's life; Oliver, 2011). When one sees this uninvited guest at their door, they have a choice—do they let this uninvited guest ruin the party—or do they enjoy the party even though there is an unwelcome guest present? This unwelcome guest could symbolize physiological sensations of frustration or discomfort during a flight. Aviators may choose to avoid or fixate on the sensations. Alternatively, aviators could accept the sensations and redirect their attention to focusing on being the type of person or pilot they want to be, even with emotions present. Aviators can ask the question "What choice can I make so that I can look back on this moment and be proud of my behavior?"

Channel one's inner wisdom. Mindfulness supports self-understanding and understanding of the thoughts and feelings that arise within oneself. Mindfulness can help one to choose how to respond, as opposed to mindlessly reacting. Humans do not have total control over their thoughts, feelings, or context; however, each person can choose how they respond. For example, if an aviator is receiving harsh feedback and notices defensiveness arising, the aviator can consider that emotion to be an invitation to pause, breathe, and channel their inner wisdom before responding with values-based action. As another example, aviators may notice their thoughts and feelings are overwhelmingly negative, yet in channeling their inner wisdom, they may be mindful of how and where they share the negativity so as not to negatively impact team morale in an operational context.

In addition to these practices, there are numerous resources available to support aviators hoping to build or expand their mindfulness practice (e.g., mobile applications, documentaries, free online videos, and books, to name a few).

How can aviators use mindfulness to optimize their

A mindfulness practice can be helpful to gain a greater understanding of oneself and patterns in thoughts and emotions. This self-awareness can be used to support additional practices to optimize performance.

Values-based action. Values-based action is rooting choices in one's values, as opposed to whatever emotions are arising in that moment. Emotions are acknowledged as important data points, but ultimately, values and not emotions are the primary drivers of behavior. To practice values-based behavior, one can ask the following questions: "What do I want to stand for here? What decision is in line with my personal and professional values? What is in my, or my team's, best interest? How is this serving me or my team? How is thinking about this problem in this way serving me? What decision would make me proud of myself? What would make this experience meaningful for me?"

As an example, an aviator may make a mistake in combat when lives are on the line. The immediate thought might be "I messed up;" however, fixating on this mistake is not helpful. Alternatively, refocusing one's attention on the task at hand with a thought such as "It doesn't matter, keep going" acknowledges the error and then efficiently refocuses attention on actions in line with one's values.

Improving the quality of one's thinking. As aviators gain a greater awareness of their thinking habits, they may notice an increased ability to identify and respond to biases in thinking, which can improve decision-making. Many of the common cognitive biases in human thinking are applicable to an aviation context, such as attentional bias, availability heuristic,[1] or confirmation bias. As a specific example, aviators may not prioritize debriefs for

[1]"the process of judging frequency by the ease with which instances come to mind" (Kahneman, 2011, p. 129).

U.S. Army SPC Cameron Jones, speaks with Theresa Justus, health educator with the Camp Atterbury Army Wellness Center, Indiana. SPC Jones is practicing Army wellness through self-awareness. U.S. Army photo by SGT Jarred Woods.

flights that went well, an example of outcome bias with implications for aviation risk management. However, just because a flight had no major issues does not mean that the preparation and decision-making process to get there was sound or worthy of being replicated.

Managing relationships. Mindfulness, or more specifically, non-judgmental curiosity, can also be applied in managing interpersonal relationships, particularly within the context of crew resource management and radio communications. Teams with higher emotional intelligence perform better (Rezvani et al., 2018). Being less negative and more mindful can impact team atmosphere, morale, and performance.

Conclusion

While the research examining mindfulness in a military aviation context is still surfacing, the practice shows potential as a performance optimization strategy. Mindfulness may give aviators an edge, particularly in the areas of emotion regulation and attention management. While mindfulness cannot replace experience, it could help aviators to optimize learning from their experiences. This practice can be incorporated into an aviator's pre-existing habits and routines, requiring no additional time commitment. Given the potential of mindfulness to support aviation safety, experimenting with a mindfulness practice appears worthwhile.

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Stress (Trouble)Shoot:

A Competitive Approach to Training Emergency Procedures

By LTC Lukas B. Berg, CW5 Michael J. Muehlendorf, and SSG Patrick M. Schustereit

Sweat stung his eyes as he kneeled over the limp body of his crew chief, fastening the retention straps on the Sked. His co-pilot, equally exhausted, lay nearby, gathering himself both for the impending drag and the mile-long run that would immediately follow. Some 10 minutes later, both pilots stumble up to their aircraft and begin to don their gear, struggling to bring labored breaths and elevated heart rates under control. By the time they climb into the cockpit, darkness has fallen and ceilings have dropped to 200 feet. A 30-second mission brief later, they are off into the clouds. First, an engine caution, and then, flight instruments start malfunctioning. Soon after, hydraulics and stability augmentation systems are failing. And just when things couldn't get any worse, a large cartoonish crack flashes across a red screen. They've crashed.

Introduction:

On 31 January 2024, the 2D Battalion, 3D Aviation Regiment, General Support Aviation Battalion (GSAB), hosted its inaugural Stress (Trouble)Shoot Competition, evaluating 12 crews on their ability to respond to Emergency Procedures (EPs) immediately after completing a grueling series of physical events.

The competition responded to the 3D Infantry Division Commanding General's guidance to integrate stress shoots into annual training, but it also reflected a battalion and company-level consensus that competition can and should be leveraged to inspire "brilliance in the basics." Ultimately, it allowed us to identify and celebrate excellence under duress, and it yielded important insights into trends related to both technical proficiency and crew coordination (Figure 1).

Event Description:

Twelve crews—each consisting of a pilot-in-command (PIC) nominated by the company and a pilot (PI) recruited by the PIC—participated in the competition. Crews reported at set times and immediately began the physical competition, consisting of timed completion for the following Army Combat Fitness Test-inspired events:

- 2000 pound Cumulative Deadlift (Repetitions x Weight)
- 70 Hand-Release Push-Ups
- 25 meter (m) Skedco Buddy Drag
- 1:35 Plank (Each)
- 1-Mile Run and 1600 m Row (Each event completed by one team member)

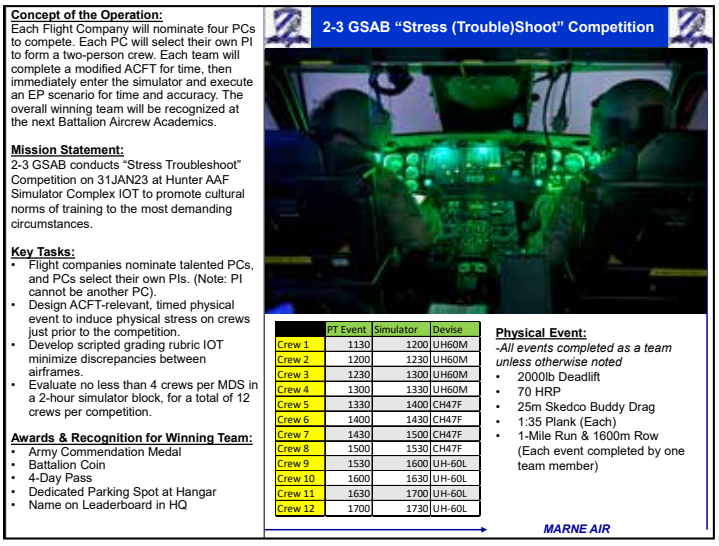


Figure 1. The 2-3 Aviation Regiment competition overview (2-3 Aviation Regiment, 2024).

Upon completion, crews jogged to the nearby simulator, where they donned their pre-staged flight gear, received a short in-brief from an evaluator, and took seats. Over the course of 20 minutes, they were then challenged with the following emergencies (Figure 2), for which crews were graded on both accuracy and timeliness. Of note, the session took place in instrument meteorological conditions in order to prevent crews from simply landing as soon as possible in response to an EP.

Battalion leaders supervise execution of the physical competition. Photo provided by the authors.

Literature Review:

We were unable to locate a record of any comparable competition—either civilian or military—that assessed EP proficiency under conditions of physical duress. That said, there are many broader studies of stress in aviation, including numerous case studies that examine its impact on cockpit resource management (crew coordination). One article "investigated whether stress training introduced during the acquisition of simulator-based flight skills enhances pilot performance during subsequent stressful flight operations in an actual aircraft" (McClernon et al., 2011, p. 207).

Grading Methodology:

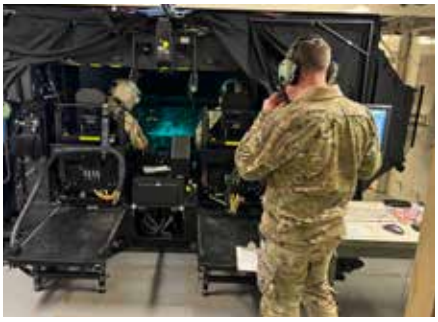
In 2019, the United States Army Aviation Center of Excellence fielded the new Emergency Response Method, which sought to change the culture and philosophy of EP training (Francis, 2020, p. 1). The emphasis was no longer on rote memorization and rapid response. Instead, emergency responses were to be deliberate and methodical, utilizing a checklist for all but the most urgent EPs. The twin imperatives of accuracy and timeliness presented a challenge in terms of grading methodology. We navigated

it by selecting time as the overall grading metric, adjusted with penalties and bonuses for incorrect and commendable actions, respectively. Time started when a crewmember began to look up an EP in the flight reference cards (FRCs), and it stopped when they found the correct page. Penalties and bonuses were also assessed in terms of time, either added to or subtracted from the crew's total event time.

UH-60L	CH-47F	HH-60M
CHIP R INPUT MDL	ENG1 CHIPS	CHIP R INPUT MDL
HYD PUMP 1 FAIL	#1 HYD FLT CONTR	HYD PUMP 1 FAIL
RSVR 2 LOW	UTIL HYD PRESS LO	RSVR 2 LOW
TAIL ROTOR QUADRANT	ENG1 FADEC	ENG 1 OIL BYPASS
FIRE (ENG 2)	AFCS1 FAIL	EGI FAILURE
STAB UNCOM NOSE DOWN	FWD LCTA FAIL	STAB UNCOM NOSE DOWN

Figure 2. Emergency challenges for the Stress (Trouble)Shoot Competition participants (2-3 Aviation Regiment, 2024).

The physical event was also graded for time, with one caveat. We wanted the event to conclude with a 1-mile run but recognized that some crewmembers had running profiles. We consequently integrated a rowing event, which was executed by one crewmember while the other ran. In order to synchronize finish times, the rower was required to stay on his machine until the runner crossed the finish line. The difference between the distance rowed and 1600 m was converted to time and added to or subtracted from the total time.



The Battalion Standardization Pilot (SP) monitors a crew from Company Alpha as they prepare for takeoff. Photo provided by the authors.

Another challenge was weighting the events. The physical events set the conditions for a challenging EP assessment, but they were not the focal point for the competition. We consequently weighted the physical score at only 10 percent of the overall competition, but we chose not to disclose this weighting in order to prevent crews from low-balling that portion. Our instructions to them were simply, "Do your best as quickly as you can."

Grader Observations:

What struck us most at the conclusion of the competition was that we had unintentionally gathered a lot of valuable data, not just regarding the proficiency of individual crews, but also about broader trends in crew coordination and task prioritization. Our sample size was admittedly small, but we still considered the following observations informative and worth sharing with our respective communities.

First, we discovered that crews that had recently flown together tended to perform at a much higher level. Our unit had redeployed from Europe less than 2 months prior to the competition, and we found that crews that had been co-located during the rotation tended to communicate more and with greater effectiveness than those who had not. Additionally, we found that combinations of mature PICs and junior PIs were also effective, perhaps due to clear divisions of labor and responsibility. All told, these observations could support an argument for unit-level battle rostering, particularly when mission stakes are high.

Unsurprisingly, we also observed that the benefits of physical fitness extended beyond the physical competition and into the EP competition. Our most fit crews were able to catch their breaths faster after arriving at the simulator, setting the conditions for more effective communication and more deliberate EP response. At the other end of the spectrum, we terminated the assessment of one team because a crewmember became lightheaded in the simulator. Graders observed that the physical portion of the competition appeared to have taken a significant toll on him.

The Battalion SP monitors a Company Charlie crew as the Battalion Standardization Instructor (SI) scores their performance. Photo provided by the authors.

Next, we noted that our best crews were deliberate about establishing and maintaining aircraft control (the first "Fly" of FADEC-F). Given an EP that produced an unusual attitude in the clouds, half of our crews made aircraft control their #1 priority, with both pilots on the controls and talking through the task of recovery. The crews that accelerated through this step or prioritized other actions ended up crashing.

A competitor from Company Bravo does hand-release push-ups during the physical competition. U.S. Army photo by SGT Caitlin Wilkins, 3D Combat Aviation Brigade Public Affairs Officer.

Another dangerous trend we observed was related to engine fires in Black Hawks. When given a #2 Engine Fire, members of two different crews announced a fire in the #1 Engine. We attribute this potentially deadly error to the fact that the sole fire light is located on the left side of the Master Warning Panel, and crewmembers consequently associated it with the #1 Engine. Another factor that may be contributing to this pattern is that most pilots spend the majority of flight school in the right seat. Instructor Pilots typically occupy the left seat and almost always simulate engine fires on the same side (#1). It is possible that some flight school students graduate without ever having responded to a simulated #2 Engine Fire, and that they are conditioned to believe that the Master Warning Panel has two fire lights, one per engine.

While not a trend, we also noted that one particularly efficient crewmember

Statement	Agree	Ambivalent	Disagree
1. The competition motivated me to study and prepare more than normal.	9	1	6
2. I learned something valuable about myself during the competition.	7	3	6
3. I learned something valuable about my teammate during the competition.	9	1	6
4. The competition challenged me as a professional aviator.	9	1	6
5. It would be valuable to execute additional competitions with different focus areas (e.g., mission planning, etc.).	10	1	5

Figure 3. Stress (Trouble)Shoot Competition online survey results (2-3 Aviation Regiment, 2024).

kept his FRCs opened to the Caution Section. He noted that the EPs in the Warning Section are required to be memorized, and simply opening the FRC to the Cautions allowed him to reduce the time spent searching for the appropriate EP.

After-Action Review:

During our in-person after-action review (AAR), we identified the following areas for improvement:

• *Balance the needs for secrecy and rehearsal*. In an effort to protect the integrity of the competition, we did not conduct a full dress rehearsal of the EP portion with a test audience. Our script was consequently unvetted, and we discovered during the competition that we had failed to articulate and/or emphasize expectations in several circumstances, leading to confusion and/or delay. Additionally, we were reminded during the competition that the simulator software initiates some uncommanded EPs when programmed EPs are not addressed quickly enough. For example, some UH-60L crews had to contend with an unscheduled transmission failure when they didn't respond to the CHIP R INPUT MDL quickly enough. A more thorough rehearsal might have identified this and allowed us to anticipate the implications for both time management and scoring.

The Battalion SP initiates an EP as the Battalion SI monitors a Company Alpha crew's response. Photo provided by the authors.

• *Build in more time for simulator reset and unanticipated delays*. New crews arrived every 30 minutes, and we only built in 10 minutes for reset and delays. In practice, we were hard-pressed to stay on time, and some crews benefited from having a few extra minutes to catch their breath as we reset the cockpit.

• *Incorporate crew chiefs*. In real life, we rely on crew chiefs for countless functions, including emergency response validation. For this competition, we did not include crew chiefs, largely due to the limited number of headsets available in each simulator (four total, with two allocated for the crew and two for graders). In future iterations, we may dispense with helmets/headsets in order to facilitate the inclusion of crew chiefs.

Recognizing that some participants might not have been fully transparent during the in-person AAR, we also administered a short, anonymous online survey to gauge the effectiveness of the competition in achieving our principal objectives. Sixteen of our 24 competitors completed the survey, and we found the responses to be positive enough to warrant further development of the concept (Figure 3).

Conclusion:

In designing and executing the Stress (Trouble)Shoot Competition, we attempted to change the narrative surrounding a foundational skill in Army Aviation. In our experience, few pilots choose to undertake EP training beyond command-directed semiannual simulator sessions, in large part because it's viewed as a high-risk, low-reward endeavor (high risk of embarrassment in front of a peer or evaluator, and low prospects of reward because EPs are themselves low-probability events). By hosting a competition that promised handsome rewards for excellence and no penalties (reputational or other) for failure, we sought to reframe associated training as low risk and high reward, and most competitors seemed to adopt this perspective. Moving forward, we intend to host quarterly EP competitions and apply the same methodology to other aviation proficiencies in an effort to achieve "brilliance in the basics."

Biographies:

LTC Lukas Berg is the Commander of 2-3 Aviation Regiment. He is rated in the UH-60A/L/M and HH-60M and previously served in the 101st Airborne, 1st Cavalry, and 25th Infantry Divisions. He also taught in West Point's Department of Social Sciences and held administrative leadership positions at U.S. Special Operations Command's Joint Special Operations University.

CW5 Michael Muehlendorf is the Senior Aviation Advisor to the III Armored Corps G3. He previously served as Senior WO Advisor and Battalion SP for 2-3 Aviation Regiment, flying UH-60L/M and HH-60 Black Hawks. He also served in the 1st Cavalry Division and the 12th Aviation Battalion, as well as at the U.S. Army Aviation Center of Excellence as an SP and in D/1-160th SOAR(A) as a Fully Mission Qualified Pilot.

SSG Patrick Schustereit is the SI for 2-3 Aviation Regiment. He holds the distinction of being a qualified non-rated crewmember in both the CH-47F Chinook and HH-60M Black Hawk. His previous assignments include serving as a Flight Engineer in the 1st Armored Division, Flight Instructor in the 110th Aviation Brigade, and Platoon Sergeant in the 3**D** Infantry Division.

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PROTECTING ARMY AVIATION MAINTAINERS AGAINST HEAVY METALS

Photo courtesy of Pexels.com

By CW3 Matthew D. Marshall and Mr. Charles T. Brown

By now, most Soldiers and Leaders have at least heard of the compound hexavalent chromium (Cr(VI)). This compound is a corrosion inhibitor and is used in coatings on all legacy Army aircraft. What they may not know is that Cr(VI) is a toxic form of chromium, which can cause severe health effects to workers, including lung cancer. Maintenance operations in Army Aviation, particularly in the repair process, can expose workers to hazardous levels of Cr(VI). In 2019, Headquarters, Department of the Army (HQDA), released Execution Order (EXORD) 031-19, *Ensuring Safe and Healthy Workplaces That Generate or Have Potential for Exposure to Heavy Metals* (U.S. Army Combat Readiness Center, 2019), highlighting that the Army uses the American Conference of Governmental Industrial Hygienists Threshold Limit Value (ACGIH® TLV®) Occupational Exposure Limit (OEL) criteria when the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) are less protective or when no OSHA PEL exists.[1] In 2018, the ACGIH TLV criteria for Cr(VI) was lowered significantly. As a result, paint booths and similar structures have been popping up in hangars across Army Aviation. In 2023, HQDA EXORD 031-19 was superseded by HQDA EXORD 145-23, which maintained the same exposure limits but expanded the requirements for control measures and Industrial Hygiene (IH) activities. One key aspect of HQDA EXORD 145-23, *Ensuring Safe and Healthy Workplaces Where Heavy Metals Exist*, is that the policy applies to all Soldiers, DA Civilians, and DA Contractors working in Army-owned, leased, or supported worksites.[2]

Maintenance personnel wearing personal protective equipment (PPE) required to protect against Cr(VI). Photo provided by the authors.

It is important for our Soldiers and Leaders to understand why the Army has taken the stance to improve protection against Cr(VI). The ACGIH lists Cr(VI) as a confirmed human carcinogen (Defense Centers for Public Health—Aberdeen, 2024). The primary health hazards from Cr(VI) result from the inhalation of airborne material and direct skin contact. Employees may develop allergies or sensitivity to Cr(VI) as a result of continuous exposure. The inhalation of Cr(VI) can cause asthma-like symptoms, such as wheezing and shortness of breath. Repeated or prolonged inhalation exposure can cause sores to develop in the nose and result in nosebleeds. Severe cases can cause the nasal septum to become perforated. Employees who breathe Cr(VI) at high levels may experience irritation or damage to the nose, throat, and lungs, and possibly lung cancer (Defense Centers for Public Health—Aberdeen, 2024).

The Army's policy reinforces the need to protect our Soldiers and their families. Unfortunately, the ACGIH exposure limits changed, and the Army has not been able to provide the necessary tools for adhering to the new, stricter standards and leaving Soldiers to attempt to create homemade safe zones. In an attempt to fill this gap in required equipment, U.S. Army Forces Command (FORSCOM) issued an order, *Corps Tasked ISO Hazard Mitigation of CR(VI) in AVN MAINT*, to each combat aviation brigade (CAB) to purchase one industrial ventilation enclosure from an approved manufacturer.[3] The good news is that most CABs have at least one enclosure installed and in use. The bad news is that the equipment is a commercial product with no funded sustainment. The Defense Logistics Agency is currently working to obtain National Stock Numbers, or NSNs, for the enclosure filters, which require replacement based on use that will drastically improve the ability to maintain the enclosures. Maintenance personnel from the Aviation Capabilities Integration Directorate (CDID), the capability developers, are teaming with the product developer for aviation ground support equipment, the materiel developer, to resolve the lack of equipment and personal protective equipment (PPE) issued to Army Aviation maintainers. This effort is targeted to address shortfalls in components (COMPOs) 1, 2, and 3.[4]

Another gap that needs addressing is the information relayed to maintainers.

[1] The OSHA Cr(VI) rule establishes an 8-hour time-weighted permissible exposure limit of 5 µg/m3 measured as Cr(VI). This means that over the course of any 8-hour work shift, the average exposure to Cr(VI) cannot exceed 5 µg/m3. **The ACGIH TLVs** for Cr(VI) are 0.0002 mg/m^3. All chromium TLV exposures are measured as inhalable fraction of the aerosol (M. Marshall, personal communication, 2024).

[2] You may find HQDA EXORD 145-23 on the G-3/5/7 Bolte Portal (CAC access only).

[3] Please contact the authors for more information on this FORSCOM order.

[4] "The United States Army is made up of three components: Compo 1—the Regular Army; and two Reserve components—Compo 2: the Army National Guard and Compo 3: the Army Reserve" (Association of Army Dentistry, 2024).

In 2022, the Assistant Secretary of the Army (ASA) for Acquisition, Logistics, and Technology (ALT) issued a policy titled *Elimination of Hexavalent Chromium in Army Acquisition and Sustainment of Weapon Systems* (DoD Environment, Safety & Occupational Health Network and Information Exchange [DENIX], 2023). Current aircraft and general technical manuals do not contain the warnings required by the ASA(ALT) policy. The U.S. Army Combat Capabilities Development Command Aviation & Missile Center has an effort underway to address updating depot maintenance work requirement tasks through maintenance engineering orders. Additionally, Aviation CDID is working with U.S. Army Aviation and Missile Command (AMCOM) on updating shop safety in the -204 series manuals (general maintenance procedures for Army Aviation).

The lack of training continues to be a challenge for Army Aviation. There is currently no formal training or mention of Cr(VI) in institutional or professional military education for Army Aviation maintainers and Leaders. Aviation CDID has brought the issue to the U.S. Army Aviation Center of Excellence, Directorate of Training and Doctrine, which is determining where training can be interjected at the institutional level. Additionally, FORSCOM Safety is trying to determine if the mitigation requirements for Cr(VI) can be added to the Aviation Resources Management Survey (ARMS) checklist.

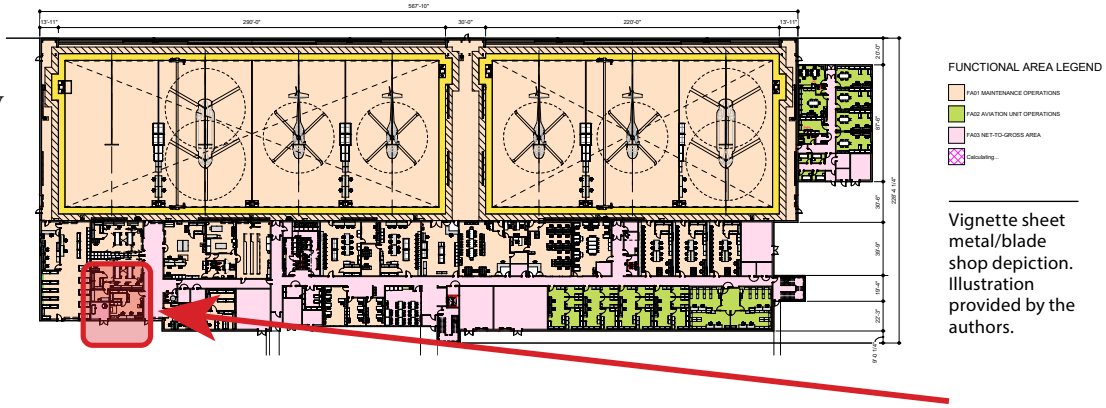
Since the release of HQDA EXORD 031-19, many Soldiers have been surveyed/sampled by their installation IH office. Leaders and Soldiers should know that OSHA requires notification within 15 days of survey, regardless of whether the maintainer's exposure is within or higher than the allowable limit (Occupational Safety and Health Administration, n.d.). Anyone who has been surveyed and has not received results should contact their supervisor or local IH office for their results. If the maintainer receives documentation showing the overexposure, a copy should be added to the individual's medical record.

Finally, Soldiers and Leaders need to understand that enclosures are only part of the mitigation process. It is important to note that the enclosure is meant to protect those outside of the enclosure more than those inside. Personnel working inside the enclosure are required to wear additional respiratory protection than personnel who work outside of the enclosure. Work that produces Cr(VI) overexposure must be performed in a regulated area that is easily identified by all employees. Maintainers must use a High Efficiency Particulate Air, or HEPA-filtered vacuum cleaner when vacuuming materials suspected of containing Cr(VI) or other metal dust and debris. Units must also provide maintainers with personal protective clothing, such as TYVEK suits, disposable gloves, and respirators. Most of the required PPE is one-time use and must be disposed of whenever taken off. Any PPE, waste, debris, or equipment that requires disposal must be labelled as hazardous and disposed of in accordance with (IAW) local installation procedures.

It would be unrealistic to expect everyone in the aviation maintenance community to know and understand every aspect of Cr(VI) mitigation. For clarification or guidance, please contact your safety officer and/or installation IH office, and they will be able to help.

For a realistic look at how the Army's Cr(VI) mitigation works in day-to-day situations, we created the following vignette.

CPT Johnson is assigned to Company D, 1st Battalion (BN), 130th Aviation Regiment (1-130), the Attack BN she took command of 2 weeks ago. Today, the installation IH office conducted personal air monitoring for Cr(VI). The sheet metal shop sample results in her hangar exceed the OSHA permissible exposure limit and by the OSHA standard for Cr(VI), which requires her to establish a Cr(VI)-regulated area. Exposures also exceeded the ACGIH TLV and exceeds the criteria for a Cr(VI) awareness zone. The full-face respirators do not provide adequate protection, and the paint booth ventilation is not operational. The Health Hazard Risk Assessment Code = 1 (RAC1), which is the highest level of risk.



Vignette sheet metal/blade shop depiction. Illustration provided by the authors.

Her blade shop is located here. The building is 45 years old and lacks a dedicated heating, ventilation, and air conditioning system in the blade shop area. The unit currently lacks an industrial air filtration and dust collection system-like enclosure.

Question: What are CPT Johnson's next steps?

Answer: In accordance with Army Regulation (AR), 40-5, "Army Public Health Program,"(Department of the Army, 2020) and HQDA EXORD 145-23, CPT Johnson will immediately halt all maintenance operations that have the potential to expose her Soldiers to potential Cr(VI) exposure until the following is accomplished:

Immediate Action

1. Repair the paint booth ventilation and ensure the booth is included in the facility preventive maintenance program.

2. Ensure that regulated areas and/or awareness zones are visually demarcated from the rest of the workplace in a manner that adequately establishes and

alerts employees of the boundaries of the regulated area. **Awareness Zone**—Signs demarcating a Cr(VI) awareness zone must include the following verbiage: (1) Danger, (2) Awareness Zone, (3) Hexavalent Chromium, (4) May cause cancer, (5) Causes damage to the lungs, (6) Authorized personnel only, and (7) Wear respiratory protection and personal protective clothing in this area.

3. Limit access to regulated areas and/or awareness zones to persons authorized by the supervisor or equivalent and required by work duties to be present, any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures, or any person authorized by the Occupational Safety and Health Act or regulations issued under it and Army policy.

4. Develop and implement housekeeping standard operating procedure, which utilizes either HEPA vacuums or wet methods for hangar bays, shops, Cr(VI) awareness zones, and/or Cr(VI)-regulated areas. Consult with the garrison Department of Public Works Environmental Division for disposal of cleaning water and waste materials.

Respirator equipment usage statement. Photo provided by the authors.

5. Establish hygiene procedures that require all Soldiers who have skin contact with Cr(VI) or other heavy metals to wash their hands and faces at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

6. Establish hygiene procedures that require all Soldiers who have contact with Cr(VI) or other heavy metals to change work clothes prior to ending their day. Where possible, use disposable PPE such as Tyvek suits, that do not require laundering. If using reusable coveralls, make arrangements for laundering that preclude personnel taking work items home. Contaminated work items carried home can expose family members to worksite hazards.

Warning sign for possible CR(VI) exposure when sanding. Photo provided by the authors.

7. Conduct quarterly IH Cr(VI) personal air monitoring for airframe personnel when the ACGIH TLV or the OSHA PEL is exceeded to validate the exposure and respiratory protection selection.

8. Conduct further IH air monitoring for Cr(VI) when the paint booth ventilation is operational.

9. Conduct additional sampling of Cr(VI) IH air monitoring for general maintenance personnel. Sample results will determine the frequency that periodic sampling is needed.

10. Industrial hygiene personnel will issue sample results to personnel represented by their sampling event to the worksite supervisor and to all personnel affected by the air sampling event. Those personnel who should be referred for medical surveillance for exposure to Cr(VI) will be notified by installation occupational health (OH) of their appointment to see an OH professional.

Notice directing paint booth usage when spraying chromate containing primers. Photo provided by the authors.

Recommendation

Upgrade airframe personnel respiratory protection to a protection factor of at least 1000, such as with a full-face powered air purifying respirator. Ensure that all personnel be medically cleared and fit-tested/cleared to wear a respirator IAW AR 11-34, "The Army Respiratory Protection Program" (DA, 2013).

Biographies:

CW3 Matthew Marshall is an Aviation Maintenance Technician (MOS 151A), and former 15R (AH-64 Repairer). He is currently assigned the Aviation Logistics (AVLOG) Division Chief for the Aviation Enablers-Requirements Determination Directorate (AE-RDD) at Fort Novosel, Alabama. CW3 Marshall has more than 20 years of Army Aviation maintenance experience and has deployed in support of Operation Iraqi Freedom, Operation Enduring Freedom, and Operation Inherent Resolve.

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Intelligence to Support Combat Aviation

3D Combat Aviation Brigade Chinook. U.S. Army photo by LTC Brian J. Fickel.

By MAJ David A. Beaumont

The complex landscape of Army combat aviation brigades (CABs) demands a robust and dynamic approach to talent management and personnel within the intelligence warfighting function (IWfF). This article explores the multifaceted challenges within CAB intelligence, focusing on the shortage of specialized personnel, the pivotal role of the CAB S2 (intelligence), and the necessity for deliberate mentorship and training. Emphasizing the deployment of advanced communication systems and military intelligence (MI) software enhances situational awareness to enable commanders at the echelon to make timely, accurate, and informed decisions. Additionally, it highlights training gaps, underscoring the importance of specialized courses. It concludes by emphasizing unit collaboration, including vital relationships and synergy between the aviation mission survivability officers (AMSOs), brigade (BDE) fire support element (FSE), and the BDE S2.

Talent Management and Personnel

Intelligence Soldiers assigned to Army CAB sections must gain practical knowledge through on-the-job experience. To forecast and assess potential risks to Army Aviation, a skilled intelligence professional must possess comprehensive knowledge about diverse aircraft models, distinctive features of aviation missions, assorted tactics employed, and the range of aircraft survival techniques and technology available. The modified table of organization and equipment (MTOE) designates all battalion (BN) S2 positions as billeted 15B, aviation combined arms operations officers, and the BDE S2, holding two military operational skills in aviation and all-source MI officer. Typically, in these positions, 15-series aviators do not perform the S2 duties, leaving the position vacant, or if units are fortunate enough, a trained and experienced 35A (all-source MI officer) fills the role. However, junior LTs assigned to the BN AS2 (assistant intelligence officer) position become the S2 actual, leaving the intelligence staff section without a trained and certified graduate of the Captain's Career Course from either aviation or MI. This critical shortage challenges aviation BNs. The BDE S2 and BN field-grade officers must provide deliberate mentorship, guidance, and training to create a sustained and ready IWfF that supports commanders and leaders at echelon. For the CAB S2, 15C35s (all-source intelligence aviators) are rare because they are generally assigned by aerial exploitation BNs operating fixed-wing, special equipment aircraft that gather tactical and strategic intelligence. Consequently, many CAB S2 positions are filled by aviation or intelligence officers, rather than individuals possessing the hybridized training necessary to effectively fulfill the role.

The CAB S2 is the senior intelligence officer in the BDE, which consists of approximately 3000 Soldiers in one BDE headquarters (HQ) and five subordinate BNs, each with a unique mission set to support operations around the globe. The CAB S2 is the command and staff's primary advisor for all IWfF matters. To support commanders at echelon, the CAB S2 must identify individuals with the right skills, aptitude, and potential for intelligence work through deliberate talent management. In the event the CAB receives a 35A MI Captain's Career Course (MICCC) graduate, priority typically goes to the BDE AS2 position, followed by the attack reconnaissance squadron and the attack BN due to shaping the division deep area with movement and maneuver, fires, and information collection capabilities for the division. Of the five organic BNs

MAJ David Beaumont, BDE S2, and MAJ John Fanelli, BDE FSO, synchronize and coordinate information collection and targeting during 101st Airborne Division (Air Assault) Operation Lethal Eagle. U.S. Army photo by SPC Beverly Roche, 101 CAB Public Affairs.

in CABs, including the BDE HQ, only two 35A CPTs are authorized, the BDE AS2 and BN S2 in the aviation support battalion (ASB). Unfortunately, the ASB typically does not receive a 35A CPT, due to division and BDE competing requirements. A 2LT fills the position with attributes that demonstrate maturity, intelligence, and the ability to work well with others, and is later rewarded with a second BN S2 or AS2 position in one of the attack BNs. Additional issues with CAB personnel are subordinate BNs do not have organic imagery analysts (35G) and geospatial engineers (12Y). To fill the gap, CAB S2 provides 35G and 12Y in a tactical control command relationship during deployments, combat training center rotations, and other BN-level training exercises to reinforce understaffed and underequipped S2s. More importantly, this provides additional operational experience and field training opportunities for geospatial intelligence (GEOINT) to maintain sustained readiness (Figure 1).

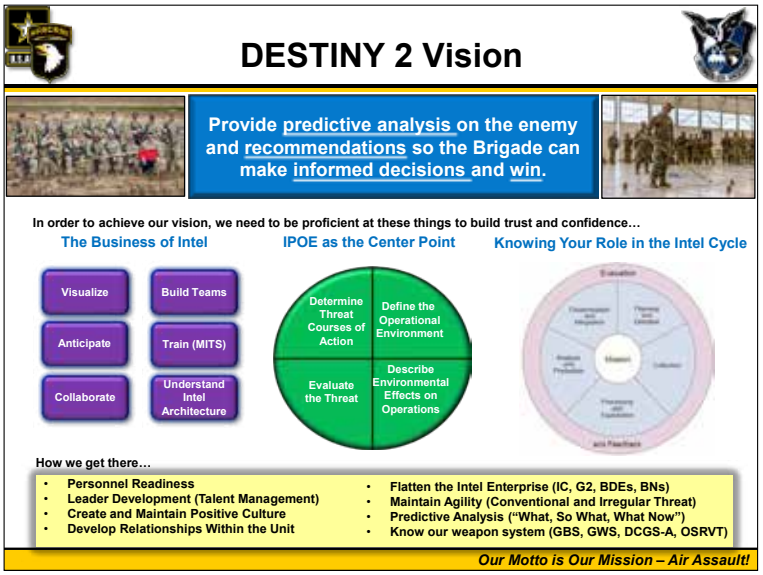

Figure 1. 101st CAB senior intelligence officer vision (Beaumont, 2023b).

Equipment

Implementing the Global Broadcast Service (GBS) within the CAB presents challenges. These primarily stem from the limited overall training on the GBS system. Organic imagery analysts undergo an introductory overview course at Advanced Individual Training. This course provides analysts with fundamental insights into connecting the GBS antenna—the next generation receive terminal—to the GBS satellite. However, the training remains limited. In contrast, the 35Fs (intelligence analysts) within the BDE receive no specific course on GBS and only gain familiarity with the equipment through the layouts they perform with their respective units. This lack of comprehensive training poses a significant issue within CABs, given that the successful implementation of GBS demands a thorough understanding of the system. Therefore, the CAB S2 enables subordinate BN S2s to understand its importance and what it provides commanders.

"The Global Broadcast Service (GBS) Transportable Ground Receive Suite (TGRS) enables mobile users at the edge of the battlefield to receive mission-critical voice, data, and video and process it for use by military decision-makers and frontline troops. Made fully rugged and designed for rapid deployment anywhere in the world, GBS TGRS equipment provides users with high-speed, high-volume multimedia communications and information flow for forces on base in garrison, transit, and theater" (General Dynamics Mission Systems, n.d.) The GBS is a satellite-based communication system that provides high-capacity, secure, and reliable data transfer capabilities. Unfortunately, the GBS is rarely employed due to a lack of training and understanding of its vast capabilities. Therefore, it is the CAB S2's responsibility for subordinate BN S2s to understand its importance and what it can give commanders.

1. Enhanced Communication and Data Transfer: Offers a robust and high-speed communication infrastructure that significantly improves the speed and efficiency of transferring files necessary to support intelligence-related WfF within the BDE.

2. Improved Situational Awareness: Facilitates the rapid dissemination of critical information, enabling commanders to make well-informed decisions in real time.

3. Reduced Dependence on Traditional Communication Methods: Provides an alternative communication system less susceptible to disruptions than traditional methods. This redundancy can be crucial in situations where conventional communication channels are compromised.

4. Support for Intelligence Operations: Ensures that the relevant data reach the right personnel quickly and securely.

5. Interoperability and Integration: Ties into existing communication systems, promotes interoperability at echelon and Joint and coalition operations.

6. Mission Flexibility: Provides increased flexibility in conducting intelligence operations. The ability to rapidly transmit data can support dynamic mission planning and adaptation to changing circumstances.

Global Broadcast Services require numerous steps for proper set up and functionality. It encompasses multiple critical tasks where a single failure can halt the entire system. Recognizing this challenge, it becomes essential for the Soldiers tasked with set up to be well-versed in troubleshooting procedures. Effectively addressing these training gaps is crucial to ensuring the seamless integration and optimal performance of the GBS within CABs.

The One System Remote Video Terminal (OSRVT) is a full-motion video (FMV) system capable of receiving data from multiple manned and unmanned platforms to provide situational awareness to personnel on the ground. Military intelligence utilizes the OSRVT to capture real-time collection provided by the assets available within the operation window. The OSRVT is authorized to the BN and BDE S2 sections. Therefore, becoming proficient in acquiring the

FMV feed for the intelligence personnel in a unit and the operators of the collection platforms is essential to utilize the system properly. The OSRVT captures FMV from the division's organic MQ-1C Gray Eagle unmanned aircraft system and AH-64E Apache.

1. The MQ-1C Gray Eagle is the most advanced unmanned FMV platform to which CABs can connect the OSRVT. Its operating altitude and feed quality make it the ideal platform for gathering situational awareness within a training setting. The OSRVT loses its practical means to provide situational awareness in deployed environments due to the distance limitations of the system. Consequently, the CAB must rely on the MQ-1 pushing its feed through the Unified Video Dissemination System (UVDS)[1] or VIDEX (software of the Federal Republic of Germany) on the Secure Internet Protocol Router Network once outside the operational range of the OSRVT.

2. A relatively unknown application of the OSRVT is to receive FMV data pushed from the AH-64E Apache. This rotary-wing platform has a high-definition camera capable of collecting on areas of interest roughly kilometers (km) away. In garrison, the OSRVT can display the Apache Target Acquisition and Designation Sights (TADS) perspective during gunnery tables. While deployed, it is possible to use the OSRVT to display the TADS perspective in base-defense scenarios. However, connectivity could present an issue. Further refinement using Digital Video Broadcasting (DVB)[2] would be necessary to project Apaches' TADS beyond the OSRVT's limitations.

MI Software

The Multi-intelligence Spatial-Temporal Tool Suite (MIST) fills the Signal Intelligence (SIGINT) gap for the CAB, since it has no organic SIGINT capability. To facilitate information collection, it also relies on other equipment provided by units that require aviation assets. The Fusion Analysis and Development Effort (FADE) intelligence program has additional programs, such as Intelbook and the Watchbox alerting tool that provide rapid retrieval on collection efforts for situational awareness in a saturated information environment. Intelbook organizes previous information pertinent to missions or targets. Watchbox provides awareness of intelligence collection data points produced in MIST and forwards that information to the intelligence section's email in-box. This makes proficiency in FADE a necessity for intelligence sections supporting aviation units. Utilizing Watchbox to provide rapid alerts of specific threat air defense systems produces SIGINT hits used to brief aviators on current, active, air defense systems that can be recorded in Intelbook to establish a life pattern for those particular systems' activation times.

Improved Many-on-Many (IMoM) is an electronic warfare model with a computer software application jointly developed and managed by the 453D Electronic Warfare Squadron and the U.S. Department of Energy's Idaho National Laboratory. Improved Many-on-Many provides analysis of air defense radar detection, air defense target interdiction ranges, effective jamming ranges, and auditory detection ranges. Additionally, it offers effects for terrain masking on ground radar and accounts for weapon capabilities along with acoustic and jamming analysis. The capability model operations in the electromagnetic (EM) environment aim to increase the CAB S2 intelligence analysis to support aviation operations. The justification is that it aids users in understanding systems interactions in the EM environment, supporting mission planning and execution. Improved Many-on-Many finds its most excellent practical usage in deployed environments. Its ability to identify the threat's air defense limitations is essential to adequately portraying how the terrain and particular interactive authoring and display software (IADS) shape the battlefield. Improved Many-on-Many's route analysis tools provide critical information regarding threats to aviators en route before operating within air space. This tool is best combined with FADE/MIST, which provides aviators with the best time windows and flight profiles to minimize their vulnerable duration to enemy air defense.

Training

There are several reasons why the Army might emphasize providing valuable battlefield intelligence to its aviators. The conventional Army has yet to put forth substantial institutional effort to enhance intelligence support to its aviators. Individual aviators, units, and intelligence professionals have undertaken commendable initiatives to improve the circumstances, with numerous individuals adapting tactics, techniques, and technology. However, the Army, as an institution, has not. Combat aviation BDE IWfF lacks formal training on aviation-related intelligence, adequately qualified track professional skills in aviation and intelligence, and sufficient personnel to offer robust, high-quality intelligence support.

1LT Ethan Hogan, 6-101 General Aviation Support Battalion S2, graduates the Army Space Cadre Basic Course at Peterson Space Force Base, Colorado Springs, Colorado. U.S. Army photo by MAJ David Beaumont, 101st CAB.

Of the Army's numerous traditional MI courses and the supplementary foundry courses, the only course that teaches the basics of aviation intelligence is the Intelligence Support to Aviation (ISTA) Course at Fort Campbell, Kentucky, led by the 160th Special Operations Avia-

[1] This "DISA [U.S. Defense Information Systems Agency] system is designed to improve access to live full-motion video (FMV) for members of the global US intelligence community" (Army Technology, 2020).
[2] "Digital video broadcasting (DVB) is a set of standards that define digital broadcasting using DVB satellite, cable and terrestrial broadcasting infrastructures" (Hanna, n.d.).

tion Regiment (SOAR) (Airborne). The U.S. Army Intelligence Center of Excellence (USAICOE) at Fort Huachuca, Arizona, instruction primarily focuses on developing future brigade combat team (BCT) S2s rather than functional BDEs. This is a common trend in U.S. Army Training and Doctrine Command professional military education (PME), as everything revolves around supporting the Infantry. However, CAB intelligence professionals have institutional training to help BCTs, but not necessarily for aviation. The CAB and its helicopters have a dependent relationship with echelons above brigade (EAB) fires, fixed-wing aviation, and intelligence. Helicopters cannot and will not enter an area not shaped by fires targeting enemy air defense assets or intelligence dictating where the enemy is and what their assets are capable of. Intelligence professionals outside the CAB need more understanding of what matters to aviation professionals. The IADS must be targeted and shaped by division or EAB fires to enable the CAB's operational reach and the ground force's ability to defeat the enemy. Combat aviation BDE intelligence professionals must strive to learn adversarial air defense threats.

The 160th SOAR has recognized this intelligence educational gap and offers the ISTA course at Fort Campbell. In 3 weeks, the instructors train intelligence professionals to a graduate-level understanding of how to best support aviation (Figure 2). The curriculum starts with the basics of understanding radar theory and the hunter-killer relationships that comprise an IADS. While the traditional BCT S2 does not need to know the intricacies of enemy IADS, having a base-level knowledge of how it contributes to a large-scale combat denied environment is crucial while operating in all domains. It all returns to the Army's end state of supporting the warfighter. After establishing the foundations of radar theory and hunter-killer relationships, ISTA moves toward learning MI software and conducting practical exercises. While USAICOE PME teaches these programs at the surface level, Soldiers need to receive robust, practical exercise learning derived from the program.

Combat aviation BDE MI professionals are space enablers, which justifies attending the Army Space Cadre Basic Course and earning the 3Y additional skill identifier and basic space badge after serving 12 months in an approved space billet by the Army Space Personnel Development Office (ASPDO). According to the ASPDO Procedural Guide #5, a validated billet "requires assigned personnel to perform space operations duties in one or all of the following key mission areas: SSA [space situational awareness], space control, satellite communications (SATCOM), satellite operations (payload control), theater missile warning, environmental monitoring, space-based intelligence, surveillance, and reconnaissance, and positioning, navigation, and timing (PNT)" (U.S. Army Space and Missile Defense Command, 2023, No. 3, para. b). Combat aviation BDE IWfF utilizes space-based intelligence, surveillance, and reconnaissance to enable the core MI competency of intelligence preparation of the operational environment (IPOE). Combat aviation BDE MI professionals work intimately with space-based intelligence assets and capabilities such as FADE/MIST, National Technical Means imagery, and the GBS. These systems and other SIGINT and GEOINT platforms are critical to MI officers within CABs, as they enable a robust IPOE product. Providing the best intelligence possible increases efficiency and survivability for the aviators, aircraft, and Soldiers that support the aviation community. The aviators rely on terrestrial and space weather reports from the S2 during everyday operations to anticipate GPS SATCOM effects. The CAB owns and operates the MQ-1C Gray Eagle, which provides the entire division with an organic ground movement target indicator information collection capability. According to the MTOE, the CAB does not have an authorized information collection manager. However, MI officers perform duties as information collection managers for their respective echelons. They use various space-based assets and capabilities during operations to generate decisions for the commander and inform the pilots. Additionally, BDE S2 officers are responsible for managing, training, and employing the geospatial imagery analysis (35G) and 12Y sections.

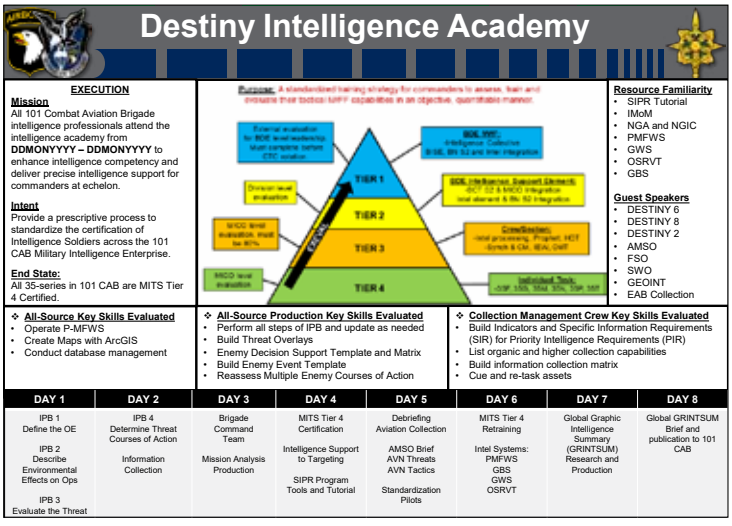

Figure 2. 101st CAB intelligence academy training (Beaumont, 2023).

Relationships

Aviation mission survivability officers are specialized tactical experts who ensure each mission executes maximum safety, efficiency, and effectiveness. Navigating through hostile environments, they provide the insight, expertise, and meticulous planning that can mean the difference between success and failure. Whether in combat scenarios or humanitarian aid missions, their work touches every aspect of Army Aviation operations. They work alongside fellow aviators, field artillery, and intelligence officers to collaborate on solutions. In combat scenarios, they ensure aircraft have the necessary countermeasures and tactics to evade enemy radar and missile systems. In humanitarian missions, they analyze risks and carefully plan routes to avoid unnecessary dangers. The role of the AMSO is to become architects of threat management and survivability, designing and orchestrating complex strategies that adapt to ever-changing battlefield environments. The AMSO must be nested with the S2 to understand the various threats the

aircraft might face in different operating environments, including enemy capabilities such as anti-aircraft systems, fighter aircraft, electronic warfare systems, etc. Analyzing intelligence data, assessing aircraft vulnerabilities, and determining best practices to mitigate risk enables an AMSO to develop, maintain, and disseminate the most effective tactics, techniques, and procedures to counter known threats. The S2 and AMSO must synchronize to allow the success of the overall mission and safety of aviation personnel and equipment and the forces they support. Seamless collaboration and coordination are pivotal in creating a cohesive strategy, bridging gaps, and optimizing resources for a unified approach.

The working relationship between the BDE FSE and the BDE S2 is crucial to enable the CAB to participate in the targeting process effectively. As a customer and delivery asset within the targeting construct, the CAB fills a unique role within the division fight. Using attack helicopters and techniques such as manned unmanned teaming, the CAB is the only organic asset available to the division commander to shape the division's deep area beyond the forward line of own troops (FLOT). However, this capability drives requirements from the Army and Joint enablers to set conditions for shaping rotary-wing attack aviation. The CAB S2, in conjunction with the AMSO, can help articulate high payoff target nominations the CAB makes to divisions and higher, that will impact the CAB's ability to shape beyond the FLOT. Bridging the knowledge gap at the division and higher level—regarding how enemy systems can adversely affect rotary-wing aviation in ways easily mitigated by the fixed wing—is a team effort that must be championed by the BDE S2, FSE, and AMSO throughout the targeting process. The CAB S2's support to targeting encompasses bringing to bear multiple enablers that can help dismantle an adversary's system and force them to react to U.S. and allied forces as we dictate the pace of operations. Specific enemy capabilities must be targeted within the construct of a system because it is too resource-intensive or impractical to target a single node within that system. Identifying the various nodes of a system and assessing attempts to influence them helps the field artillery community achieve cumulative and compounding effects on the adversary's system. This erosion of enemy capability gives the U.S. a twofold advantage: it forces an adversary to reevaluate their plan based on newly constrained resources, and it opens a window of opportunity for the U.S. and its allies to press their advantage (Figure 3).

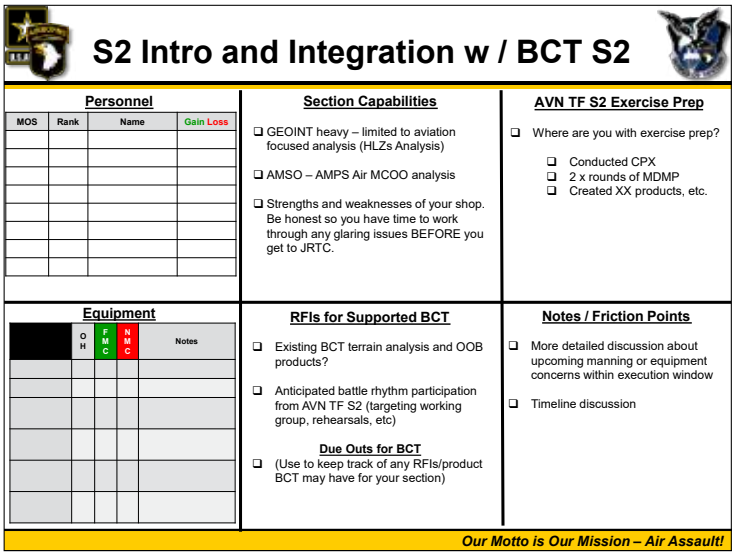

Figure 3. Aviation task force S2 introduction and integration with ground force S2s (Beaumont, 2023).

Conclusion

Addressing the intricate challenges within Army CABs requires a proactive and adaptive approach to talent management in the IWfF. This includes recognizing the pressing issues of personnel shortages, the pivotal role played by the CAB S2, and the imperative need for deliberate mentorship and training. Deploying communication systems and MI software is critical in enhancing situational awareness for timely and well-informed decision-making for commanders at the echelon. The identified training gaps underscore the significance of specialized courses, highlighting a pathway for improvement. Ultimately, fostering collaboration among units, especially in vital relationships between the AMSO, BDE FSE, and BDE S2, stands out as essential for effectively addressing and overcoming these challenges.

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Biography:

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

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Bridging the Gap
Between Army Aviation and Industry Stakeholders: Fostering Collaboration for Enhanced Capabilities

By CW3 Kane L. Strickland

Introduction

In the dynamic landscape of military aviation, the synergy between Armed Forces and aerospace industry leaders has long been essential for driving innovation, ensuring operational readiness, and safeguarding national security interests. This expansive exploration seeks to delve deeply into the multifaceted collaboration between Army Aviation and industry stakeholders, unraveling the complexities, opportunities, and strategies that underpin their partnership.

The Role of Training With Industry Programs

Among the myriad initiatives aimed at fostering collaboration, Training with Industry (TWI) programs[1] stand out as a cornerstone for bridging the gap between Army Aviation and industry. These immersive training experiences offer Army personnel unparalleled opportunities to gain hands-on exposure to industry best practices, advanced maintenance techniques, and cutting-edge technologies. By cultivating a cadre of highly skilled and adaptable professionals, TWI programs enhance operational readiness and promote knowledge exchange between military and civilian sectors. "The Army's main objective in sponsoring the TWI Program is to develop a group of Soldiers experienced in higher level managerial techniques and who have an understanding of the relationship of their industry as it relates to specific functions of the Army. Once the TWI student is integrated back into an Army organization, they can use this information to improve the Army's ability to interact and conduct business with industry" (U.S. Army Human Resources Command, 2023).

CW5 Donald Chambers, CCWO, 128th Aviation Brigade, shared his thoughts about the TWI program. "Training with Industry (TWI) stands as an indispensable program for the Aviation Maintenance Technician (151A), profoundly enriching their knowledge base within the tight-knit community of Army Aviation experts. By participating in TWI, 151As gain invaluable insights, skills, and experiences that significantly elevate their expertise, making them indispensable assets to their units and the broader Army Aviation Enterprise. As 151As transition to or from their subsequent assignments within the United States Army Training and Doctrine Command, Aviation Maintenance Technician TWI experience equips them with a distinct perspective, amplifying the collective wisdom of the 151A community. This unique blend of practical know-how and strategic insight not only enhances individual capabilities but also fosters and provides a culture of continuous learning, and innovation enables the maintenance transformation toward sustainment in large-scale combat (LSC) and building that continuum "Sacred Trust" to those we support throughout the entire Army, aviation and 151A community" (D. Chambers, personal communication, March 2024).

The Boeing TWI program, of which this author is a part, serves as a prime example of industry-driven training initiatives aimed at nurturing talent and fostering collaboration. Tailored to the specific needs and objectives of Army Aviation maintenance technicians, this comprehensive program encompasses a diverse array of aerospace technologies, including but not limited to production, business development, captains of industry, systems engineering, and field service. Through mentorship from seasoned industry experts, participants acquire invaluable insights and skills that empower them to excel in their roles and contribute to mission success upon return to military service.

Three biomedical equipment specialists participating in the Army's medical maintenance TWI program conduct an inspection of a computed tomography, or CT, machine during on-the-job training October 23, 2023. Photo courtesy of Betsey Meyer.

Understanding the Collaborative Landscape

To comprehend the intricacies of collaboration between Army Aviation and industry stakeholders, it's crucial to contextualize their relationship within the broader framework of military-industrial cooperation. From Boeing and Lockheed Martin to General Electric and Northrop Grumman, industry titans contribute cutting-edge technologies, expertise, and

[1] More information regarding the TWI program can be found here: https://www.hrc.army.mil/content/Training%20With%20Industry%20TWI%20Preference%20Statement%20Information

solutions that are instrumental in bolstering military capabilities and fulfilling strategic objectives. Over the decades, the collaboration between Army Aviation and industry stakeholders has undergone a remarkable evolution, marked by significant milestones in technological innovation, strategic alliances, and joint ventures. From the inception of iconic rotorcraft like the CH-47 Chinook and AH-64 Apache to the integration of advanced avionics, propulsion systems, and materials, industry contributions have been pivotal in enhancing Army Aviation's operational effectiveness and survivability. Despite the mutual benefits of collaboration, the journey hasn't been without its share of challenges. Differences in priorities, timelines, and regulatory frameworks often pose hurdles, complicating efforts to align operational imperatives with commercial interests. Moreover, contractual disputes, competitive pressures, and budget constraints can strain the partnership, necessitating a delicate balance of diplomacy, negotiation, and compromise to overcome obstacles and achieve common goals.

CW3 Jesus Gonzalez (left) goes over final test procedures for the 24K PATRIOT air-conditioner with John Neville Jr. (right), Letterkenny Army Depot (LEAD) A/C shop employee, as part of the TWI internship at Letterkenny Army Depot, Chambersburg, Pennsylvania. U.S. Army photo by Pam Goodhart.

The gap between Army Aviation and industry manifests in various forms, including differences in priorities, timelines, and perspectives. While the Army seeks solutions tailored to its operational needs, industry often operates within commercial parameters, driven by profit margins and market demands. Bridging this gap requires a nuanced approach acknowledging the distinct objectives of both parties, while aligning efforts toward common goals.

Case Studies in Collaboration

Examining case studies offers invaluable insights into the dynamics of successful collaboration between Army Aviation and industry stakeholders. For instance, the Future Vertical Lift (FVL) program exemplifies the power of strategic partnerships in driving innovation and capability development. By leveraging industry expertise and resources, stakeholders are working collaboratively to develop next-generation rotorcraft that meet the Army's evolving requirements for agility, lethality, and survivability. Through close collaboration, stakeholders can overcome technical challenges, accelerate development timelines, and optimize lifecycle costs, ultimately enhancing Army Aviation's operational capabilities and maintaining technological air superiority on the battlefield.

At times, disputes between the Army and Boeing have surfaced, ranging from contractual disagreements to concerns over cost overruns and delivery delays. Such challenges underscore the complexities inherent in the relationship between a military organization driven by operational imperatives and a corporate entity accountable to shareholders. However, effective communication, transparent collaboration, and a shared commitment to mission success have been instrumental in resolving conflicts and fostering mutual understanding. Both parties recognize the importance of maintaining a constructive dialogue to address issues promptly and find mutually beneficial solutions.

One significant challenge lies in the competitive landscape of defense procurement. Additionally, there are many ongoing initiatives with the FVL program that present their own unique additional challenges, such as the Improved Turbine Engine Program (ITEP). "The ITEP program *[sic]* was originally scheduled to deliver a prototype for the two FARA [Future Attack Reconnaissance Aircraft] competitors by the end of 2022, but the delivery date was delayed until the spring of 2023, and then again to early 2024. Under the Army's proposed restructuring, the ITEP effort would be further slowed, but the engine would still be integrated into Apache and Black Hawk helicopters" (Congressional Research Service [CRS], 2024, p. 2). Moreover, the FARA program is now cancelled and Jennifer DiMascio, analyst in U.S. Defense Policy asks, "What implications would the Army's proposed restructuring, including the proposed cancellation of the FARA program, have for the U.S. rotorcraft industrial base, including both prime contractors and supplier firms?" (CRS, 2024, p. 2). Although this issue continues to pose a persistent challenge for the Army, it also offers a distinctive chance for industry partners like Boeing. This situation is poised to generate further business development prospects for Boeing, its stakeholders, and the modernized AH-64 Apache program.

Navigating Complex Procurement Processes

Procurement processes for helicopters and rotor head systems are inherently complex, involving a myriad of stakeholders, regulations, and competing interests. Streamlining these processes requires close collaboration between Army acquisition professionals, industry partners, and government agencies to ensure timely delivery, cost-effectiveness, and compliance with quality standards. By adopting agile acquisition methodologies, embracing innovative contracting mechanisms, and fostering transparent communica-

The next generation Modernized Apache. Public domain image retrieved from Boeing.

A group of AH-64E, version 6 Apache helicopters depart the Boeing manufacturing facilities at Mesa, Arizona. The AH-64E Version 6.5 is the next version of the Apache helicopter. Photo by Paul Stevenson.

tion, stakeholders can navigate bureaucratic hurdles and expedite the fielding of new technologies, thereby enhancing operational readiness and effectiveness.

Even after procurement is complete, there are a myriad of challenges regarding flight critical components and follow-on commitments to the Army to ensure that flight safety is paramount. Ensuring flight safety for critical components presents ongoing challenges post-procurement. The responsibility to uphold stringent standards and fulfill follow-on commitments to the Army remains paramount. This requires rigorous quality assurance measures, proactive maintenance protocols, and continuous monitoring of component performance. Challenges include maintaining integrity amidst evolving operational requirements and environmental factors. Modern aviation systems introduce complexity, demanding a deep understanding of intricate functionalities and potential failure modes. External factors like harsh weather and high-stress flight operations further impact component longevity. A proactive approach to maintenance is crucial, including regular inspections, testing, and preventative measures. Collaboration between stakeholders is essential for timely decision-making and alignment with safety standards. Investing in research and development fosters innovation, optimizing component reliability and safety. Ultimately, a commitment to continuous improvement and risk management ensures that safety remains paramount throughout the operational lifespan of aircraft.

Harnessing Technological Innovation for Future Challenges

In an era defined by rapid technological advancement, harnessing innovation is paramount for maintaining a competitive edge in military aviation. Emerging technologies, such as unmanned aerial systems, advanced sensor technologies, and artificial intelligence hold immense potential for enhancing Army Aviation's capabilities in areas such as surveillance, reconnaissance, and precision strike. By leveraging industry expertise and fostering collaboration with leading innovators, the Army can stay at the forefront of technological innovation, ensuring readiness to confront emerging threats and operational challenges in a rapidly evolving security environment.

A great example of this is the next generation Modernized Apache. “Each version of the Apache has been the world’s most advanced and dominant attack helicopter. The next evolution — the Modernized Apache — builds on the combat-proven AH-64 platform to deliver more reach, survivability and lethality while enabling rapid capability integration via a Modular Open Systems Approach” (Boeing, 2023). While Boeing remains a key supplier of military aircraft, the Army must also consider alternative options to ensure the best value for taxpayer dollars and the highest level of performance for its fleet. This often entails engaging in competitive bidding processes that can strain the relationship between the Army and Boeing. Moreover, technological advancements and emerging threats continuously push the boundaries of military aviation. In this ever-evolving landscape, the Army faces pressure to stay ahead of the curve, prompting it to explore partnerships with other industry players and invest in research and development initiatives that may not always align with Boeing's strategic objectives.

Fostering a Culture of Innovation

Cultivating a culture of innovation within Army Aviation and industry requires concerted efforts to promote creativity, experimentation, and continuous learning. By fostering an environment where ideas are encouraged, risks are tolerated, and lessons learned from both successes and failures are embraced, stakeholders can drive transformative change and maintain a competitive edge in an increasingly complex and unpredictable operational environment. “In today’s rapidly evolving military landscape, Aviation and Missile Command senior leaders’ routine engagements with original equipment manufacturers have become increasingly important to ensuring the readiness and modernization of fleet weapon systems. These engagements provide a valuable platform for collaboration between the military and industry, facilitating the exchange of ideas, technologies, and best practices that are essential for maintaining a competitive edge on the battlefield” (Brown, 2024). By investing in research and development, promoting cross-disciplinary collaboration, and empowering individuals at all levels to contribute to the innovation process, stakeholders can unlock new opportunities, address emerging threats, and ensure Army Aviation

Training with Industry students pose outside of the Smithville Dam control tower after a tour on April 20, 2023. Photo by Abigail Voegeli, U.S. Army Corps of Engineers, Kansas City District.

remains at the forefront of technological advancement and operational excellence.

Additive Manufacturing

I would be remiss if I overlooked the additional advantages of additive manufacturing in an article discussing innovation and collaboration. As an inventor who has utilized additive manufacturing for my patented inventions, as well as for shop aids and tools during my tenure in the Army, those familiar with my work understand the significance of additive manufacturing to me. Due to the limitations imposed by multiple non-disclosure agreements I've entered into, I regret that I cannot provide comprehensive insights into additive manufacturing and its potential applications within Army Aviation and industry. However, the capabilities of industry currently surpass those of the Army. For instance, Boeing's plant already utilizes numerous additive-manufactured shop aids, fly-away gear, and tooling for the Apache. According to *Defense News* writer, Jen Judson (2023), "The Apache program has so far provided a list of eight parts designated as items that require replacing as soon as possible and were deemed good candidates for 3D printing."

Unfortunately, organizations within the Army lack access to these resources due to what seems to be communication or procurement challenges between industry and the military. Additive manufacturing, also known as 3D printing, is a transformative technology that plays a critical role in cultivating a culture of innovation through various mechanisms.

Firstly, it facilitates rapid prototyping by offering a cost-effective means of producing prototypes swiftly. This capability allows innovators to experiment with different designs, iterate on concepts, and realize ideas at a pace previously unattainable with traditional manufacturing methods. Moreover, additive manufacturing provides unparalleled design freedom, enabling the creation of highly intricate and customized shapes. This freedom encourages innovators to explore unconventional designs and push the boundaries of what is considered feasible.

Next, additive manufacturing offers significant cost and time efficiencies, particularly for low-volume or customized production runs. For instance, components of the ITEP engines are produced using additive manufacturing alongside numerous other components involved in the ongoing FVL initiatives within the Army's FVL program. By reducing production costs and lead times, this technology democratizes innovation, making it more accessible to a broader range of individuals and organizations.

Furthermore, additive manufacturing also enables on-demand production, promoting just-in-time manufacturing practices, minimizing waste, and fostering more responsive supply chains. These attributes contribute to a culture of innovation by facilitating agile and efficient production processes. In addition, additive manufacturing drives innovation in materials science by allowing the use of novel materials and material combinations that may not be viable with traditional manufacturing

SSG Boggs and SSG Faendrich are Joint Culinary Center of Excellence instructors who underwent training under the Quartermaster School's TWI program. Training with Industry provides a 1 year assignment with an industry partner to help develop a Soldier's skills. Photo by Terrance Bell, Fort Gregg-Adams.

The Additively Manufactured (AM) 3D model of the T901 engine, shown installed in the engine bay of an Apache AH-64E helicopter for fit testing. Photo by Paul Stevenson, PEO, Aviation.

methods. This encourages exploration of new material properties tailored to specific applications, opening up avenues for further innovation.

Finally, the accessibility of additive manufacturing technology promotes collaboration and open innovation across industries. Innovators can easily share digital designs, collaborate on projects, and leverage each other's expertise and resources to advance innovation collectively. Additive manufacturing revolutionizes manufacturing processes and fosters innovation by empowering individuals and organizations to explore new ideas, iterate rapidly, and collaborate effectively.

The Army's adoption of additive manufacturing could be significantly influenced by the ability to swiftly repair grounded aircraft using 3D-printed parts instead of waiting for traditionally forged components. This expedited repair process would minimize downtime and contribute to the overall acceptance of additive manufacturing within the Army. Additive manufacturing's ability to accelerate prototyping, offer design freedom, reduce costs and lead times, facilitate on-demand manufacturing, drive materials innovation, and promote collaboration underscores its pivotal role in cultivating a culture of innovation.

Conclusion

As we look ahead to the future of Army Aviation and industry collaboration, it's evident that the partnership between Armed Forces and aerospace industry leaders will continue to play a pivotal role in shaping the trajectory of military aviation. By embracing innovation, fostering collaboration, and upholding a shared commitment to excellence, stakeholders can navigate challenges, seize opportunities, and ensure that Army Aviation remains at the vanguard of technological advancement, operational readiness, and national security. Through concerted efforts and sustained engagement, Army Aviation and industry stakeholders can continue to advance together, meeting the evolving challenges of modern warfare head-on and safeguarding the nation's interests in an increasingly complex and unpredictable world. Bridging the gap between Army Aviation and industry is essential for ensuring the readiness, effectiveness, and technological superiority of military aviation. By establishing collaborative frameworks, harnessing technological innovation, streamlining acquisition processes, and cultivating a culture of innovation, stakeholders can maximize synergies and achieve shared objectives.

Despite the challenges, the relationship between Army Aviation and Boeing remains resilient. Both entities share a common goal: to ensure the readiness and effectiveness of the U.S. Army's aviation assets in fulfilling its critical missions. As technology continues to advance and geopolitical dynamics evolve, the partnership between the Army and Boeing will continue to adapt and evolve. Embracing innovation, fostering collaboration, and upholding a shared commitment to excellence will be essential in overcoming challenges and forging ahead into an era of unparalleled capability and readiness throughout the Army Aviation Enterprise.

Biography:

CW3 Kane Strickland is a Florida native and Aviation Maintenance Technician (151A) with 23 years of expertise in Army Aviation. Holding licenses including Federal Aviation Administration Airframe and Powerplant Mechanic, FCC, and Refrigerant Technician, he's also a Fiber Optic Technician and inventor with a utility patent. Kane earned a Master of Arts in Organizational Leadership from Chapman University and a Bachelor of Science in Business from Excelsior College of New York. He's held diverse roles such as Platoon Leader, New Systems Integration Branch Training Developer, and Production Control Officer. Currently, he's engaged in the TWI program at the Boeing Apache plant, Mesa, Arizona, broadening his expertise in industry best practices and cutting-edge technologies.

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Mitigating the Risk Mitigators

Soldiers from the 1AD CAB conduct several flights from Fort Bliss, Texas, to Fort Campbell, Kentucky. U.S. Army photo by CPT Roxana Thompson.

By CW5 Scott A. Bean

Risk management is the process of identifying, assessing, and controlling risks arising from operational factors and making decisions that balance risk cost with mission benefits (Joint Publication 3-0, 2022, p. III-14). In Army Aviation, the mission briefing officer (MBO) is arguably the most important part in the risk management process. So how does a unit ensure that their MBOs are the right ones for the job? For the 1st Armored Division Combat Aviation Brigade (1AD CAB), it required an in-depth review of the CAB's mission approval and MBO selection process.

Every mission in Army Aviation uses the same three step process for mission approval: initial mission approval, mission briefing, and final mission approval. All three steps involve identifying and mitigating risk and are essential for the successful completion of the mission and survivability of the crew. The initial and final mission approvers, commanders, or their designees, are responsible for assuming risk; however, the primary responsibility of the MBO is to manage that risk before it reaches the final approval process. To accomplish that, they must **first identify the risk, assess it, develop controls, and then implement those controls**. This requires the MBO to have a thorough understanding of the type of risk (to force and to mission) that may be encountered on the mission they're briefing. This requires a significant level of experience to be able to "see the risk" to properly mitigate it.

Following a Class A aircraft accident during an air assault mission at the Joint Multinational Readiness Center in Hohenfels, Germany, we determined that the experience level of a large portion of the 1AD CAB MBOs was not sufficient to thoroughly mitigate risk across the broad spectrum of missions the CAB conducted. As a result, the 1AD CAB commander determined that the CAB MBO rosters needed to be pared down to an "elite core" of briefers. The challenge was reducing a very robust field of MBOs to the most experienced briefers without significantly impacting operations.

The process started with a change in culture across all battalions. One school of thought when it comes to MBOs is, "the more the better." This is especially true during deployments when the units are decentralized, and a briefer may not be available because they are "off-cycle" or already on a mission. However, with the available technology and connectivity we have today, that may be considered an outdated and unnecessary reason for designating MBOs. The 1AD CAB's approach to selecting MBOs is: Instead of making a pilot an MBO based on duty position (Instructor Pilot, Maintenance

A U.S. Army SPC assigned to the 1AD CAB pulls a fuel hose toward a CH-47 Chinook at a forward arming and refueling point. U.S. Army photo by SPC William Thompson.

Test Pilot, etc.) or a perceived need for many briefers, we needed to focus on the experience of the briefers, which enriches the risk mitigation process and "buy down" risk by leveraging their experience against the potential risk.

To select the best MBOs, each of the battalion commanders and their senior aviators reviewed their list of MBOs. They then selected the most experienced pilots and unmanned aircraft system operators based on total flight hours, deployment experience, and overall mission experience. After compiling a list of mission briefers from the battalions, a single roster was developed by the brigade standardization officer. This roster was then vetted by the brigade's senior aviators and further pared down to the most experienced aviators, with oversight from the brigade commander. Once the process was complete, there was approximately a 55 percent reduction in MBOs across the brigade. The list of MBOs was then finalized and approved by the brigade commander. Although the reduction in MBOs decreased the number of available briefers, it increased the experience level of the available MBOs. This ensured the risk mitigation process was more thorough and specific to the mission. The intent of this process was not to discount the experience of those MBOs who were cut—it was to baseline the MBO process and set a "mark on the wall" for future MBOs.

The 1AD mission sets included six "Deep Attack" operations comprised of three battalion/squadron live-fire missions, two China Lake Naval Air Weapons Station missions, and a culminating event at the Nevada Test and Training Range that occurred at night. This event integrated a multitude of aircraft, including HH-60s, UH-60Ms, CH-47s that provided a "Fat Cow" rapidly employed forward arming and refueling point, and AH-64s, as well as a ground convoy that traveled more than 200 miles round-trip over unimproved roads and trails to provide Class V and IX support to all participating aircraft.

There are many ways to manage risk, and the 1AD CAB process is just one way. A testament to the 1AD CAB way was the safe and successful ground and air operations they conducted at the National Training Center, California, during rotation 24-03. Despite a very aggressive flight schedule that directly supported the 1AD, the CAB experienced no ground or aviation accidents or injuries. The 1CAB will continue to mitigate their risk mitigators as a means of decreasing overall risk.

Biography:

CW5 Scott Bean is the Command Chief WO of 1AD CAB, Fort Bliss, Texas. He has over 30 years of Army experience across multiple Major Commands. He's been a Kiowa and Apache Standardization Pilot at all operational levels and during deployments to multiple theaters of operation including Iraq, Afghanistan, and U.S. European Command.

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Forward Arming and Refueling Point Operations

By LTC Linus D. Wilson and CPT Jaden S. Bryant

The 1st Armored Division Combat Aviation Brigade (1AD CAB) began a crucial focus on logistics operations months before one of the most historic National Training Center (NTC) rotations (first-ever divisional NTC rotation to this scale since the WWII era), NTC 24-03. The main concentration was the forward arming and refueling points (FARPs) supporting the attack helicopter operations in the corps' deep area of operations. Field Manual (FM) 3-0 "Operations," states, "**Deep operations are tactical actions against enemy forces, typically out of direct contact with friendly forces, intended to shape future close operations**" (Department of the Army [DA], 2022a, p. 3-29). As pilots train to extend operational reach, it is equally important that logistician nodes supporting the operations train in chorus. Furthermore, providing logistical support in the rear and supporting aircraft providing maximum destruction in the deep is not something one singular forward support company (FSC) is capable of executing unassisted. Tailored and led by the 127th Aviation Support Battalion (ASB) Support Operations Officer (SPO) team, the aviation support formations across the brigade completed training in four phases—creating one standard to enable a centralized understanding—and improved their ability to support higher echelons more effectively. This training started in August 2023 and culminated with the NTC rotation in February 2024.

The four phases included: **academics, validations, a brigade FARP competition, and full-scale training at the NTC**. The critical focus on FARP operations for multiple months leading up to the NTC consisted of a successful evaluation of FARP doctrinal fundamentals in the classroom, a coherent standard within every formation, and culminated in a momentous training event at the NTC, shaping the way Army Aviation conducts operations in large-scale combat.

The academic portion of training focused on doctrinal fundamentals of FARP operations, execution, and tactics according to FM 4-0, "Sustainment Operations," (DA, 2019); Army Techniques Publication (ATP) 4-43, "Petroleum Supply Operations," (DA, 2022b); and ATP 3-04.17, "Techniques for Forward Arming and Refueling Points," (DA, 2018). Academics included all 92F (fuelers), cross-trained individuals in the entire brigade, and an additional team of 92Fs from the division. Field Manual 3-0 further states "Commanders must plan for the possibility of heavy losses to personnel, supplies, and equipment" in large-scale combat operations (DA, 2022a, p. 6-19). Integrating all 92Fs and select cross-trained Soldiers across the division increased dispersion on assets, redundancy, and avoided a singular point of failure. Focusing on standards and training in a classroom environment enabled a critical shift in focus and attention for the Soldiers to sustain the brigade as efficiently as possible and according to the correct rules and regulations. The Soldiers utilized their newfound knowledge to rapidly advance to the next phase of the operation's multiple validation exercises.

Battalion and company commanders took the initiative to train their formations during platoon training exercises, battalion field training exercises, and a brigade aerial gunnery to achieve the standard. Not only did the battalions train, but the 127th ASB SPO conducted brigade-level validations, including hands-on training, equipment validations and inspections on multiple occasions, and visual products of the standard for every battalion support formation. All aviation support formations were ready to deploy to the NTC through these multiple required trainups. Besides the required standard unit training from FM 7-0, "Training," (DA, 2021) the 127th ASB supported the battalions in creating a standard using lessons learned from all training events, doctrine, and proof of concept. The 127th Battalion Safety and SPO team created a standard operating procedure (SOP) for FARPs—that included locations for inbound and outbound aircraft, equipment, mission command structure, and FARP tactics—and coincided with ATP 3-04.17, safety SOP, and FM 3-04, "Army Aviation," (DA, 2020). A comprehensive brigade standard was created for aviators and logistics personnel to implement into their formations.

The SPO team held a competition for the brigade to further validate the implementation of the new brigade standard. Every battalion competed for the best FARP team of fiscal year 2024, using their technical skills, knowledge, and tactics gained from the months of focused training. Thanks to disciplined attention at the company and battalion level, the competition showed minimal discrepan-

A U.S. Army UH-60M Black Hawk refuels at forward arming and refueling point Seven Eleven during NTC 24-03, January 20, 2024. U.S. Army photo by SPC David Poleski.

cies across the battalions, and evaluators within the SPO team addressed all issues using one comprehensive rating system and standard. They used the FARP certification checklist given to all subordinate units in the Army by the Army Petroleum Center at Fort Belvoir, Virginia. Combining individual tasks, collective tasks, and verification of the doctrinal fuel qualifications created a forcing function for extra support and oversight within what usually would be only battalion-level training. The brigade oversight created confidence in the systems; therefore, higher headquarters chose 1AD CAB to conduct division-level deep attacks flying outside air corridors and forward passage of lines passage points adjacent to lethal ground nodes with confidence.

As the 1AD CAB participated in this momentous NTC division-level rotation, the particular focus on FARP operations was necessary. This was due to the long-distance missions and deep fighting the aviators executed. Even with hours and months of training for the battalions, work still had to be done before execution. Each battalion conducted layouts of their FARP equipment before deployment to "the Box," training area at the NTC. It allowed cross-level talk between company leadership at the FSC level and platoon involvement down to the Soldier. The cross-level talk also continued to build the relationships necessary for an NTC rotation as unique as this one. The aviation battalions have different mission sets based on the required aircraft. Therefore, the lack of essential crosstalk creates division. The relationship needed to train and execute as a brigade leading up to the NTC rotation closed those gaps.

Once in "the Box," units must train how we fight. Company Alpha, 127th ASB, with support from E FSC, 1-501st Battalion, executed a convoy across state lines and over 200 miles of land to set up a 12-point FARP supporting the 1-501st Attack Battalion and 3-6 Air Cavalry Squadron's corps deep attack missions. The support the 127th ASB and 1-501st Battalion gave these Apache battalions was crucial in creating hyper-lethal aviators. To prepare this Army to fight peer adversaries, Army Aviation must be ready to execute missions in the deep areas of division and corps. The battalions achieved mission success, but Colin Powell, former U.S. Secretary of State, said it best, "there are no secrets to success. It is the result of preparation, hard work, and learning from failure." Through failure, we learn the most.

A. U.S. Army door gunner scans the desert after refueling from FARP Seven Eleven during NTC 24-03. U.S. Army photo by SPC David Poleski.

Preparation and hard work were evident, but it was clear that every level of involvement made mistakes and needed to learn from them. It is the nature of the complex environment we train in. Aviation operations are smooth and involve immense training and attention to detail. Commanders take it seriously, trusting aviators to fly into combat across hundreds of miles. Though logistics and aviation cross, it becomes complex and requires more preparation than everyday battalion training. Incorporating Fat Cow (rapidly employed FARP) operations, Chinooks, and supporting units requires the same training and synchronization as the battalion FSC companies and the 127th ASB did before deployment to the NTC. We believe that Fat Cow operations should have been equally integrated into our training program months prior to NTC 24-03. Due to competing training requirement, interaction with CH-47 crews did not occur. This setback led to designated trained personnel rapidly adjusting to support the Fat Cow operations on-site during the culminating deep attack mission. Focused training on this aspect of refueling operations—refueling through the Fat Cow—requires the same focus we had on the FARP training.

With complex dynamic training comes learning that the NTC allowed 1AD to advance Army Aviation years forward. The division integration of multiple aviation battalions, artillery, and special forces was monumental and deserves excellent recognition no matter what. In closing, FARP operation training is the focal point of success in supporting aviation formations. The use of academic evaluations of doctrine in the classroom—creating a brigade standard and training to that—and training to scale at the NTC set the 1AD CAB apart from other Army Aviation brigades.

Biographies:

CPT Jaden Bryant is the Echo FSC Commander, 1-501st Attack Battalion, 1AD CAB, at Fort Bliss, Texas. She was commissioned and went on active duty as an ordnance officer in August 2018 after graduating from the United States Military Academy at West Point. Her previous assignments include 1AD CAB SPO Deputy, as well as a Maintenance Control Officer and Fuel and Water Platoon Leader at Fort Stewart, Georgia.

LTC Linus Wilson is the 127th ASB Commander in the 1AD CAB at Fort Bliss, Texas. He was commissioned and went on active duty as an Aviation Officer in October 2004 after graduating from Troy University in Troy, Alabama. His previous assignments include Deputy Commander, Joint Special Task Force–Somalia, as well as assigned Organization Personnel & Force Development, Fort Novosel, Alabama, and Brigade Executive Officer, 1st Aviation Brigade, Fort Novosel, Alabama.

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Modernization of Army Aviation Refueling Operations in a Large-Scale Combat Environment

Soldiers fuel and arm an AH-64 Apache helicopter during aerial gunnery operations at Fort Stewart, Georgia. U.S. Army photo by SGT Andrew McNeil.

By CPT Calan M. Farley and CPT Madison A. Maddux

As Army Aviation shifts its focus to large-scale combat (LSC) against a near-peer threat, it must consider shifting its sustainment strategy as well. Due to the proliferation of air defense artillery (ADA) and unmanned aerial vehicles (UAVs) distributed down to the platoon and team level, aviation assets are beginning to co-locate their tactical assembly areas (TAA) within the division and corps levels up to 200 kilometers (km) behind the forward line of own troops (FLOT). Both of the increased distance aircraft must travel, and the proliferation of enemy threats require a greater need for tactical sustainment operations that possess increased survivability over what traditional jump forward arming and refueling points (FARPs) offer. In an effort to increase survivability without sacrificing sustainment capabilities, the 10th Combat Aviation Brigade (CAB) tested a new concept for sustainment operations during the National Training Center (NTC) 23-04 and NTC 23-05 exercises, designated as a forward arming and refueling area. This concept, modeled on the ground force refuel on the move (ROM) method, increases survivability by allowing for greater flexibility, decreased exposure time, rapid mobility, reduced footprint, and prolonged sustainment operations.

Within the scope of LSC operations, extended sustainment capabilities become integral to the success of Army Aviation. The proliferation of ADA and UAVs across the battlespace increases the risk to sustainment assets, creating the need for a more mobile and survivable method of refueling and rearming aircraft. The 10th CAB modified ROM operations to create a new concept coined **The forward arming and refueling area during NTC rotations 23-04 and 23-05.** This concept was instrumental in expanding the scope of aviation operations into the deep area in support of 2D/3D Armored Brigade Combat Team, while also creating a survivable and sustainable method of refueling operations. The forward arming and refueling area that 10th CAB tested offers a promising solution to the arising threats to aviation operations in a LSC environment.

Army FARP operations. U.S. Army photo by 2LT Kate Kramer.

The U.S. Army is shifting its strategy of warfare away from counterinsurgency operations (COIN) to that of combating near-peer threats in LSC, which requires the integration of multiple domains across all echelons of the military. As this focus shifts, so too do the threats that the military faces and therefore, its techniques and strategies must also evolve. In terms of aviation, the U.S. can no longer assume it will have air superiority in the operational environment due to the proliferation of ADA threats down to the squad and team levels. In response to the increased ADA threat, Ukraine has shifted to utilizing its aviation assets in platoon-sized elements with great increases to survivability in its conflict with Russia. If the U.S. adapts its tactics to mirror this trend, the size of the elements conducting rearming and refueling operations at one time is drastically reduced, enabling adaptations to the traditional four-point jump FARP. In LSC, aviation assets must travel increasingly farther distances from their TAAs to the FLOT and beyond, often moving distances of up to 200 km, to shape combat operations. This requires an increased need for aviation assets to refuel outside of the TAA but within 40 km of the FLOT to reach their objectives with sufficient on-station time. Because of the number of elements in a near-peer fight, aviation assets must be able to rearm and quickly return to the fight to help shape combat operations. This is never more apparent

than with attack operations utilizing AH-64s where the on-station time is critical to shaping both the close and deep areas. Another trend on the rise within modern warfare is the utilization of UAVs as illustrated in the Second Nagorno-Karabakh War and the ongoing Ukraine War.

Within the operational environment, proliferation of cheap, mass-produced commercial UAVs has occurred, as can be seen in the Second Nagorno-Karabakh War and in the Ukraine War. These UAVs drastically increase military intelligence-gathering capabilities and assist in locating the disposition and composition of forces on the battlefield. Upon identification of a target of interest, these UAVs have two options. In some instances, these UAVs have been loaded with explosives and act as a loitering munition, which can either damage or destroy the target of interest outright. This effectiveness can be seen when Azerbaijan utilized Bayraktar TB-2 UAVs during the Second Nagorno-Karabakh War to successfully destroy 120 tanks, 53 armored vehicles, and 143 towed artillery pieces over a period of 6 weeks (Kallenborn, 2022, para. 5).

The Bayraktar TB-2 UAV. Photo courtesy of Defensebridge.com.

If a UAV is not loaded with explosives and is therefore unable to directly engage a target, it can still act as an observer for intelligence gathering or guide indirect artillery fire onto the target in order to destroy it. The use of these UAVs has proven to be an essential element of strategy on both sides of the conflict in the Ukraine War. Reports indicate that along frontlines between Ukrainian and Russian forces, anywhere from 25–50 UAVs are active at a given time in a 10-km square area (Pietralunga, 2023, para. 4). Ukraine's utilization of UAVs is so widespread that they lose an average of 10,000 UAVs a month (Pietralunga, 2023, para. 1). The prevalence of these UAVs makes it unlikely for the presence of forces to remain undetected for any extended period of time. Current UAV countermeasures rely on the use of jammers for disruption or destruction purposes; however, these jammers are bulky and thus are typically only suited for defending static positions with mobile forces remaining vulnerable (Kallenborn, 2022, paras. 9–10). Aviation refuel and rearming operations are one such mobile force that is increasingly at risk due to these UAVs.

Army Aviation employs FARPs to extend the operational range of its air assets and to meet the demand for farther reach with longer on-station times. Typically, aviation employs jump FARPs, which establish themselves outside of the TAA and around 40 km behind the FLOT. A jump FARP consists of an advanced forward area refueling system (AAFARS), a 2,500-gallon modular fuel tank, two Heavy Expanded Mobility Tactical Truck (HEMTT) fuelers with a combined 5,000-gallon capacity, and any required ammunition on flat rack vehicles (Department of the Army [DA], 2018). These FARPs are readily recognizable and distinguishable as they generally consist of two parked HEMTT fuelers with a hose apparatus extending out into four fuel points and the flat rack vehicles containing ammunition all parked within a large open area of approximately 400 x 400 meters, easily accessible by aircraft (Figure). A jump FARP, on average, takes 2 hours to emplace and another 2 hours to dissemble and stage for relocation (DA, 2018, Appendix F).

Any component failures can drastically increase this emplacement time as parts would need to be transported from the TAA to the FARP location. These jump FARPS will normally operate outside of the TAA for no longer than 24 hours to support rotary-wing aircraft refueling and rearming over the course of an operation. Both the time and space requirements make jump FARPs especially vulnerable to detection and destruction by UAV and reconnaissance assets, therefore requiring modifications to meet the changing operational environment.

Aviation needs to move away from establishing large jump FARPs and instead expand on the ground forces concept of ROM. When utilizing ROM, instead of parking HEMTT fuelers in one location for a prolonged period and setting up a system of hoses to allow for fueling of multiple vehicles from one fueler, a singular HEMTT fueler positions alongside the vehicle and connects directly to that vehicle without the use of an AAFARS (DA, 2022, pp. 5–33 through 5–34). Similarly, rotary-wing aircraft can be directly refueled by HEMTT fuelers. In garrison, this operation is conducted when the aircraft are parked and shut down and is also known as cold refuel. This can be conducted while the aircraft is running (known as hot refuel) but at an increased risk of a helicopter rotor blade striking the HEMTT fueler. This risk can be mitigated through training and development of standardized operating procedures (SOPs), with an emphasis on ensuring that the HEMTT fueler remains outside of the rotor disc. Utilization of hot refuel would greatly reduce the time that the helicopter and fueler are exposed on the ground. While this method of direct hot refuel could take longer to refuel multiple aircraft, overall exposure time would be decreased as there would no longer be the requirement for FARP emplacement, certification, and disassembly prior to relocation (DA, 2022, section VI; DA, 2018).

The forward arming and refueling area would consist of one to two HEMTT fuelers and a flat rack vehicle with command and control capabilities. These vehicles

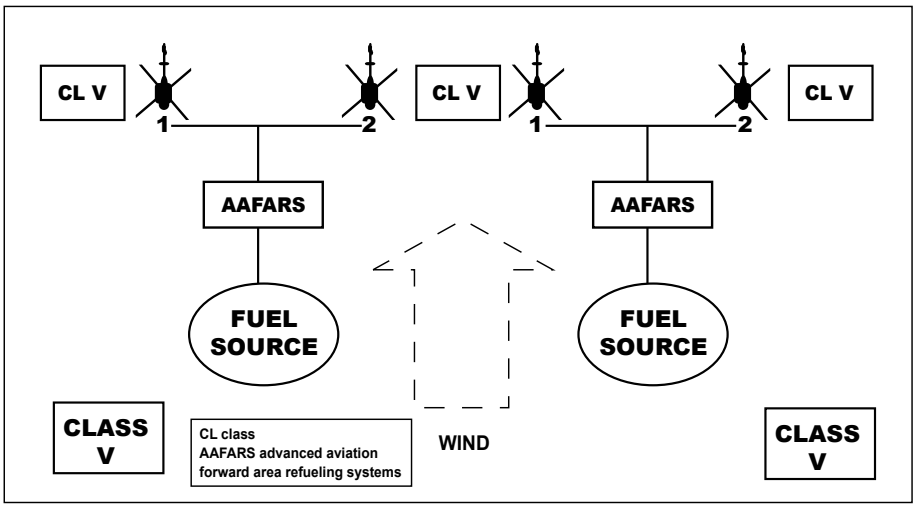

Figure. T-formation advanced aviation forward area refueling system setup (DA, 2018, p. 2–29).

can be staged under cover and concealment such as a barn, parking garage, or heavily wooded areas where the likelihood of detection by UAVs and reconnaissance assets would be minimized. Forward arming and refueling area elements would communicate location and status updates via Joint Battle Command–Platform (JBC-P)[1] to the main command post, allowing sustainment assets the flexibility of movement for survivability purposes. These locations would be communicated to aircrews during operations and intelligence briefs prior to mission or via direct communications to aircraft while on mission over JBC-P or FM radio. Aircraft would land in the vicinity of staged sustainment assets, which could then rapidly rearm and refuel the aircraft and displace immediately upon aircraft departure. This reduces exposure time of both the aircraft and sustainment assets to enemy observation and targeting, drastically increasing unit survivability. The 10th CAB tested this concept at Fort Irwin, California, during NTC 23-04 and 23-05.

During NTC 23-04 and 23-05, the 1st Attack Battalion (AB) of 10th CAB tested the forward arming and refueling area over the course of the exercise in a LSC scenario with success. Throughout the 30 days of the scenario, the forward arming and refueling area was identified only once by opposing forces (OPFOR); however, it relocated before OPFOR was able to target it (McNeil & Megerdoomian, 2023). On average, the forward arming and refueling area took 30 minutes to rearm and refuel two aircraft during the day and an hour at night, compared to the 30 to 45 minutes that it would normally take in a FARP to rearm and refuel four aircraft (McNeil & Megerdoomian, 2023). The disparity in this time was due to 1-10 AB utilizing cold refuel in the interests of safety. This time gap can be decreased by using a hot refuel method and with training on the technique to ensure Soldier familiarity with the task. The forward arming and refueling area was able to operate for 72 hours without returning to the TAA by resupplying at strategically placed forward logistics elements consisting of a 5,000-gallon fuel tank and ammunition caches. Eagle Team did note one safety concern regarding the aircraft landing to areas that were not pre-safed, which increased the risk of damage to aircraft. Overall, due to the speed, flexibility, and decreased footprint of the forward arming and refueling area, Eagle Team determined that the forward arming and refueling area concept had a higher survivability rate in a LSC environment than a standard jump FARP (McNeil & Megerdoomian, 2023).

As the Army transitions to planning for operations against near-peer threats in a LSC environment, the risk to its force increases. The proliferation of ADA and UAV threats directly endangers aviation operations, as can be observed in the Ukraine war. To increase survivability and depth of operations, aviation needs to employ nontraditional methods of sustainment. The forward arming and refueling area decreases exposure time of sustainment assets, increases speed and flexibility of positioning and repositioning, reduces footprint of the refueling area, and prolongs operation of sustainment capability away from the TAA when compared to the standard jump FARP. While the forward arming and refueling area increases the risk of damage to aircraft and fueling assets, this can be mitigated through development of SOPs and proper training. The higher survivability of the forward arming and refueling area is critical to increasing the range and time on-station for aviation assets, allowing them to have greater impact in shaping operations.

Biographies:

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[1]"JBC-P, is the Army's next-generation friendly force tracking system, equipping Soldiers with a faster satellite network, secure data encryption and advanced logistics." PEO C3T, https://peoc3t.army.mil/

Combat Aviation Brigades in the Dirt at the Combat Training Centers

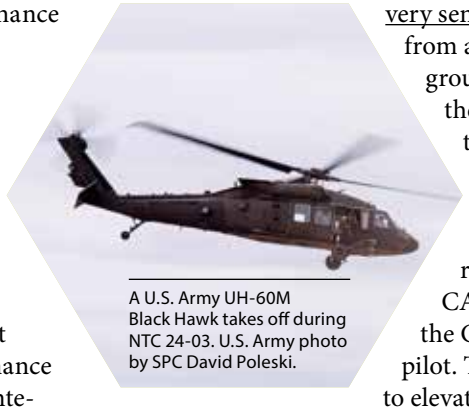
The FURY Brigade enters "the Box" at the NTC, Fort Irwin, California. U.S. Army photo by SPC David Nye.

By COL John A. Morris, III

In January 2024, the 1st Armored Division Combat Aviation Brigade (1AD CAB) had the opportunity to participate in a division-(DIV) level combat training center (CTC) rotation at the National Training Center (NTC), Fort Irwin, California. To our knowledge, this is the first time a rotation of this scale has been conducted since the years prior to WWII. With this experience behind us and the possibility of similar rotations in the future, this article will discuss the focus areas used by 1AD CAB to get ready for the NTC rotation and highlight a few gaps that will drive training across the CAB in the future.

Preparation: Based on our experience and the assessed starting proficiency of our battalions (BNs), we recommend a minimum of a 6-month dedicated preparation window to get ready for a CTC. Depending on the desired level of execution and the status of some programs across the CAB, a 12–18 month window may be required. The 1AD CAB's preparation started 18 months prior to the actual event. This process consisted of revamping major portions of the maintenance and safety programs before beginning a gated training strategy[1] focused on validation by echelon from the platoon to company level. A series of external evaluations (EXEVALS) validated the gated strategy progression.

Maintenance: First, to operate at the brigade (BDE) level during a CTC (flying two or more companies per night), the CAB must have tailored, well-organized, and lead maintenance teams. Initially, our focus started with building proficient phase teams capable of completing phases in a predicable manner that also met or surpassed the U.S. Army Forces Command (FORSCOM)-stated goals. This gave us not only a solid post-phase aircraft, but it also gave us confidence that we could provide the desired number of aircraft for the rotation without affecting the ability to maintain our bank goal or disrupting the phase program. Next, we focused on detailed maintenance management and troubleshooting at the BN/squadron (SQDN)-level to ensure unscheduled issues were addressed quickly without triggering unnecessary component replacement or wasting maintenance hours. A solid maintenance program must be the foundation of a BDE. Without appropriate leadership focus for that program early on, you will fail to achieve the desired echelon of training and will default to no higher than platoon- (4 ship) level missions. You also may be required to run BDE-level pools of aircraft to accomplish BN-level missions (more than two companies).



A U.S. Army UH-60M Black Hawk takes off during NTC 24-03. U.S. Army photo by SPC David Poleski.

Safety: Mission briefing philosophy and control measure implementation that actually mitigate risk is the second preparation area in which the 1AD CAB placed a large amount of energy. We revamped the mission briefing program after identifying issues with the process used to select briefing officers. The CAB pulled the assessment and assigning of mission briefing officers (MBOs) to the CAB commander level to standardize the selection process. This allowed the BDE leadership to enforce the idea that the MBO population was not anchored on perceived requirements, but that the MBOs were an elite group of very senior aviation leaders from across the CAB. This group of leaders assist the commanders in the management of mission risk levels. These leaders were briefed on their responsibilities by the CAB commander and the CAB standardization pilot. They were mandated to elevate risk as appropriate above the risk-common operating procedure (RCOP)-listed risk levels, based on their experience and the nature of the mission requirements. The flight risk was not the only area covered in this revamping. A ground RCOP was developed and required no lower than a company commander to sign and review every ground movement risk assessment. This quickly put a high focus on ground movements and ensured there was little to no "hidden risk" baked into convoy operations (OPS) while at home station, as well as "in the Box" at the NTC.

[1] "Gated training strategy is a model that logically outlines training progression within the U.S. Army. It ensures that soldiers and crews meet specific standards before advancing to the next level of training" (Abrams, 2016).

Gated training strategy: Jumping echelons in training progression is dangerous and that danger is very apparent during flight training. In 1AD CAB, we instituted an EXEVAL system that drove the weekly training program at the company level. The CAB developed platoon and company/troop EXEVAL windows and directed the BN/SQDN commanders to institute training glide slopes that built toward the evaluation. Battalion/SQDN commanders owned the platoon EXEVALs, and the BDE commander owned the company EXEVALs. Once the platoon achieved proficiency, validated by the BN commander, they were moved into the company-level training window. This provided time and space for each echelon to develop tactics, techniques, and procedures (TTPs) and focused planning procedures. The progression also allows multiple turns at the staff level, producing orders that are executable at the appropriate level and allow growth over time with a junior staff. Platoon missions are structured differently than BN missions, and this progression allowed appropriate learning opportunities without triggering mission failures and a loss of confidence in the planners. It also allowed a progressive increase in complexity. Team missions were run by the companies, platoon missions were executed with BN-level resources, and company-level missions were executed with support and resources from across the CAB.

Execution: In execution, a DIV-level CTC rotation is much different than a home station training opportunity. Daily interaction with the DIV/CORPS has unanticipated consequences. Daily "combat" battle rhythms, unplanned mission requirements, and the air tasking order cycle will stress the CAB's staff much more than home station training. Flexibility and structure are the keys to success. Two major items helped 1AD CAB operate in this environment successfully: (1) The integrated air planning cell, and (2) Early discussions regarding risk to mission and risk to force tradeoffs.

Integrated air planning cell: Early in the preparation phase, we discovered an issue, which was that the CAB is reliant upon the DIV to synchronize enablers to make missions into the DIV deep area successful. The G3 air cell, by structure, would have these responsibilities; however, manning and experience levels prevented the air cell from meeting the needs of the CAB. This generated the requirement to create an integration cell to co-locate with the DIV. This would cut down on refinement actions after the mission was assigned. The cell's goal was to provide a mission packet that was ready to push down to the BNs 48 hours prior to execution. To maintain the pace required by the DIV, manning constraints made this idea a necessity. The integrated air planning cell consisted of the CAB S3 (OPS and training) and 4–5 planners from across the warfighting functions. This cell integrated into the DIV planning cells to appropriately synchronize DIV- and CORPS-level enablers into the CAB's missions.

Risk to mission/risk to force: During a CTC, risk is constantly being assessed. Prior to the rotation, a necessary conversation about the balance between risk to mission and the risk to force should occur. Is the CAB located in "relative sanctuary," and what does that mean? Must the CAB conduct survivability jumps? Does every mission require a mid-point forward arming and refueling point (FARP)? Are the BNs separated or consolidated? Is the CAB Headquarters (HQs) located with the BNs or separated? Is the FARP package capable of being pushed out to support every mission, or must they stay out for multiple days? Every action has consequences, and those consequences should be known and discussed prior to reception, staging, onward movement, and integration. The answers to these questions will drive training structure 6 months prior to the rotation.

Two major topics that arose prior to the deployment that fell into the risk to mission/risk to force conversation were FARPs and maintenance. During the trainup, we identified that each BN had grown individualized FARP TTPs that become confusing to non-organic pilots as they approached the FARP pads. This induced unnecessary go-arounds as pilots attempted to gain situational awareness on the unfamiliar FARP. This problem was solved by standardizing FARP OPS at the BDE level. The trainup also identified that BNs were sharing low-density special equipment, tools, and in some cases, personnel—not only amongst themselves—but with the contract teams at home station. This triggered a conversation about the cost and benefit of geographically separating the BNs before the equipment and personnel shortages were appropriately addressed. In isolation or in a single BN rotation, none of these are issues. When multiple BNs from across the CAB deploy to the CTC, they can become compounding, output-limiting issues if not adequately addressed.

Gaps: As with any major training event, failure to identify gaps in preparation or during the execution will cause a unit to fail to learn and continue to make the same mistakes. The NTC 24-03 rotation

A 1AD CAB Soldier performs pre-flight maintenance for an upcoming mission. U.S. Army photo by SPC William Thompson.

U.S. Army CPT, Colton Hudson, conducts pre-flight checks during NTC 24-03. U.S. Army photo by SPC David Poleski.

highlighted several items that will drive the 1AD CAB's training as it prepares for a future deployment.

1) The integrated air planning cell is a requirement. The synchronization and integration required at the DIV level to make large-scale combat aviation successful requires a more robust G3 air cell than our manning levels can currently provide. During NTC 24-03, we placed the BDE S3 officer-in-charge (OIC) and a 4–5 person team at the DIV. At times, that seemed to be insufficient planning horsepower. The actual composition of the team—and the amount of expertise required—depends on the complexity of the mission and the reliability of the digital connections between the DIV and the CAB, as well as the numbers of people physically available to deploy in support of the rotation. Every decision has consequences.

2) Trainups should consist of the expected structure that will deploy. From personnel to equipment, the need to train as close to the expected reality is important. During the trainup with the DIV, the CAB failed to understand "who" was physically deploying to the NTC. This caused personnel who were not deploying to cover down on capabilities they would not provide during the rotation. It also triggered process development that would not work during the rotation. Training at the staff level had to be conducted during the rotation. This slowed down an already compressed timeline. To compound the personnel issues, the trainups relied upon fiber digital backbones that would not be available at the CTC. The digital connection instability caused major disruptions to the rehearsed timelines and forced work arounds. Although the end results were successful, "training like you plan to fight" is just as relevant at the BDE level as it is at the SQDN level. The command post (CP) exercise progression should validate personnel and equipment requirements in the integrated air planning cell, tactical CP, and the main CP to ensure all staff members understand their roles and responsibilities. Otherwise, time is unnecessarily spent during the CTC rotation in an ad-hoc manner and training battle CPs, staff planners, and liaison officers.

3) Delineation of duties between G3 air and the CAB. There are still concerns across the CAB about the requirements resident at the G3 air level vs. the augmentation needed by the CAB staff. During this rotation, G3 air was consumed with current OPS but had gaps in knowledge about all CAB functions (examples: Gray Eagle, attack OPS, and aviation sustainment). This reinforces the need to not only select the right personnel to round out the DIV air cell, but to ensure they receive appropriate training. In the DIV fight, there is a large appetite for attack aircraft in the close and deep areas. Detailed knowledge of attack helicopter capabilities is a must.

4) Liaison officer (LNO) teams at the CAB level. The 1AD CAB experience at the NTC highlights the need for robust LNO teams resident in the CAB S3 shop. During this rotation, the CAB only supported the DIV deep fight, but there was a large need to liaise with host nation units and security force assistance brigade formations working in the DIV area of OPS. During future rotations, there is the possibility that the CAB will support the deep and close fight simultaneously. This would overload the current capacity of the CAB planners and force the CAB to assume risk in the LNO requirement. This is not an ideal situation and is one that runs the risk of elevating risk levels well above the CAB commander's ability to control.

As the DIV takes its place as the unit of action across the Army, the CAB needs to review what normal looks like. Not long ago, perception anchored the primary aviation warfighter at the BN level, and the CAB functioned in a resource role. That has ended. Combat aviation brigades must be a competent warfighting HQs that are manned, equipped, and structured to integrate the BNs into the DIV fight. Planning, preparing and cross-leveling lessons learned is the path to success. The 1AD CAB is hopeful that its shared lessons learned serve to lay a small path toward greater success as it continues to help DIVs and CORPS gain greater warfighting capacity.

Biography:

COL John Morris is the 1AD CAB Commander at Fort Bliss, Texas. He has a broad range of experience across FORSCOM and U.S. European Command as a BDE S3 at 82D CAB, G3 air/Army Aviation OIC in the North Atlantic Treaty Organization Rapid Deployment Corps–Spain, Commander of 1-3 Attack BN in Katterbach, Germany, and deploying to Europe as the Regionally Aligned Forces CAB in 2022–2023.

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Attack Battalion Plan to Plan Timeline in Large-Scale Combat as Part of the Division Targeting Cycle

By LTC Lucas J. Kennedy and CPT Genevieve E. McCormick

The 1st Armored Division (1AD) executed a division-level rotation at the National Training Center (NTC) during rotation 24-03. The rotation supported U.S. Forces Command's division combat training center training goal to execute operations in a Large-Scale Combat (LSC) environment. The 1AD deployed seven command posts (CPs) to the NTC consisting of the 1AD Tactical (DTAC) CP, the 1AD Main CP, the 1AD Rear Area CP, the 1AD Mobile Command Group, the 1AD Early Entry CP, the Combat Aviation Brigade (CAB) CP, the Division Artillery CP, and the Division Sustainment Brigade CP. Each of these CPs was dispersed across the operational environment (OE). The 1-501st Attack Battalion (AB) established a tactical assembly area in the division OE, 150 kilometers (replicated) west of the division boundary. To accurately reflect this distance in the OE, mission execution included a 45-minute administrative standard use aircraft flight route, or SAAFR, and the establishment and utilization of forward arming and refueling points (FARPs) forward in the area of operations. Over the course of an 8-day air tasking order (ATO) cycle (CA-CH), the 1-501st AB companies conducted four LSC attack missions, while the battalion staff conducted four military decision-making process (MDMP) iterations under the constraint of a 24-hour planning cycle—72-hours from the target decision board (TDB) to mission execution. This forced the battalion staff to identify areas of risk within the planning cycle for acceptance by the battalion commander. The primary area of risk accepted was the condensing or omission of some MDMP steps. Due to the planning constraints encountered by units at echelon in LSC, the battalion plan to plan timeline must become a living, driving, document for all actions within the battalion. This ensures synchronization of actions and protects subordinate echelon deliberate planning and rehearsal timelines.

An Army flight medic assigned to Company Charlie, 2D Battalion, 501st Aviation Regiment, CAB, 1AD, scans the horizon overlooking a sunset during a flight to the NTC for rotation 24-03. U.S. Army photo by SPC David Poleski.

During NTC 24-03, depending on the actual time of the receipt of mission from higher headquarters, 1-501st AB planners had anywhere between 14 and 24 hours to produce an operations order (OPORD), while ensuring maximum protected planning windows for company troop leading procedures (TLPs) and rehearsals. Further modification of a premade, condensed plan to plan timeline resulted in a 5-step MDMP timeline characterized by a combined mission analysis (MA) and course of action (COA) development brief—the contract of a directed COA between the battalion commander and the staff—and the subsequent elimination of COA comparison and COA approval. Pilot duty-day constraints limited parallel planning efforts, as well as the commander's flexibility to conduct multiple briefings with his staff. With an already condensed planning timeline, any deviation by higher echelons in orders production resulted in serious "trickle-down" effects on the AB's ability to conduct bottom-up refinement and execute critical rehearsals at echelon.

The division targeting cycle is aligned with the ATO to integrate joint/operational resources to effectively engage high-payoff targets and shape the OE. In accordance with the 1AD targeting standard operating procedure, the ATO targeting cycle occurs daily during the division's execution of operations and follows the 96-hour ATO process. The NTC 24-03 rotation replicated a 72-hour construct that presented a strain on targeting cycles at echelon and illuminated problem sets consistent with "trickle-down" effects, one of which became the condensed plan to plan timeline at the AB level.

The ATO cycle orders production crosswalk (Figures 1–5) depicts the presumed timeline of all inputs, outputs, and actions from the DTAC, CAB main, and AB from receipt of mission to execution. To highlight the entire process, we will focus on the expected timeline for ATO CE. On

CE–4 days (CA), between 1500-1800L, the division TAC produces Warning Order (WARNORD) 1 (Figure 1). This WARNORD is disseminated to brigade and battalion staffs. On CE–4 days (CA) at 0400L, the division TAC produces the CE concept of operation (CONOP) (Figure 1) to be analyzed by brigade staff to provide refinement at the brigade and division target working groups (TWG) on CE–3 days (CB) between 1100-1500L (Figure 2). On CE–3 days (CB), at 0300L, the division TAC produces a refined CE CONOP (Figure 2) following the division TDB and deep operational planning team. This CONOP is analyzed by brigade and battalion staffs to provide refinement during the brigade and division TWG on CE–2 days (CC), between 1100-1500L (Figure 3). Refinement by higher echelons continues following the TWG, while the AB executes MDMP, airspace coordination, and bottom-up refinement between CE–2 days (CC) 2200L and CE–day of execution 0500L (Figures 3–4). Mission execution occurs on CE between 1500-1900L (Figure 5).

The orders production crosswalk (Figures 2–6) provides a 31-hour staffing and coordination window for the AB. During this period, the battalion staff and companies must execute MDMP, associated briefs, a combined arms rehearsal, TLPs, air mission briefs, company rehearsals, and platoon rehearsals. Pilots were constrained to a 14-hour duty day and received 10 hours of rest prior to mission execution. Leveraging pilot duty day was a top priority at the company level. This affected bottom-up refinement and provided maximum opportunity for rehearsals. Therefore, the battalion staff must produce an OPORD in close to 17 hours.

In anticipation of the condensed planning timeline expected during NTC 24-03, the 1-501st AB staff executed iterations of condensed MDMPs during company simulated training exercises and external evaluations to refine a 24-hour plan to plan timeline (from receipt of mission to orders production) and 72-hour timeline (from TDB to mission execution) for utilization at NTC 24-03 (Figure 6). This timeline was characterized by limited deadlines to achieve specified outputs in individual MDMP steps. Additionally, it combined COA analysis and wargaming with COA comparison to create a 5-step condensed timeline: receipt of mission, MA, COA development, combined COA analysis/wargaming and COA comparison, and orders production.

The proposed timeline was the initial baseline for all plans during NTC 24-03. However, with the increased pilot duty day from 12 to 14 hours while at NTC and constraints on orders production and transmission due to limited communications, compounding effects made it necessary to abridge MDMPs even further. The 1-501st AB's first mission (Figure 7) was an attack in contact with friendly forces on ATO CA. According to higher headquarters' orders production crosswalk, the battalion should have received a WARNORD on 15 January–ATO BW. However, partially due to initial command and control systems' establishment issues during deployment into the NTC's training area, "the Box," the first CA order was a CONOP received at approximately 1400L on 17 January–ATO BY. This created a 19-hour receipt of mission to orders production timeline and pushed the COA decision brief into the very early hours on the morning of 18 January–ATO BZ. This early morning brief was not generally conducive to the commander's duty day due to him flying in the mobile command group employed on every mission execution. Therefore, the commander and the battalion staff made a contract to maximize resources and manpower toward expeditious OPORD production and sufficient time for company TLPs and rehearsals at echelon. The battalion commander would provide a directed COA following the COA development brief. This impacted the plan to plan timeline by immediately eliminating the requirement for a COA decision brief. Additionally, this enabled COA analysis efforts to be dedicated solely to the more

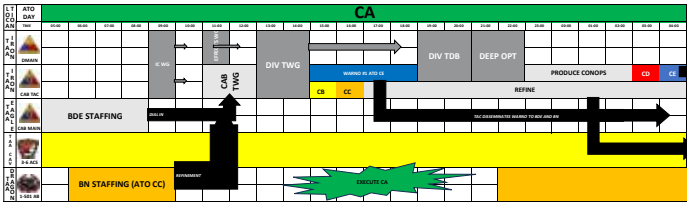

Figure 1. Air tasking order CA (CE–4 DAYS). Integrated air planning cell produces CE WARNORD 1 for dissemination to CAB and AB (1500-1800L), and the integrated air planning cell produces a concept of the operation for the CAB (0400L). Produced by the 1AD CAB operations section during NTC 24-03, January 2024.

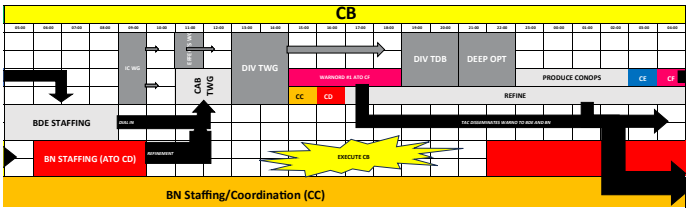

Figure 2. Air tasking order CB (CE–3 DAYS). Integrated air planning cell produces a refined CONOP for the CAB (0300L). Produced by the 1AD CAB operations section during NTC 24-03, January 2024.

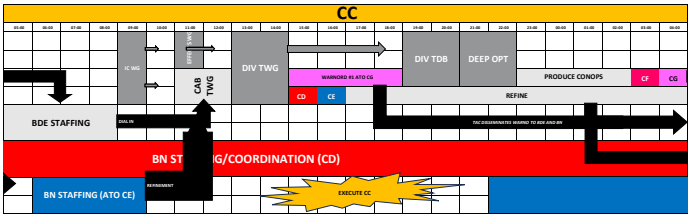

Figure 3. Air tasking order CC (CE–2 DAYS). Aviation battalion staffing of ATO CE feeds finalized targeting for CE during the CAB and division TWG (0600-1000L). The CAB produces a CONOP for the AB (1600L), and battalion staffing and coordination window begins–AB MDMP (2200L). Produced by the 1AD CAB operations section during NTC 24-03, January 2024.

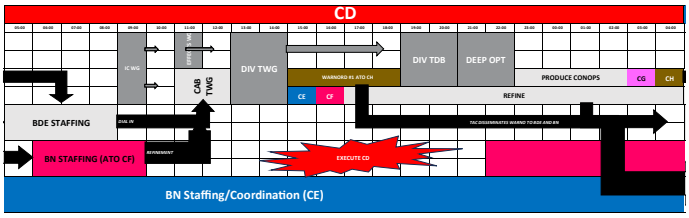

Figure 4. Air tasking order CD (CE–1 DAY). Battalion staffing and coordination window continues–AB MDMP/CO TLPs and rehearsals. The CAB produces a refined CONOP for the AB (1500L). Produced by the 1AD CAB operations section during NTC 24-03, January 2024.

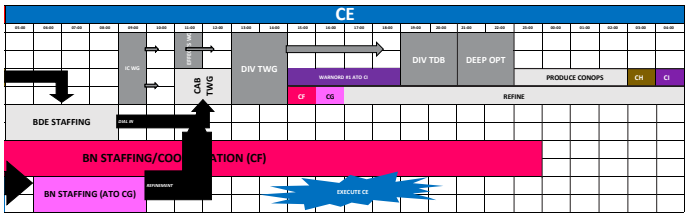

Figure 5. The ATO CE (mission execution). Mission execution (1500-1900L). Produced by the 1AD CAB operations section during NTC 24-03, January 2024.

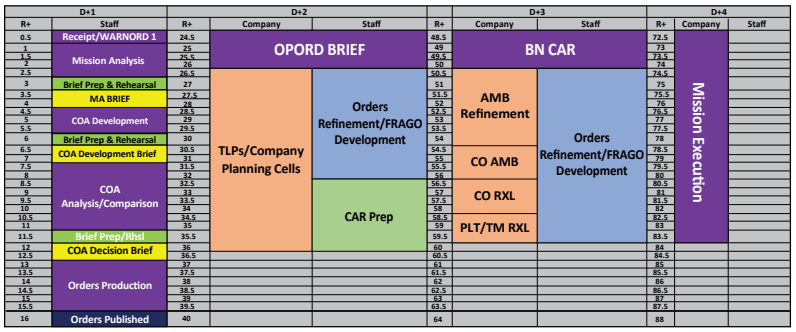

Figure 6. 1-501 AB plan to plan baseline. Produced by the 1-501st operations staff during CO external evaluations, November 2023.

detailed analysis of one COA and removed COA comparison requirements from the process entirely. As part of this contract, the staff clearly understood its responsibility to identify any holes in the directed COA and appropriate recommendations to remedy these solution sets. This flexibility provided by the battalion commander came only from a multitude of previous tactical planning iterations and his trust that the staff understood his expectations, focus areas, and requirements for mission execution.

The AB's second mission was planned for execution on ATO CC. The battalion staff first received the mission at approximately 2200L on ATO CA. The plan to plan timeline (Figure 8), back-planned off the aircrew's mission showtime of 1000L on ATO CC, left the staff with 14 hours to conduct MDMP and publish an OPORD. This MDMP iteration was largely conducted during aviators' crew rest. This recurring timeline drove a twofold solution set.

First, the decision to fight the battalion commander forward in the aircraft prevented his presence at multiple planning briefs due to duty-day constraints. Therefore, in addition to removing the COA decision brief from the plan to plan timeline, a combined MA and COA development brief became normalized. The MA portion of the brief focused on higher headquarters' mission and intent, the 1-501st AB's mission and intent, intelligence preparation of the OE, task organization, the problem statement, staff running estimates by warfighting function, commander's critical information requirements, risks to mission and force, COA evaluation criteria, and the plan to plan timeline. Upon completion of the MA brief, the staff immediately transitioned to a COA development brief, which included two different COAs and associated concept sketches defined by purpose, form of maneuver, tactical risk and mitigation, decisive point, decisive operation, shaping operation, sustaining operation, and end state. Additionally, the staff defined a communications structure and concept of sustainment to clarify the concept of support for each COA and enable immediate movement of sustainment support in preparation for the selected COA. At the brief's conclusion, the battalion commander would specify a directed COA after an in-depth discussion with the staff. At this point in the planning process, the battalion staff transitioned to an abbreviated COA analysis and wargaming, followed by orders production.

Second, we were severely restricted in integrating company planners into the MDMP process to capitalize upon parallel planning efforts. Abbreviated timelines forced battalion planners to rapidly generate COAs to deliver sufficient analysis for the commander prior to OPORD production. This affected the staff's ability to simultaneously generate multiple WARNORDs for companies. The combination of inadequate parallel planning and WARNORD publication was compensated for by providing a full 14-hour planning window for company TLPs and rehearsals. This period also capitalized on bottom-up refinement efforts. After-action reviews highlighted the battalion staff's responsibility to dictate times for company liaison officers/planners to receive a 5 to 10-minute verbal update brief to expedite future company-level planning and increase cross-unit understanding of upcoming missions. Likewise, companies should be responsible for providing representation to MA and COA development briefs. To solidify the issue of executing missions every 48 hours, these recommendations are only feasible when the aviator/planner duty day permits participation in the planning process.

The third and the fourth missions (Figure 9) permitted a 24-hour complete planning cycle for the battalion staff. This was because of the shift in a daytime mission execution window to execution over the period of darkness. Additionally, higher echelons adhered more closely to the orders production crosswalk timeline. This was attributed to increases in communications capabilities and efficiencies gained through the first iterations. Despite the increase in the MDMP execution window, the AB maintained all previous changes in the plan to plan timeline—a combined MA/COA development brief with a directed COA output—and elimination of the COA decision, COA comparison, and COA approval briefs.

After the first two planning iterations, battalion planners further refined the condensed plan to plan timeline (Figure 9) to maximize the production of a detailed, synchronized, and well-analyzed OPORD. This was defined by an approximate 7 to 8-hour MA and COA development window prior to the execution of the combined MA and COA development brief. Following receipt of the directed COA, the staff transitioned to a 7 to 8-hour abridged COA analysis and wargaming window. They used this

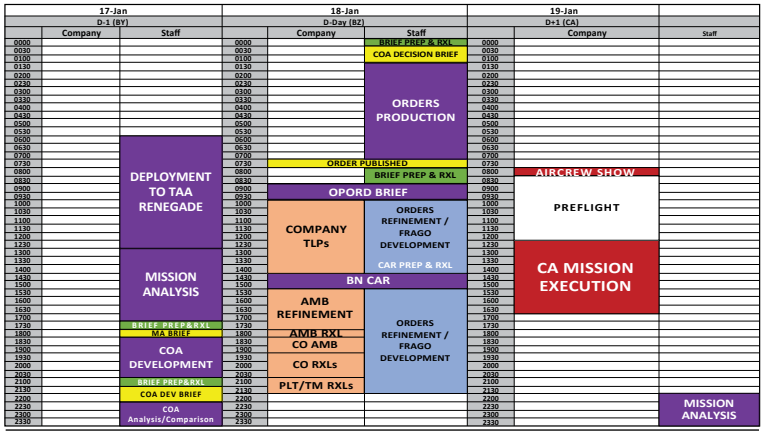

Figure 7. Mission 1 plan to plan timeline. Produced by the 1-501st operations staff during NTC 24-03, January 2024.

window to synchronize all warfighting functions and to sharpen mission timelines and fuel calculations; mitigate risk through detailed airspeed, altitude, and intervisibility analysis to combat air defense artillery threats; and conduct comprehensive attack by fire position selection. Most importantly, the staff utilized this window for the deliberate planning of FARP sequencing, which continuously proved to be the decisive operation in the LSCO fight. Upon completion of this window, the staff transitioned to the final orders production phase, an approximate 6-hour window, to create and compile all mission fighting products, graphical overlays, matrices, the aviation mission planning load, and the OPORD itself. This order was given to the companies these to some extent at combined arms rehearsals in time and space, but the battalion did not codify these into fighting products. Decision points were identified in the abbreviated COA analysis, but the decisions did not create full branch plans or sequels to planned actions and relied heavily on the real-time command and control of the commander as part of the mobile command group. The lack of more detailed analysis and COA comparison presented itself in the 1-501st AB's final mission, when the targets did not present themselves inside the planned engagement area. Due to the lack of detailed contingency planning, there were no templated secondary battle positions to address the identified enemy location.

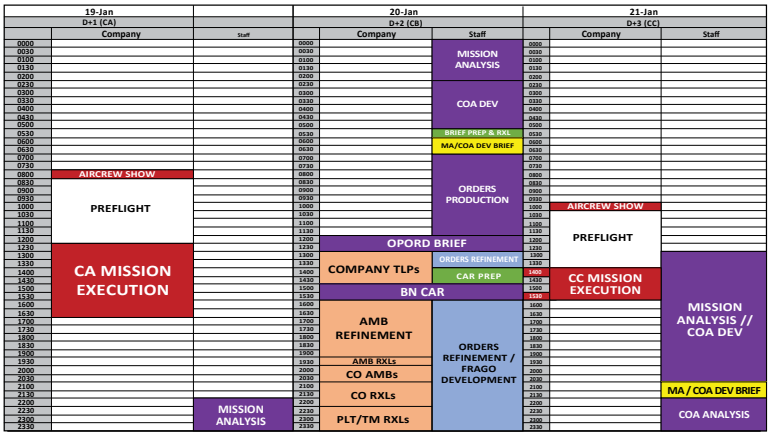

Figure 8. Mission 2 plan to plan timeline. Produced by the 1-501st operations staff during NTC 24-03, January 2024.

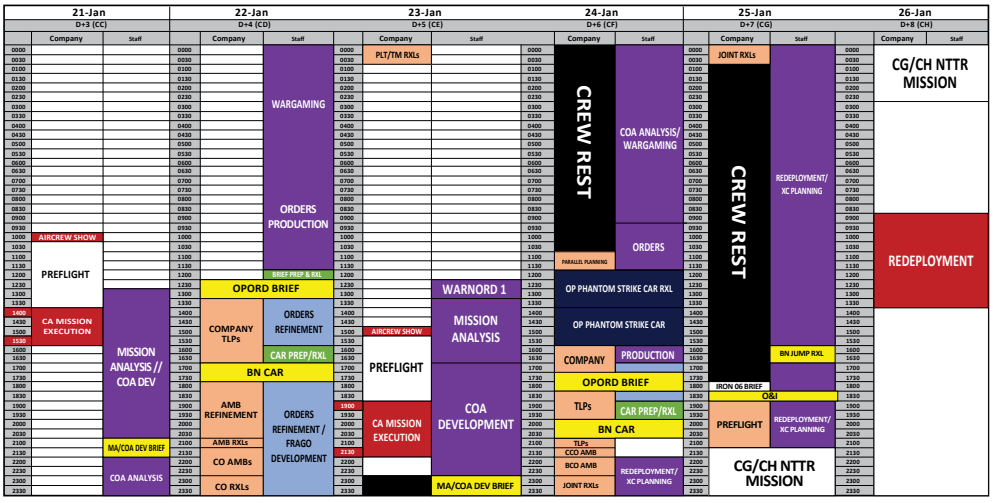

Figure 9. Mission 3 and mission 4 plan to plan timeline. Produced by the 1-501st operations staff during NTC 24-03, January 2024.

In LSC, analysis by the battalion staff and rehearsals at the company level will be the difference between mission success and unnecessary losses in combat power and lives. We found that the detailed plan to plan timeline, therefore, must serve as the action-driving document for the battalion. We provide these notes, observations, and adapted practices as "a way," and certainly do not recommend that the full MDMP be abandoned without careful consideration. The 1-501st AB's condensed version of MDMP (receipt of mission, a combined MA and COA development brief, the contract of a directed COA, abbreviated COA analysis, and orders production) proved to be highly effective and provided essential time for bottom-up refinement and rehearsals at the company level.

by means of a standard, face-to-face brief format with all corresponding paper products for distribution.

While the directed COA approach facilitated the creation of a holistic plan in a condensed timeframe, the lack of COA comparison and the abbreviated COA analysis came with accepted shortfalls in OPORDS, namely, refined decision points and the development of branches and sequels. The 1-501st AB addressed

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FIGHTING THE AVIATION SUPPORT BATTALION

By CPT Ian A. Greer, LTC Gregory S. Sterley, MAJ Andrew J. Keithley, and MAJ Michael E. Haynes

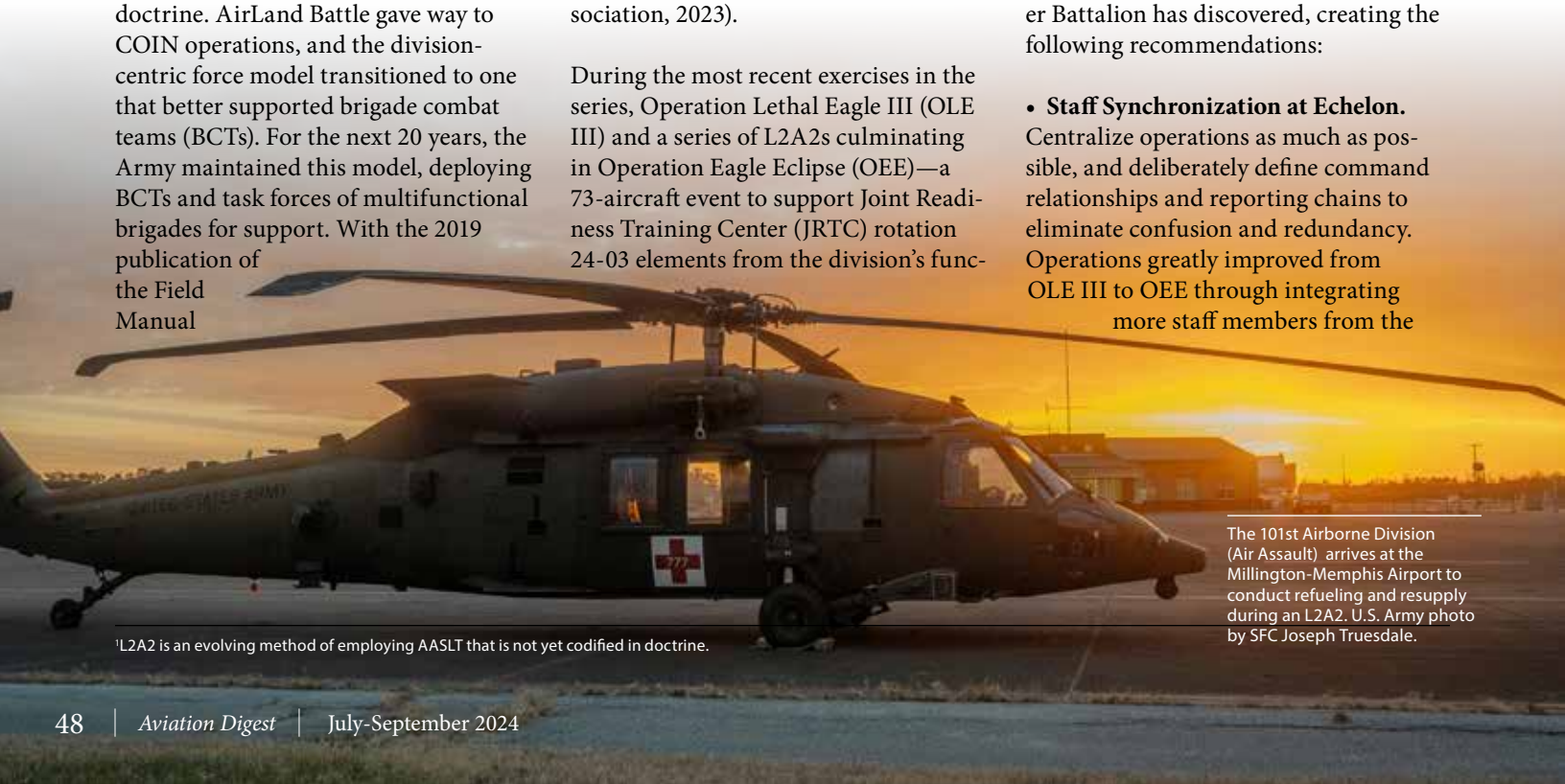
In 2003, the 603D Aviation Support Battalion (ASB) deployed with the Division Support Command to support the 3D Infantry Division in Operation Iraqi Freedom (Whalen & Knapp, 2004, p. 23). Throughout the deployment, the 603D fixed, fueled, armed, and sustained the division's combat aviation brigade (CAB) as their aircraft covered hundreds of miles of distance throughout several countries in the Middle East (Whalen & Knapp, 2004, p. 23). This distance formed the primary problem set for the 603D ASB throughout the seizure of Baghdad and subsequent sustainment operations during one of the most recent examples of Large-Scale Combat (LSC)—the seizure of Baghdad International Airport (Whalen & Knapp, 2004, p. 24). After the opening days of combat in Operation Iraqi Freedom and the airfield seizure, joint operations transitioned to counterinsurgency (COIN) and so too, did the supporting military doctrine. AirLand Battle gave way to COIN operations, and the division-centric force model transitioned to one that better supported brigade combat teams (BCTs). For the next 20 years, the Army maintained this model, deploying BCTs and task forces of multifunctional brigades for support. With the 2019 publication of the Field Manual (FM) 3-0, "Operations"; however, the Army shifted its paradigm back to LSC. Just a few years later, the Army revived the AirLand Battle line of thought as "the multidomain operations concept [that] draws from previous Army operational concepts, including AirLand Battle, Full Spectrum Operations, and Unified Land Operations" (Department of the Army [DA], 2022, p. ix). Key changes with this revision were a more formalized role of space and cyberspace in military campaigns, as well as the return to divisions as the primary unit of action (DA, 2022, p. 1–11).

To bridge a 20-year gap in operational knowledge, Fort Campbell, Kentucky, and the 101st Airborne Division (Air Assault) implemented a series of division-level field training exercises and large-scale long-range air assaults (L2A2s)[1] to provide experience required to train a division to fight in LSC (Infantry Association, 2023).

During the most recent exercises in the series, Operation Lethal Eagle III (OLE III) and a series of L2A2s culminating in Operation Eagle Eclipse (OEE)—a 73-aircraft event to support Joint Readiness Training Center (JRTC) rotation 24-03 elements from the division's functional and multifunctional brigades—trained with BCTs to replicate LSC.

While providing fuel, aviation/ground maintenance and recovery, and armament and communications provisions during each training event, the Troubleshooter Battalion (96th ASB) identified and overcame several problem sets ASBs can expect to face in LSC. Staff synchronization at echelon, multiple command relationships among support units, and efficient integration of support and aviation maintenance companies at the brigade level consistently complicated the concept of support. These division-level training exercises provided significant insights into how support units from the ASB, to include aviation maintenance and forward support companies (FSCs), support complex operations at echelons above the brigade level. Support elements in all aviation brigades can benefit from key insights that the Troubleshooter Battalion has discovered, creating the following recommendations:

- **Staff Synchronization at Echelon.** Centralize operations as much as possible, and deliberately define command relationships and reporting chains to eliminate confusion and redundancy. Operations greatly improved from OLE III to OEE through integrating more staff members from the



The 101st Airborne Division (Air Assault) arrives at the Millington-Memphis Airport to conduct refueling and resupply during an L2A2. U.S. Army photo by SFC Joseph Truesdale.

[1] L2A2 is an evolving method of employing AASLT that is not yet codified in doctrine.

101st Airborne Division, Air Assault, conducts artillery raid during OLE III. U.S. Army photo by SFC Joseph Truesdale.

same organization at each operational node; however, reporting becomes more redundant as higher echelons become involved.

• **Multiple Command Relationships.** The ASB does not share the same command relationship with subordinate FSCs as the brigade support battalion does with its subordinate support elements in a BCT. This necessitates the publication of regular updates to the brigade concept of sustainment to more effectively manage FSCs. Fostering a close relationship among the ASB and FSCs between training exercises allowed for efficiently task organizing the support companies under the ASB during mission execution with the support operations officer (SPO) or ASB S-3 (operations and training) synchronizing support efforts.

• **Aviation Maintenance Integration.** Refine the role of the aviation support company (ASC) commander during LSCO and clearly define decision-making authorities for different levels of maintenance required, including the maintenance aircraft and bump plan.[2] Operation Eagle Eclipse was the first iteration of integrating brigade-level aviation maintenance support into sustainment operations. Formalizing the command relationship between the ASB, node officers in charge, and aviation maintenance companies would overcome some of the confusion with control of aviation maintenance resources.

Staff Synchronization at Echelon

During OLE III and the L2A2s supporting JRTC 23-10, Operation Ultimate Destiny, and OEE, operations occurred in a constructed U.S. Indo-Pacific Command scenario. Each exercise replicated distances between islands with progressively more accurate scenarios that revealed unique challenges to fighting the ASB.

In OLE III, operations occurred on Fort Campbell and neighboring Hopkinsville airport for the collective infiltration and then transitioned to Fort Campbell, Fort Knox, and Wendell H. Ford Regional Training Center for the culminating exercise. Though the constructive scenario listed nearly 100 nautical miles between operational nodes, each node was within approximately half that distance, which allowed relatively centralized operations at the brigade level. However, at the ASB level, task organization was disjointed, and companies operated from three separate locations. To best replicate operations on separate islands, the battalion prioritized over-the-horizon (OTH) communications in the develops a primary (P), alternate (A), contingency (C), and emergency (E) (PACE) plan and minimized use of line-of-sight systems. The Troubleshooters soon identified shortcomings in equipment and trained personnel, as the Joint Battle Command Platform was the only OTH system organic to all companies with operators down to the platoon level. The tactical satellite radio was the next system in use. With only three radios and a much less user-friendly platform that did not allow for quick off-tuning, the battalion could only maintain communications with brigade and to a limited extent, the ASC operating on the local airfield. Effectively, the lack of personnel trained to off-tune the radios allowed their use at only two locations: the battalion main command post and one additional site. The ASB did not use the final OTH system on its modified tables of organization and equipment, high frequency (HF), because the radio waves needed a larger distance than that between operational nodes, rendering the system useless. These limitations in communication throughout the exercise led the battalion to recommend support operations be centralized when fighting the ASB organically.

During the next exercise, the L2A2 in support of JRTC rotation 23-10, the ASB conducted fueling operations more than 150 nautical miles away at Ripley Airfield (Mississippi). With the ASB only operating at two nodes—Ripley and the Brigade Operations Cell—limitations in equipment did not hinder OTH communications, but the distance did reinforce the need for OTH systems and capable

[2] A "bump plan specifies which personnel and equipment should be bumped when aircraft go down or do not arrive. If all personnel within a load cannot be lifted, they must know who is to offload and in what sequence. This ensures that key personnel are not bumped. A bump plan is designated for aircraft in each serial or flight" (Baillergeon & Sutherland, 2009).

operators at the battalion tactical command post (TAC). Lessons learned from this exercise fueled improvements in Operation Destiny Phoenix, which replicated 23-10 with a larger aircraft package and with involvement from the brigade and division staff.

The L2A2 supporting OEE, however, merged the scale of operations during OLE with the distances of 23-10 and Destiny Phoenix. Space between operational nodes exceeded 150 nautical miles, and units formed task forces to support operations at each location. Additionally, heavy division involvement in this exercise complicated reporting procedures, and elements at all echelons experienced confusion as personnel reported to node commanders and, in the case of the ASB, sustainment leaders. Moreover, this exercise was the first true integration of brigade-level consolidated aviation maintenance, which brought complications we will explore later. To meet reporting requirements, the brigade increased its OTH communications capacity through integrating new systems, such as the geospatial applications Android Tactical Assault Kit for Military (ATAK-MIL) and the Apple-compatible (IOS) Team Awareness Kit (iTAK), and HF radio into its PACE plan. The ASB followed suit.

Multiple Command Relationships

While the FSCs are not organic to the ASB, they task organized under the ASB during culminating events in each major division training exercise. In each operation, the SPO section created a command post aligned with the brigade TAC to integrate closer with the brigade operations cell and effectively manage the brigade concept of support. This also aligned the CAB with external units, such as the division support brigade (DSBs), that provided sustainment support but a lack of knowledge on large-scale aviation concepts. The lack of organizational knowledge required flexibility from the brigade SPO to align assets from both CAB FSCs and DSBs with the brigade operations. Support operations officer integration created ample opportunity for professional development of the DSB and division sustainment support battalion as the organizations learned aviation operations. This required the ASB SPO to teach and mentor all who requested the specificities of ASB support in LSC, with specific emphasis on aviation refueling/Class III (B) (bulk fuel) tracking and aviation mission planning. Due to the inaugural nature of this exercise, reporting mechanisms were very redundant, with multiple entities across the division requesting and recording different "current" sustainment postures. Multiple reporting channels created a lack of visibility to the division G4 (logistics) and sustainment brigade commander, and therefore, the air assault commander, the 101st Division Commander. Ultimately, this issue injected confusion and unnecessary redundancy into the mission. Future exercises should look to remedy this through formalizing the command relationship (COMREL) between units and clarifying report requirements and timelines to synchronize staffs at echelon.

The ATAK in the field: forging a tactical edge. Photo courtesy of the Defense Threat Reduction Agency's Chemical and Biological Technologies Department.

Aviation Maintenance Integration

The integration of brigade-level aviation maintenance into OEE was a nuanced change from previous exercises, leading to some unique insights. The initial idea entailed utilizing the commander for the ASC as a "SPO analogue" for aviation maintenance and tailoring the maintenance and bump plan to fit an operation of this scale.

The ASB faced several roadblocks with the "SPO analogue" model. To begin, the brigade operation order never formalized the COMREL between the ASB and the aviation maintenance companies in each of the other battalions. As a result, communication and coordination throughout the planning phase was disjointed because the companies tended to prioritize their battalions' current operational needs rather than the brigade's planning efforts. Additionally, the model required the ASC commander to prioritize mission planning and brigade-level coordination among a group of commanders whose primary focus was building bank time for their battalion and not necessarily planning to integrate in a unified maintenance front. The additional focus took valuable time away from running a company, which already has a low leader-to-Soldier ratio. While this is sustainable in the short term, in the longer duration it could exacerbate problems in the division's largest companies. Finally, the SPO is a well-codified and even revered position in support brigades, offering logisticians a window back to the Sustainment Enterprise when support commanders are working surrounded by Aviators, Infantrymen, or Armor officers. The aviation maintenance company commanders, on the other hand, work alongside fellow aviators, and the 15D (Aviation Maintenance Officer) designation does not cause a great separation from their 15B (Aviation Officer) peers.

Concerning responses to aircraft deficiencies, the battalion staff generated recommendations for each level of maintenance and created a tentative plan to respond to deficiencies that warranted each level. The initial definition of **"Immediate"** recovery was that the maintenance issue was minor to the point that on-site support could fix the aircraft, and the aircraft could return to mission with its original serial. **"Self"** recovery indicated a more serious maintenance action—where on-site maintenance capabilities could fix the deficiency, and the aircraft would likely not be able to support in its original serial—but could support within the same lift. **"Dedicated"** recovery, as we applied it to the exercise, would be maintenance so severe that on-site maintenance either could not remedy the issue, the aircraft would not be able to provide support until the end of the mission, or a combination of the two.

The staff then formulated recommendations and maintenance packages to provide support at each level of maintenance and to facilitate a bump plan. Immediate packages were available at all nodes except the Millington, Tennessee, airport and included a technical inspector for each mission design series (MDS) flying through the site, as well as a package of smaller parts that

could reasonably meet demands of minor deficiencies under a short suspense. Self-recovery packages existed at Monroe, Louisiana, and Alexandria, Louisiana—both nodes where aircraft scheduled shutdowns, and therefore, a more likely location to experience more significant maintenance issues. The dedicated recovery package consisted of a UH-60M stationed at Monroe, which was the center of gravity for aviation maintenance during the first night of the mission. This aircraft would respond to any maintenance issue meeting the criteria of "dedicated recovery" with a tailored, well-analyzed package of personnel and equipment required to respond to the maintenance issue. In the event of a maintenance issue beyond immediate recovery, the brigade controlling authority would also initiate a bump plan. Though centralizing the bump plan departed from traditional operating procedures in smaller air assaults where the air mission commander initiated movement, the margin of only four spare UH-60s, one spare AH-64, and one spare CH-47 necessitated careful resource allocation, and therefore, a centralized decision maker. To meet quick timeline requirements, the spare aircraft for the UH-60 and AH-64 serials integrated into the serial. The CH-47, however, planned to depart early to integrate with the sustainment node at Monroe. This allowed the flexibility to support any serial of CH-47s and to be closer to the launch decision authority. The dedicated maintenance aircraft would shuttle maintainers, as necessary, to aircraft experiencing maintenance issues at sites other than Monroe.

The 96th ASB establishes a FARP at Millington-Memphis Airport during an L2A2. U.S. Army photo by SFC Joseph Truesdale. Authors' note: While the ASB had command and control for sustainment operations in the exercise, the E/6-101st was responsible for establishing this FARP.

In execution, many aspects of the plan did not come to fruition as briefed. To begin, confusion circulated within the brigade about whether the dedicated maintenance aircraft was truly dedicated for maintenance purposes throughout the operation or if it was a spare aircraft. This would support the assault helicopter battalion's bump plan if a spare aircraft broke. While the aircraft did not launch on a maintenance support mission as on-site maintenance support and a bump plan could resolve most issues, this confusion and the aircraft's activation as a spare could be detrimental to the maintenance plan for the other MDSs. Too early of a launch would rob the brigade of a flexible contact team capable of delivering maintenance assets anywhere within a UH-60's normal range. Moreover, the AH-64 and CH-47 bump plan included fewer spare aircraft, and the AH-64 was unable to transport its own maintainers. Resultantly, battalion commanders stood at odds with the aircraft's role in the mission.

Conclusion

As the Army's operational paradigm shifts from COIN back to LSC, division support units must find ways to accommodate operations of a far more massive scale than have occurred in the past 20 years. The OLE series and successive iterations of the L2A2 presented excellent training opportunities to identify shortfalls and implement solutions prior to conducting such operations in combat. The Troubleshooter Battalion took full advantage of each exercise, identifying shortfalls and bridging knowledge and experience gaps within the division. Each iteration allowed the ASB to streamline its command and control and act as a liaison with higher echelons to build institutional knowledge about supporting division-level operations. Later exercises incorporated novel implementations of aviation maintenance that identified several shortfalls in the concept of support unique to the ASB. The Troubleshooters will continue to streamline command and control, advocate to formalize command relationships in various support units, and develop a brigade-level approach to aviation maintenance support in future training.

Biographies:

CPT Ian Greer is currently assigned as the Company Commander for HHC, 5-101st AHB. He previously served as the Battalion Operations Officer in the 96th ASB. CPT Greer graduated from the United States Military Academy in 2018 with a bachelor's degree in physics. His operational assignments include a Platoon Leader and an Assistant Operations Officer in the 2916th Aviation Battalion at Fort Irwin, California; Chief of Plans in the 96th ASB; and the 96th ASB Operations Officer. CPT Greer holds qualifications in the UH-60M, UH-60L, and LUH-72.

LTC Gregory Sterley is the current Battalion Commander of the 96th ASB. He is a graduate of Bowling Green State University, Ohio, and the Air Command and Staff College. His previous assignments include Executive Officer, 110th Aviation Brigade; Operations Officer, 1-14th Aviation Regiment and 1-101st Aviation Regiment; and Company Commander for Company B, 96th ASB and Company D, 4-227th Aviation Regiment. LTC Sterley holds qualifications in the AH64D/E as an Instructor Pilot, Maintenance Test Pilot, and Maintenance Examiner.

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MAJ Michael Haynes is the commander of Company B, 96th ASB. He is a Senior Army Aviator qualified in the UH-60 A/L/M. He served as a platoon leader, commander, instructor, and is a Command and General Staff College graduate. He holds a bachelor's degree in political science and a Master of Operational Studies.

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Sundown maintenance being performed during an international combat exercise at Gulfport Combat Readiness Center, Gulfport, Mississippi. U.S. Army National Guard photo by SGT Jovi Prevot.

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