Aviation DIGEST

UNITED STATES ARMY

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MASTERING THE FUNDAMENTALS

IN THIS ISSUE:

THE PROFESSIONAL BULLETIN OF THE ARMY AVIATION BRANCH

UNITED STATES ARMY Aviation DIGEST

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Volume 11/Issue 4

About the Cover:

U.S. Army Aviation brigade and paratroopers train on Cyprus. U.S. Army photo by MAJ Robert Fellingham.

The Command Corner

MASTERING THE FUNDAMENTALS

As we continuously transform our Army to fight in large-scale combat operations (LSCO), we cannot lose sight of the basics. To use a football analogy, we must practice and perfect our blocking and tackling techniques.

Army Aviation must have a similar mindset. Our Soldiers, noncommissioned officers, and officers must master the fundamentals. You may hear it framed as being technically and tactically proficient while our new Sergeant Major of the Army calls it "being brilliant at the basics."

To develop this brilliance, rigorous training is required. For example, the Aviation Basic Officer Leader Course (ABOLC-B) provides newly commissioned Lieutenants with requisite technical, tactical, leadership, and general knowledge of common military subjects and combined arms training to effectively serve as platoon leaders in all components. The course emphasizes Troop Leading Procedures, warfighting, sustainment and maintenance, and leader development. Similarly, Basic Combat Training develops Soldiers proficient in basic Soldier skills required to operate in all environments. They become confident teammates who possess the character and commitment to live the Army Values and Warrior ethos while developing discipline, physical fitness, and adaptive thinking skills, making them ready to fight and win when called. Both courses are aimed at providing our new Soldiers and leaders with the physical and mental skills required for their first assignments.

Mastering the fundamentals does not stop there, however. It is only the beginning. As our Soldiers and leaders progress through their subsequent professional military education (PME) or functional training, the basics continue to be a focus while expanding the skills necessary to execute crew, collective, and combined arms training, and operations. The foundation for executing collective training remains the mastery of the basics. Formations should not progress to the next level of training unless they demonstrate proficiency of the current level. This training is an iterative process that require the necessary "sets and reps" to develop the tactical and technical "muscle memory" to perform instinctively. Being brilliant at the basics allows for formations to build upon those foundational skills to move to higher level training more rapidly. Every step on the ladder is assessed by a leader empowered to pass the Soldier or unit or require retraining. Professional military education and functional training then reinforce skills gained, but the touch points with our leaders are limited and fleeting. Our Soldiers and leaders must also leverage self-development opportunities to master the fundamentals.

Field Manual 6-22, "Developing Leaders," states that self-development is key in developing leaders of all cohorts. It bridges the gap between operational and institutional domains. Soldiers must commit to studying and learning on their own. Learning is a lifelong process with self-development enabling the individual's continuous growth beyond institutional and operational assignments. Self-development supports mastering the fundamentals by reinforcing and expanding the depth and breadth of basic knowledge developed in PME and functional training through structured and guided self-development courses, while encouraging personal self-development through enrollment and participation in college or credential programs. Leaders should encourage reading and writing articles for professional publications such as *Army Aviation Digest*, as well as participating in blogs, conferences, and online discussions with others in the profession of arms. And that profession of arms should not be limited to only Aviation. Having an open dialogue with other combined arms team members is beneficial and encouraged.

We all have a lot to learn. This journey of lifelong learning starts with your initial entry training and continues throughout your career, but every step of that journey must always include mastering the fundamentals and being brilliant at the basics.

This We'll Defend!

Fly Army! Above the Best!

Michael C. McCurry
Major General, USA
Commanding

UH-60 Black Hawk helicopters fly by during Swift Response 21 at Babadag Training Area, Romania. U.S. Army photo by SGT Randis Monroe.

Aviation DIGEST

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https://home.army.mil/novosel/index.php/aviationdigest

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.

Please note that *Aviation Digest* does not accept previously published work or simultaneous submissions. This prevents an overlap of material in like publications with a similar or same audience.

Aviation Digest is an open-source publication. As such, we do not accept articles containing For Official Use Only or Classified materials. Please do not submit articles containing Operations Security (OPSEC) violations. If possible, have articles reviewed by an OPSEC officer prior to submission.

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.

Non-military authors should submit authorization for *Aviation Digest* to print their material. This can be an email stating that *Aviation Digest* has permission to print the submitted article. Additionally, the author should provide a separate comment indicating that there is no copyright restriction on the use of the submitted material.

Our publication schedule and author deadlines are as follows:

January-March 2024 (published on or around January 15, 2024). Content for this issue is complete.

April-June 2023 (published on or around May 15, 2024). Accepting articles now through February 15, 2024.

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

A Commander's Farewell

This being my last issue of the *Digest*, I would like to take a few moments and relay some useful lessons learned to the next generation of leaders. I have seen an immense amount in my 33.8 years of service and think the following will resonate with all of you. My professional journey has taken me from a 19-year-old Private 67N, UH-1 Crew Chief—fresh out of Yano Hall, to a COL in the finest, most lethal branch in the Army. During my time, I have seen aircraft development and divestiture, force modernization, conflict, and peace. Through it all, the one constant is the need to train hard for the next looming mission: large-scale combat operations (LSCO) with a level of lethality that has yet to be observed. The next fight will be an all-in venture, requiring the formations of all COMPOS, all branches of service, and all our allies to safeguard mission success. As a branch at echelon, we must train hard in challenging environments and modes—particularly with mixed-mission design series and under night-vision goggle conditions—while getting comfortable with repeating training repetitions and sets. We need to adopt a mindset of not getting it right only once but the mindset of getting it right all the time, in every mission set. Ask yourself every day, "am I—my squad, my team, my platoon, my company, my battalion—ready to **fight and win** *the first time* in LSCO?" If not, what can you do as a leader to change the environment, and do you understand both the risk of being untrained and the inherent, yet necessary, risk of the training required? Dive into the Army Training Network and understand you cannot do this alone.

Seek mindful mentors, solicit leaders who inspire and motivate you, and look for leaders who spark something in you, regardless of their rank. Find those leaders who will push you beyond your limits because *those* are the leaders who will help you grow. Mentors should pour into you—and you must be ready and receptive when they do. One of the most beneficial aspects of mentorship—both as a mentor and a mentee—will be the lessons you learn *about yourself*. Get better, get sharper, and get stronger every day.

As you progress in your aviation military career and beyond, always be an advocate for our Army and our branch. Recommend only the best, share the benefits of service, and emphasize the commitment to something greater than our individual selves. Tell *your* Army story. As an Army leader, your advice, your guidance, and your voice carry weight. Your mere presence will exert influence—be mindful and certain to use that influence for the greater good. Make your voice the catalyst that inspires others toward *leadership excellence*! Our Nation's defense rests on the shoulders of competent leaders of character who are comfortable with complexity and capable of operating from the tactical to the strategic level both inside a platform and out. Witnessing leadership operating across the Enterprise, I am confident that each of you are ready to meet the challenges our changing world presents and to lead Army Aviation into that future. Remember, you oversee and transport some of our Nation's most precious resource in our aircraft: it's sons and daughters—pilots, crewmembers, maintainers, and passengers.

Before I step away, I want to leave you with a few items I have carried in my figurative rucksack since I was a young Soldier, passed on to me by my collection of old Army mentors: officers, warrant officers, and noncommissioned officers. First, **BE**, **KNOW**, and **DO**.

BE: Be the *best* you can be personally, physically, and mentally while always seeking knowledge.

KNOW: Know your aircraft, role, task, purpose, and mission. Eighty percent of combat operation happens before we hit the **Start** button. Do we know our mission-essential tasks, Combined Arms Training Strategies, and have the right reps at the right time based on our unit's ability, readiness levels, and associated risk?

DO: Do what is necessary to develop subordinate leaders who can adapt and excel in the most demanding combat environments. Train hard collectively at echelon because the crucible of LSCO is unforgiving for the untrained.

Next, always remember the "BIG 5":

1. Be at the right place at the right time. Leadership is a contact sport and requires your actual presence, not via digital. Always be in a mission-ready posture.

2. Always be ready to fight and win the first time around using the 7 Aviation Core Competencies.

3. Lead from the front: Be, Know, Do. Remember your Oath and reflect on it often.

4. Teach, coach, mentor, and learn every day. Train hard and understand the risk associated.

5. Be all you can be, drive change, develop leaders, and *WIN*.

Ultimately, always remember that the ground forces are our primary customer — supporting them is our number one mission.

Eric C. Puls
Colonel, Aviation (Ret.)
Former Director of Training and Doctrine

Notices to Air Missions (NOTAMs)

U.S. ARMY

What you need to know about the Directorate of Training and Doctrine's (DOTD's) efforts

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

The Directorate of Training and Doctrine continues to serve as a catalyst for change within the U.S. Army Aviation Branch. Our priority efforts include revising the Aviation Training Strategy and Flying Hour Model, adjusting the aviation's Risk Common Operational Picture to capture compounding risk, analyzing Aviation Mission Survivability multi-ship maneuvers, developing objective crew readiness standards that inform training readiness standards, transforming Warrant Officer professional military education, and continuing to refine and update our doctrine.

Since the last *Digest*, Training Circular (TC) 3-04.3, "Aviation Gunnery," and TC 3-04.9, "Commander's Aviation Mission Survivability Program," revisions have posted to the Army Publishing Directorate, and Field Manual 3-04, "Army Aviation," is in final chapter-by-chapter adjudication with the U.S. Army Aviation Center of Excellence Commanding General. We always welcome feedback on any of our doctrinal publications – Points of contact are in the address section of the NOTAMs. Send us your notes on what you like and what you recommend be changed in the next editions!

Training Division Chief (Mr. Bo Thurman):

The Directorate's Training Division continues to work multiple efforts as we transform Army Aviation. A major initiative our Officer Training Branch continues to work is the Warrant Officer Modernization plan that includes a transformation of the Warrant Officer Professional Military Education (PME) training path. This will include the development of a W2 PME Course and the creation of an institutional Maintenance Examiner Course. Our New Systems Integration Branch also continues to work several modernization efforts as the Army continues to upgrade current and future systems and sub-systems. We also continue to modernize our Educational Technologies Branch with capabilities in the development of 3D production to enhance current and future training products for the Enterprise.

If you have questions pertaining to any of our efforts, you can reach out to the Training Division at usarmy.novosel.avncoe.mbx.dotd-training-division@army.mil

If you need access the Aircrew Training Manuals, they can be located at the following common access card-enabled link: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Flight-Training-Branch.aspx?csf=1&web=1&e=F0v0Uz

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The Aircraft Pneudraulics Repairer MOS 15H survey will close 13 February 2024.

Participants can access the survey using the link or QR code below: https://survey.tradoc.army.mil/EFM/se/0AFDD71A63CB945D

The Aircraft Powerplant Repairer MOS 15B survey will close 22 April 2024.

Participants can access the survey using the link or QR code below: https://survey.tradoc.army.mil/EFM/se/0AFDD71A7707CF89

The Avionic Mechanic MOS 15N survey will close 30 June 2024.

Participants can access the survey using the link or QR code below: https://survey.tradoc.army.mil/EFM/se/0AFDD71A275E9210

Enlisted Training Branch

(Branch Chief: Mr. Morris Anderson):

The Directorate of Training and Doctrine (DOTD) Enlisted Training Branch (ETB) successfully conducted a virtual 15M unmanned aircraft systems (UAS) Repairer Critical Task Site Selection Board (CTSSB) from 22-25 May 2023, consisting of Soldiers from different regions/time zones including South Korea. The board participants included subject matter expert (SME) voting members from the United States Army Forces Command (FORSCOM), United States Army Pacific Command (PACOM), SMEs from Fort Novosel Noncommissioned Officer Academy (NCOA), 2-13th Aviation Training Developers, Quality Assurance Office (QAO) representatives, and the U.S. Army Aviation Center of Excellence (USAACE) Training SGM.

The voting members selected by FORSCOM and PACOM consisted of experienced and well-rounded Soldiers from COMPO 1 serving in various aviation assignments across the Army Aviation Enterprise from SGT to 1SG. The board members participated in engaging discussions on critical tasks from an Aviation doctrine and personal experience perspective. Throughout the CTSSB process, it was evident the amount of dedication and commitment by the voting board members to enhance the training for their Soldiers and the future of the 15M military occupational specialty (MOS). The following is a summary of the 15M CTSSB the ETB implemented during the 3rd quarter of Fiscal Year 2023:

- MQ-1 UAS Repairer (15E) CTSSB results: convened on 22-25 May 2023 at Fort Novosel, Alabama, consisting of seven E-5 through E-7 voting members who voted on 150 Tasks, 29 Tasks removed, 57 Tasks Institutional Domain, 64 Task Operational

Domain. The board results will shape future training for Gray Eagle UAS Repairers at IET, 15M unit training, and their organization Aviation Maintenance Training Program.

The 15M CTSSB offered more than a way of identifying critical tasks required for the MOS. It provided insight into potential training gaps at the Institutional Domain regarding Soldier equipment and training. The tone of this board proceeding continues to set a standard for other CMFs to emulate regarding the professionalism and mission focus these group of leaders reflected. The participation from NCOA and IET School SMEs was nothing less than OUTSTANDING. The ETB execution of the 15M CTSSB to support the USAACE mission continues to be a resounding success.

Flight Training Branch (Branch Chief: CW5 Lucas Abeln):

The Flight Training Branch (FTB) has added a folder containing historical Aircrew Coordination Training to FTB's SharePoint page at https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTDRUCKER/SitePages/Flight-Training-Branch.aspx. The folder is for reference purposes only.

Aircrews are required to complete the current year's training in accordance with Training Circular 3-04.11: "Annual Sustainment Training." All ACMs are required to complete the training each ATP year. ACT sustainment material is updated at the beginning of each calendar year and can be found at the DOTD FTB website. We have added a folder containing historical Aircrew Coordination Training to FTB's SharePoint page at https://armyeitaas.sharepoint-mil.us/sites/TR-ACOE-DOTDRUCKER/SitePages/Flight-Training-Branch.aspx. The folder is for reference purposes only.

Officer Training Branch (Branch Chief: Mr. Andrew Mars):

As you know from previous issues, the new Aviation Captain Career Course (AVC3) has a Combined Arms Center Common Core Distributed Learning (C5DL) phase. While students are supposed to be enrolled in the course automatically upon promotion to 1LT, this is not happening for everyone. Students must complete the C5DL prior to attending resident phases for both the active and reserve AVC3 courses. The new dates for the AVC3 reserve course have been posted in Army Training Requirements and Resource System. The phases show out of order currently, but will be corrected in October to the new naming: Phase 1 DL, Phase 2 Resident, Phase 3 Resident.

No updates on Warrant Officer Professional Military Education Modernization. Final decisions will be given in January 2024.

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

Move over, Field Manual (FM) 3-0, "Operations"–the newest major doctrinal update in town is now the FM 3-90, "Tactics," which was released effective 1 May 2023! Doctrine and Tactics is still working its way through digesting its 480 pages, ensuring we nest aviation's tactical manual, Army Techniques Publication 3-04.1, "Aviation Tactical Employment," into FM 3-90's major updates. Expect to see an article in a future issue discussing aviation implications more in-depth, but here are the wavetops updates:

The Army's new **tactical framework**, through which all offensive and defensive operations are described, is: **Find, Fix, Finish,** and **Follow Through**.

Actions on Contact is now simplified to 4 steps: **React, Develop the Situation, Choose an Action,** and **Execute and Report**.

Defeat is no longer a tactical mission task; it was too vague anyway.

New types of enabling operations are: **mobility, countermobility, link-up,** and **tactical deception (TAC-D)**; expect aviation to contribute significantly to TAC-D.

Encirclement was removed as an enabling operation; it requires special planning (whether to encircle the enemy or break-out from an enemy encirclement) and now is described in an appendix.

The old "forms of the defense" (defense of a linear obstacle, perimeter defense, and reverse slope defense) are now **variations of an Area Defense**.

Tactical Mission Tasks are no longer broken up by "actions by friendly forces" vs. "effects on enemy forces."

Engagement Area Planning steps 4-6 were adjusted to emphasize that obstacles reinforce direct and indirect fire plans.

If you'd like to listen to the FM 3-90 lead author brief us on the updates, go to the USAACE LSCO LPD Classes Microsoft Teams, "DOCTRINE OUTREACH-e.g., FM 3-0, FM 3-90" channel, or you can check out their interviews on the Combined Arms Center's Breaking Doctrine podcast.

Tactics Branch (Branch Chief: CPT John [Logan] Meehan):

Our Lessons Learned Team would like to recognize and commend the support of the 4th Combat Aviation Brigade and 1st Armored Division Combat Aviation Brigade for hosting members of DOTD at their Brigade Field Training Exercise and Post Deployment Collection Visit. Valuable insights and lessons were garnered from these experiences and will be used to shape and inform future doctrine, collective training, and deployment preparations. We are always looking for new opportunities to observe and learn from the force. Tactics Branch at DOTD strives to gather, integrate, and disseminate current best practices; tactics, techniques, and procedures; challenges; and

perspectives from across the Aviation Branch. The "Lessons Learned" section of our SharePoint serves as a resource to units as they prepare for missions, exercises, and deployments, with recent additions including outputs from Warfighter Exercise 23-4, TF NO MERCY's CENTCOM deployment, 82D CAB's JRTC rotation 23-07, and more. Please send us your unit's products to be published on SharePoint, CALL, and JLLS to enable and enhance success across the force.

The Collective Team works within Tactics Branch, and is already working on FY24 Unit Task Lists, Mission Essential Tasks, and Combined Arms Training Strategies. Feedback from the operating force is vital to ensure that tasks remain relevant and correct. Provide any feedback to usarmy.rucker.avncoe.mbx.dotd-collective@army.mil, and we will get back to you ASAP to make appropriate additions and revisions.

DOTD Tactics Branch Lessons Learned SharePoint Link: https://armyeitaas.sharepoint-mil.us/sites/TR-ACOEDOTDRUCKER/SitePages/Tactics-%26-Lessons-Learned.aspx

Doctrine Branch (Branch Chief: CPT Ashley Howard):

The Doctrine Branch continues to shape the channels of change with revision across all aviation publications with widespread impacts stemming from updates to Field Manual (FM) 3-04, "Army Aviation," and Army Techniques Publication (ATP) 3-04.1, "Aviation Tactical Employment," as the foundational documents for understanding aviation's role in the latest concept of multi-domain operations. Particular thanks are owed to the observer-coach/trainers at both the Joint Readiness Training Center and the National Training Center, who allowed our revision team to borrow their time and their expertise to identify the critical points of change required in our operational doctrine. Thanks to their feedback on the hard lessons learned at the Combat Training Centers, these next revisions promise to be more readily employable and rapidly digestible amid the deluge of doctrinal change leaders at all levels are trying to digest. Revisions closed this summer in anticipation of publication late this fall. Keep an eye out for digital "knee-board cards" for these publications available for reference in the New Year!

Recent releases: Training Circular (TC) 3-04.9, "Commander's Aviation Mission Survivability Program," and TC 3-04.3, "Aviation Gunnery."

Additional pending releases include ATP 3-04.16, "Airfield Operations," TC 3-04.5, "Instrument Flight for Army Aviators," and TC 3-04.71, "Commander's Aviation Maintenance Training Program," and aviation maintenance and safety standard operating procedures (SOP).

Have an idea on how Army Aviation can do business better? Now is the time to submit documented, well thought-out changes! Submit a Department of the Army Form 2028 today to usarmy.novosel.avncoe.mbx.doctrinebranch@army.mil

Particular areas of interest are: Forward arming and refueling points, aviation sustainment in maritime operations, and command and control as far forward as the division deep area.

Anticipate a new risk common operating picture (RCOP) version to drop with enhanced compounding risk considerations this fall. Updates will include changes to the RCOP, instructions, and annual mission briefing officer/final mission approval authority training. Additionally, look for an updated Aviation Branch Maintenance SOP and *new* Aviation Branch Safety SOP before the 2024 holiday season.

Be sure to visit the Army Publishing Directorate, or APD, to acquire current aviation doctrine. Additionally, the Aviation Branch Operations SOP (ABOS) with Annexes A: *Aviation Handbook, B: BAO and LNO Handbook [Brigade Aviation Officer and Liaison Officer Handbook], C: RCOP,* and supporting instructions as of 01 November 2022 can all be found on the USAACE DOTD SharePoint page. Anticipate a revised RCOP with enhanced features for addressing compounding risk in October 2023. See the address book below for more details.

Doctrine Branch welcomed CW4 Santiago "Rocky" Garcia to the sustainment team and back to active duty after a temporary retirement from federal service. Looking for a fulfilling career move with an unlimited potential to make a difference? The Directorate of Training and Doctrine is always seeking innovative, diligent minds to shape the future of aviation doctrine. Contact us today for a unique job opportunity here at Fort Novosel!

Gunnery Branch (Branch Chief: CW4 Steve Dickson):

It's here! The new Training Circular (TC) 3-04.3, "Aviation Gunnery" manual was released on 27 June 2023, and you can access the change brief on our NIPR Intelink. It includes major updates to unmanned aerial systems and door gunnery programs, with additional changes affecting collective gunnery tables across all airframes. These changes will effectively develop Army Aviators across the force in conducting aerial gunnery training and execution of live-fire events in the future. The Gunnery Branch will continuously evaluate feedback from all components for future revisions. If there are changes you would like to see or new ideas that would improve gunnery program implementation, please send us a Department of the Army Form 2028. We'd love to hear your feedback!

With the new TC 3-04.3, the Gunnery Branch is looking to assist Army Aviation units during gunnery program implementation and live-fire events. We are interested in collecting data as to how the new TC 3-04.3 is impacting aviation units, as well as any constraints that units may have relating to resources required for gunnery execution. Site assistance visits are the best way to gather the insights and data we are looking for, such as issues arising from geographical location, range constraints/availability, Standards in Training Commission, targets, aerial weapons scoring system, etc. The Gunnery Branch is willing to travel anywhere in the world; our team of highly experienced professionals can further refine your gunnery programs, assist in planning of gunnery live-fire exercises, provide feedback of combat training center exercises, and prepare for ARMS/Directorate of Evaluation and Standardization inspections. Don't hesitate to reach out (our contact information is in the address section) and schedule a site assistance visit. You'll be glad you did!

Address Book:

Fort Novosel has gone through several SharePoint migrations in the past year. The active DOTD public-facing SharePoint is: https://army-eitaas.sharepoint-mil.us/sites/TR-ACOE-DOTDRUCKER

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

Aviation Training Strategy: https://intranet.tradoc.army.mil/sites/usaacedotd/Shared%20Documents/FHP%20spreadsheets/Army%20Avn%20Tng%20Strategy%20Jan%202020.pdf

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/sites/TR-ACoE-DOTD/SitePages/Directorate-of-Training-and-Doctrine.aspx?csf=1&web=1&e=zabyEd

DOTD Public Site (legacy): https://intranet.tradoc.army.mil/sites/usaacedotd/

- Training: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Training.aspx?csf=1&web=1&e=c1FwlT
- DTAC: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/DTAC.aspx?csf=1&web=1&e=7hbMcT

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: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Educational%20Technologies%20Branch.aspx?csf=1&web=1&e=Z3Fc7M

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: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Enlisted-Training-Branch. aspx?csf=1&web=1&e=g2Jcm9

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: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Flight-Training-Branch.aspx?csf=1&web=1&e=F0v0Uz

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: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Flight-Training-Integration-Branch.aspx?csf=1&web=1&e=IzdUmH

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: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/New-Systems-Integration-Branch.aspx?csf=1&web=1&e=rjpaU0

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

- Branch Chief: Mr. Andrew Mars at 334-255-0433 or andrew.s.mars.civ@army.mil
- TRADOC SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Officer-Training-Branch.aspx?csf=1&web=1&e=cEfDnt

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?csf=1&web=1&e=0PGyMu

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: CPT Ashley Howard at 334-255-1796 or ashley.h.howard.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: from the TRADOC SharePoint homepage, click "documents" on the left, then "ARCHIVE," then "Living Doctrine."

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: CPT John (Logan) Meehan at 334-255-1252 or john.l.meehan@army.mil
- Group Mailbox: usarmy.novosel.avncoe.mbx.dotd-dtac-division
- SharePoint: https://armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/DTAC.aspx?csf=1&web=1&e=7hbMcT
- *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
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- Intelinks NIPR/SIPR: https://intelshare.intelink.gov/sites/army-ams/ / 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 / https://intelshare.intelink.sgov.gov/sites/GunneryBranch

Editor's note:
I've received several inquiries regarding the Intrepid 6 Reading List mentioned by USAACE Commanding General, MG Michael C. McCurry, in the October-December 2022 issue's Command Corner section. We are happy to provide you with the printed list below.

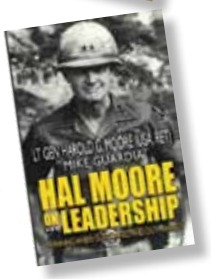
USAACE CG's Reading List

Army Aviation

- *A History of Army Aviation From Its Beginnings to the War on Terror* by Dr James E. Williams.
- *Fighting the Flying Circus* by Captain Edward V. Rickenbacker
- *The Aviators (Brotherhood of War, Book 8)* by W. E. B. Griffin
- *Dustoff: The Memoir of an Army Aviator* by CW4 (Ret.) Michael Novosel
- *Cowboys Over Iraq* by COL (Ret.) Jimmy Blackmon

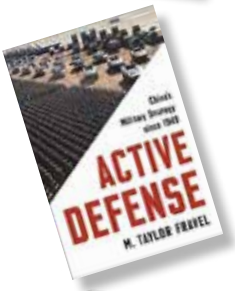
History of Warfare

- *The Regulars: The American Army, 1898-1941* by Edward "Mac" Coffman
- *American Soldiers: Ground Combat in the World Wars, Korea, and Vietnam* by Peter Kindsvatter
- *Kevlar Legions: The Transformation of the U.S. Army, 1989–2005* by John Sloan Brown
- *Military Service and American Democracy: From World War II to the Iraq and Afghanistan Wars* by William Taylor
- *Thinking in Time: The Uses of History for Decision Makers* by Richard E. Neustadt and Ernest R. May (of the RAND Corporation)
- *This Kind of War: A Study in Unpreparedness* by T. R. Fehrenbach
- *Military Innovation in the Interwar Period* by Williamson Murray
- *We Were Soldiers Once...and Young: Ia Drang - the Battle That Changed the War in Vietnam* by LTG (Ret.) Hal Moore and Joseph L. Galloway
- *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare* by Robert M. Citino
- *Takedown: The 3rd Infantry Division's Twenty-One Day Assault on Baghdad* by James Lacey
- *Not a Good Day to Die: The Untold Story of Operation Anaconda* by Sean Naylor
- *Red Platoon* by Clint Romesha



Leadership

- *Once an Eagle* by Anton Meyer
- *19 Stars: A Study in Military Character and Leadership* by Edgar F. Puryear Jr
- *Grey Eminence: Fox Conner and the Art of Mentorship* by Edward Cox
- *A Message to Garcia* by Elbert Hubbard
- *The Art of War* by Sun Tzu (Translation by Ralph Sawyer)
- *Hal Moore on Leadership: Winning When Outgunned and Outmanned* by LTG Harold G. Moore (Ret.) and Mike Guardia
- *Call Sign Chaos: Learning to Lead* by Gen (Ret.) James Mattis and Bing West
- *Start With Why: How Great Leaders Inspire Everyone to Take Action* by Simon Senek
- *Leaders Eat Last* by Simon Senek
- *The Art of Command: Military Leadership from George Washington to Colin Powell* by • Harry S. Laver and Jeffrey J. Matthews (Editors)
- *Black Hearts* by Jim Frederick
- *Turn the Ship Around* by CAPT (Ret.) L. David Marquet
- *Meditations* by Marcus Aurelius



Understanding the International Strategic Environment

- *Building a Sustainable International Order: A RAND Project to Explore U.S. Strategy in a • Changing World* by Michael J. Mazarr, Miranda Priebe, and Andrew Radin
- *World Order* by Henry Kissinger
- *The Revenge of Geography* by Robert Kaplan
- *Battlegrounds: The Fight to Defend the Free World* by LTG (Ret.) H.R. McMaster
- *Active Defense: China's Military Strategy* since 1949 by M. Taylor Fravel

Innovation, Technology, and Future Concepts

- *Army of None: Autonomous Weapons and the Future of War* by Paul Scharre
- *Cybersecurity and Cyberwar: What Everyone Needs to Know* by P. W. Singer and Allan Friedman
- *Enders Game* by Orson S. Card
- *The Kill Chain* by Christian Brose
- *2034: A Novel of the Next World War* by Elliot Ackerman and Admiral (Ret.) James Stavridis
- *Ghost Fleet: A Novel of the Next World War* by P.W. Singer and August Cole
- *Press On!: Selected Works of General Donn A. Starry Vol I & II* by Lewis Sorley

Training – Focus on Fundamentals

Soldiers train for wet gap crossing missions to prepare for large-scale combat operations. U.S. Army photo by CPT Anthony Grady.

By CPT Ty R. Dawson

We are going to be an organization that focuses on mastering the fundamentals. As Army leaders, we often hear this vision statement at meetings and quarterly training briefs. Do we really know what that vision entails or how to achieve it? There are at least two ongoing major events that give us reason to pause and think about the fundamentals of our profession. First, the world watches as a powerful Russian military fails at the fundamentals of warfare with disastrous consequences for its personnel and wanton disregard for innocent Ukrainian civilians. Second, while that war rages on and threatens greater conflict, we are transitioning to a multi-domain operating concept while focusing on large-scale combat operations (Department of the Army [DA], 2022, p. ix). We cannot afford a haphazard approach to achieving that oft-stated vision of an organization focused on mastering the fundamentals. Without a simple, coherent strategy that includes SMART—**S**pecific, **M**easurable, **A**chievable, **R**ealistic, and **T**imely goals, (Doran, 1981) the Army, along with Army Aviation, risks losing its superiority over its adversaries.

I wrote this article to help commanders and other leaders assess whether their organizations actually focus on mastering the fundamentals by providing information and ideas regarding the following:

1. Identifying the fundamentals units must strive to master

2. Providing a simple, multi-echelon training strategy

3. Linking aviation training to mastering the fundamentals

4. Fighting for white space

Identifying the Fundamentals

Field Manual (FM) 7-0, "Training," guides commanders to use a prioritized training approach to maximize limited time and scarce resources to achieve proficiencies supporting their unit's mission. "Every unit is unique, but the fundamentals of **shoot, move, communicate, and survive** apply to all types of formations and serve as the basis for training prioritization"

(DA, 2021, p. 2-1). Based on this guidance, **shoot, move, communicate, and survive** are the fundamentals Soldiers and their units must master to maintain a tactical advantage. If a training event does not include a task supporting at least one of these fundamentals, **it should not be prioritized**. The fundamentals, as listed in FM 7-0, assist commanders with crafting a training strategy starting at the individual level and culminating at the desired echelon.

Ultimately, commanders want their units to be able to **shoot, move, communicate, and survive** in diverse environments while achieving the desired end state within the confines of the commander's intent. This means being able to complete a mission-essential task (MET) at night with a dynamic and complex threat and four or more operational variables. Field Manual 7-0 describes a MET as "a collective task on which an organization trains to be proficient in its designated capabilities or assigned mission" (DA, 2021, p. 2-1). For aviators, this means not only being proficient at the individual tasks (IT) listed in the Aircrew Training Manual (ATM) but also the supporting collective tasks (SCTs) found in the Training Evaluation and Outline (TE&O) for a given MET.[1] For commanders, this means crafting a simple and robust training strategy for your organization.

Multi-echelon Training Strategy

This article will use an Air Cavalry Troop's (ACT) METs to create a draft training plan. The process begins with first understanding your unit's overall mission and capabilities. Many resources exist to address this, but I recommend starting with FM 3-04, "Army Aviation," (DA, 2020). Among other things, you will learn from this FM that an Air Cavalry Squadron (ACS), and subsequently, an ACT, "…provides accurate and timely information collection, provides reaction time and maneuver space … destroys, defeats, delays, diverts or disrupts enemy forces." It explains further, "… the integration of RQ-7B UAS [unmanned aircraft system] at the troop level makes the ACS the best formation for conducting reconnaissance, security, and movement to contact as primary missions, with attack operations as a secondary mission" (p. 2-7).

Having developed a general understanding of your unit's missions and capabilities, shift focus to understanding your unit's specific METs. You will find your unit's mission-essential task list (METL) on the Army Training Network (ATN) website.[2] Recall that a MET is a "collective task on which an organization trains to be proficient in its designed capabilities or assigned mission," and a METL is "a group of mission-essential tasks" (DA, 2021, p. 2-1). In other words, a unit's METL includes those selected METs the Army expects a unit to perform in order to successfully complete the assigned mission. A unit's METL provides the foundation for training.

Planning a multi-echelon training strategy requires knowledge of your unit's mission, capabilities, and METs. After reviewing the relevant content on ATN, you will discover an ACT has the following METs:

- Conduct Aerial Screening Missions
- Conduct Aerial Movement to Contact Missions
- Conduct Aerial Reconnaissance Missions
- Conduct Expeditionary Deployment Operations

With limited time each month for training, how do you pick the correct METs to prioritize? Several things must be considered when pondering this question. First, ask yourself, "What does doctrine say?" For an ACT, FM 3-04 tells us that "reconnaissance, security and movement to contact" missions should be prioritized due to the integration of UAS at the troop level (DA, 2020, p. 2-7). Second, what culminating events or deployments are on the horizon? Consult the long-range training calendar to identify the next "big thing." This could be a combat training center (CTC) rotation, troop external evaluation (EXEVAL), or an operational deployment. From there, backward plan to determine how much time you have to train your unit. Third, identify your unit's mission in support of the upcoming event. Which METs will evaluators rate your unit on during an EXEVAL or, what missions are the supported unit at a CTC expected to assign? Finally, determine your unit's current level of proficiency. Regardless of the mission assigned, could your Soldiers perform their mission at night, in complex terrain, with a dynamic and complex threat while integrating external capabilities? These questions are not all-encompassing but provide a starting point for determining which METs you need to prioritize. Having developed an understanding of your unit's mission, capabilities, METs, and training priorities, you are ready to develop a training plan.

We are told that training is a commander's primary responsibility, thus causing some to create their training plan in a vacuum devoid of input from other members of the organization. The Army intentionally structured units with key positions for expert personnel to support the commander with recommendations based on institutional knowledge and combat-tested practical experience. These key personnel include the standardization pilot (SP), aviation mission survivability officer, instructor pilots (IPs), and platoon leaders (PLs) to ensure they have a say in how the unit is trained. Your point of view of the unit as its commander is drastically different compared to the SP or PLs. Building trust by forming a strong working relationship with your team of experts is part of keeping your finger on the pulse of the organization. Input from these key personnel includes real-time feedback on many things, such as an honest assessment of your aviators' proficiencies. Working together on a training plan is one way of building trust. Once complete, brief the entire organization, ask for feedback, and give others ownership of the plan. Not only does this help create buy-in by ensuring everyone has skin

[1] Aircrew training manuals can be accessed via the Directorate of Training and Doctrine, Flight Training Branch SharePoint site at the following link with a valid common access card: armyeitaas.sharepoint-mil.us/sites/TR-ACoE-DOTD/SitePages/Flight-Training-Branch.aspx?csf=1&web=1&e=F0v0Uz. Training Evaluation & Outlines can be accessed via the Army Training Network (located within the Training Network Enterprise Access Management Service-Army) with a valid common access card.

[2] The ATN is available via the Enterprise Access Management System-Army to those with a valid common access card.

in the game but it also provides predictability to the extent a troop or company commander can control.

There are many methods for building a training plan. For instance, one way is to backward plan and publish it with an accompanying calendar in an easily digestible format no less than 6 weeks prior to the event. Planning early gives you time to create buy-in across the organization and make adjustments based on Soldier feedback. Figure 1 is an example visual aid that helps unit members understand the commander's intent and training strategy. When published and shared early, it creates understanding by showing clear training imperatives, the training success factors, and how the training leads to the desired end state. The arrow along the bottom of Figure 1 shows a monthly rotation of METs and supporting training events leading to a final culminating event.

In Figure 1, a new MET focus is planned monthly, ensuring the organization can prioritize limited time and resources without being spread too thin. As shown in Figure 2, Conduct Aerial Reconnaissance has been selected as the monthly MET focus. Supporting collective tasks and ITs, selected from the reconnaissance TE&O, listed on the right of Figure 2, rotate monthly and provide focused training during regular training flights.

Having these tasks listed on a kneeboard provides an easy grab-and-go product for aircrews to track their training during a flight. By providing these kneeboards, the unit is able to get the most out of their training flights and maximize the hours they have available. Instead of wasteful discussions the day of the flight about where everyone wants to fly to, aviators will have a focused list of tasks to train (Figure 3).

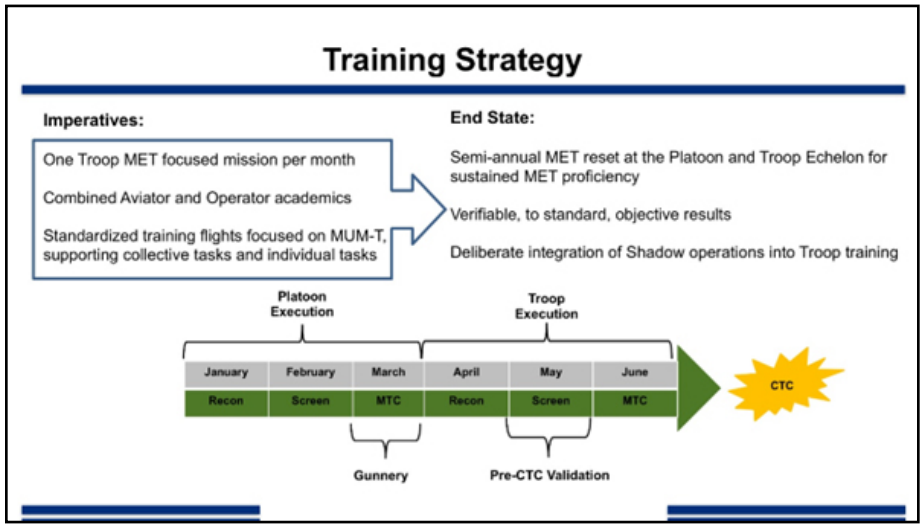


Figure 1. Example of a training strategy summary (Dawson, 2022a).

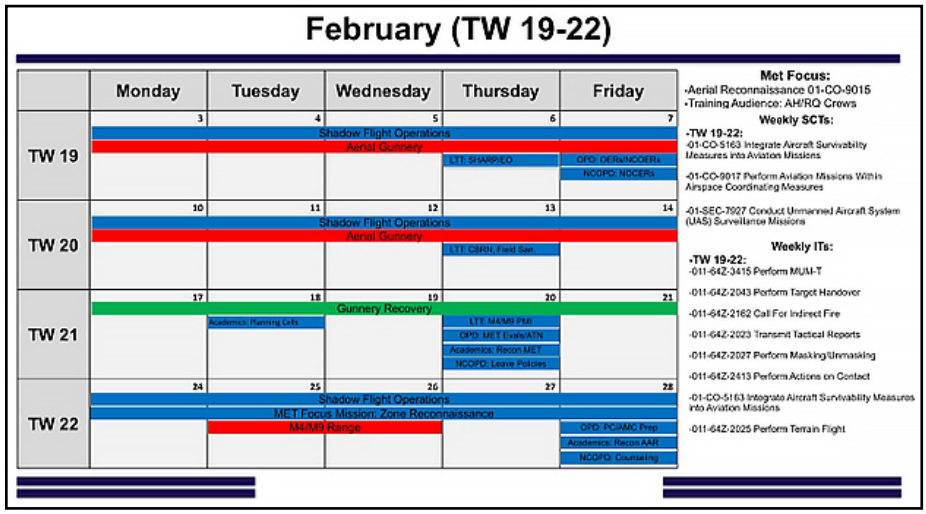


Figure 2. Example of a monthly training calendar (Dawson, 2022b).

Preparation for a regular training flight should begin the day prior with a brief discussion led by the pilot-in-command (PC). As primary trainers, PCs should discuss with the pilots the tasks to be trained during the next day's flight so they can be reviewed in the ATM. A fruitful discussion can then take place during the crew brief about where and how each task will be trained. The discussion need not be overly complex but should include the standards and procedures for the tasks to be performed. It could be as simple as identifying a remote training site where the crew will practice terrain flight, conduct simulated engagements, and culminate in a call for fire.

Look for efficiencies to be gained between the monthly kneeboard and an aviator or operator's Commander's Task List (CTL). Some of the tasks listed on the kneeboard may also be on the CTL, creating opportunities for completion during MET-focused training. Additionally, these kneeboards are not specific to manned aviation only and should be used for unmanned operators as well. The intent is not to limit how training is conducted or to stymie creativity; rather, it is to provide a starting point to ensure the unit is holistically working toward increased proficiency.

As previously mentioned, a well-constructed training plan creates buy-in and will provide opportunities for the audience to be invested in the success of their own training. To help facilitate weekly training flights, as an example, have the troop or company aviators each generate a simple grab-and-go concept of the operation for a selected MET. These can be kept on hand and provide simple scenarios covering the basics, enemy situation, mission, commander's intent, etc., for the local training area. Not only will these provide another layer of realism but will make completing the tasks on the kneeboard more mission-focused and less check the block.

Once mission week has arrived, the MET mission is the focus for that week. It is important that other flights, such as annual proficiency and readiness tests, proficiency flight evaluations, and progression flights are scheduled for the other 3

weeks of the training cycle to maximize personnel availability, especially the SP and IPs. A platoon echelon mission week generally functions as shown in Figure 4.

Recon Task Checklist		Date:	
Tail Numbers:	PC/AC:	PI/AO:	
Link 16	Tail #	Status:	
BFT	Tail #	Status:	
Secure Comms.	Tail #	Status:	
AAG	Tail #	Status:	
UR	Tail #	Status:	
FCR/RFI	Tail #	Status:	
SUPPORTING COLLECTIVE TASKS			
01-CO-5163	Integrate Aircraft Survivability Measures into AV Missions		
01-CO-9017	Perform AV missions within Airspace Coordination Measures		
01-SEC-7927	Conduct UAS Surveillance Missions		
Complete	INDIVIDUAL TASKS	# Iterations	
	Perform MUM-T		
	011-64Z-3415		
	Perform Target Handover		
	011-64Z-2043		
	Call For Indirect Fire		
	011-64Z-2162		
	Transmit Tactical Reports		
	011-64Z-2023		
	Perform Masking/Unmasking		
	011-64Z-2027		
	Perform Actions on Contact		
	011-64Z-2413		
	Ingrate Aircraft Survivability		
	01-CO-5163		
	Perform Terrain Flight		
	011-64Z-2025		
NOTES			

Figure 3. Example training flight kneeboard (Dawson, 2022c).

On Monday, the PLs, serving as the air mission commander (AMC), receive the mission order, lead planning cells, and conduct a mission brief on the day of execution. After the brief, the mission is executed twice per platoon. The first during the day and the second at night. The first iteration serves as a dry run to mitigate risk, while the second increases the complexity of the operational environment potentially culminating in a "T" (fully trained) level of proficiency. In between each iteration, time is allotted for a hot wash[3] for the AMC, pilots, and external evaluator to quickly debrief any key sticking points or safety concerns prior to execution at night. To conclude the week, Thursday is a weather and maintenance backup day, and during Friday's troop pilot's brief, a formal after-action review (AAR) can take place.

Troop echelon execution functions primarily the same except the troop commander serves as the AMC. Additional time is allocated for planning and mission completion due to the increased complexity and risk associated with additional aircraft (Figure 5).

[3] Hot wash is jargon for a brief AAR or review while an exercise is ongoing and is meant to be followed up with a full AAR after the event concludes.

This begs the question; from where does a troop or company commander receive an operations order (OPORD) with supporting annexes and appendices? If coordinated in advance, the S3 and S2 could provide the needed products, or they can be created internally. For most units, a quick search of the shared drive will yield previous OPORDs and supporting products that can easily be adapted to meet the needs of the unit. Products such as an information collection matrix and fires support execution matrix add increased realism, while enabling aviators in the various mission planning cells to hone their skills. This ensures the scenario used requires aviators to practice the ITs and SCTs covered during the month's training flights.

Opposition forces (OPFOR) can be sourced from within. For example, during a training mission, crew chiefs with light medium tactical vehicles and high-mobility multipurpose wheeled vehicles can be used to simulate enemy convoys, tanks, or other vehicles. The intent is not to spend egregious amounts of time building OPORDS and coordinating OPFOR but to provide what is necessary to facilitate the training.

Monday	Tuesday	Wednesday	Thursday	Friday
Mission order received	1st Platoon Mission Brief	2D Platoon Mission Brief	Weather and maintenance backup day	Pilots brief AAR
Mission planning begins	1st Platoon Day Execution	2D Platoon Day Execution		
	Hot wash	Hot wash		
	1st Platoon Night Execution	2D Platoon Night Execution		

Figure 4. Example platoon MET mission week schedule (Dawson, 2022d).

Monday	Tuesday	Wednesday	Thursday	Friday
Mission order received	Mission planning concludes	Update brief	Weather and maintenance backup day	Pilots brief AAR
Mission planning begins	Troop mission brief	Troop night execution		
	Troop day execution			

Figure 5. Example troop or company MET mission week schedule (Dawson, 2022e).

At the conclusion of training, has the unit **objectively and completely** met the criteria to achieve a **T** rating using the task evaluation criteria matrix (Figure 6)? If not, has additional time been included on the calendar for retraining? Leaders demonstrate their commitment to training to standard and not to time by including time for retraining and additional repetitions as needed on the calendar. Not attaining a specific rating doesn't mean failure; that is what training is for, making mistakes and learning from them. It enables leaders to "drill down" and determine the specific tasks requiring additional attention.

For units who do attain a **T** rating on their first attempt, it isn't a one-and-done process. Proficiency is something that must be maintained

over time. A good training plan should be easily repeated, ensuring the unit has multiple attempts to sustain their expertise. Put simply, for aviators to remember how to plan and execute a certain mission, they require **meaningful repetition**. After proficiency is achieved, leaders should change the scenario to keep the training fresh and interesting, while providing additional tactical challenges for the unit to overcome. This enables leaders to continually evaluate their unit's proficiency level objectively and completely. However, this does not mean units will be able to attain a **T** on all METs. In fact, FM 7-0 allows for this by emphasizing that "units are rarely able to achieve and sustain fully trained proficiency on all METs simultaneously" (DA, 2021, p. 2-1). In Figure 1, all METs are listed, not to infer the organization has achieved a **T** on every MET, but rather for presentation purposes. If a unit requires it, the same MET could be trained multiple months in a row. *Prioritization* remains paramount to planning and executing a successful training strategy.

Linking Aviation Training to Mastering the Fundamentals

How does aviation training, which results in achieving and sustaining a **T** rating on a MET, relate to mastery of the fundamentals? Proficiency, and subsequently a **T** rating, must be built from the individual level up. The ITs and SCTs trained during weekly training flights are selected from the TE&O of the month's MET focus and correlate to the fundamentals listed in FM 7-0. A review of the ATM will show the majority of tasks revolve around the fundamentals of **shooting, moving, communicating and surviving**, regardless of airframe. For example: Engage Target with Area Weapon System (shoot), Perform Terrain Flight (move), Perform Digital Communications (communicate), and Operate Aircraft Survivability Equipment (survive).

Consider the Integrate Survivability Measures Into Aviation Missions task, an SCT for the reconnaissance MET.

Plan and Prepare			Execute						Evaluate	
Operational Environment / CO & BN		Training Environment (L/V/C)	% Leaders present at training/authorized	% Present at training/authorized	External evaluation	Performance measures	Critical performance measures	Leader performance measures	Evaluator's observed task proficiency rating	Commander's assessment
Dynamic and Complex (4+ OE Variables and Hybrid Threat)	Night	Commanders will determine if task training will be conducted under live, virtual, or constructive conditions using corresponding event types (e.g., class, situational training exercise (STX), field training exercise (FTX)) in order to facilitate the crawl-walk-run methodology of training progression. External evaluations (EXEVAL) must be conducted in a live environment.	>=75%	>=80%	Yes	>=80% GO	All	>=85% GO	T	T
Dynamic (Single Threat)	Day		60-74%	60-79%	No	65-79% GO	<All	75-84% GO	P	P
Static (Single Threat)	Day		<=59%	<=59%	No	<65% GO	<All	<=74% GO	U	U

Figure 6. Task evaluation criteria matrix (Army Training Network, 2022).

Upon reviewing the Integrate task, one will find Operate Aircraft Survivability Equipment (ASE) listed as a supporting individual task. As noted earlier, Operate ASE is an individual task found in the ATM. This is just one simple example demonstrating the relationship between an IT, SCT, and MET.

Fighting for White Space

This method is not a one size fits all and will not always work exactly as explained here due to other requirements. In practice, not every month will be a perfect 4-week cycle with 3 weeks of training flights and 1 week for mission execution. Changes may have to be made based on the proficiency of the organization or possibly prioritization of other training requirements. To minimize the disruption to training, it is imperative to engage **early and often** with the S3 and ensure adequate time is allotted for troop-level training. In other words, fight for every day of white space on the calendar. For example, if the next higher headquarters is planning a field problem, such as a pre-CTC validation, ensure your training requirements are included. Request an OPORD assigning a platoon, company, or troop mission based on the month's MET focus. For METs with a live-fire component, such as Movement to Contact, try to align these with gunnery or other live-fire events. As challenging as it may be, staying ahead of the S3 and commander will make it more likely company or troop training events are supported.

Final Thoughts

In closing, it is important to note the ideas above simply represent **a way** and are not **the way** to train. Every team is different and will require its commander to be familiar with the intricacies of the unit they command. Striking a balance between training the organization and burning people out is paramount. Push too hard and resentment will fester, push too little and skills will atrophy, increasing risk. Ultimately, stick to the following principles and they will help you succeed:

1. Do not be the officer who chides others for flying. Make flying a priority. Technical and tactical proficiency saves lives

2. Set the standard by training hard

3. Create buy-in and give others ownership

The ideas presented in this article are not solely the creation of the author. They are the result of collective efforts from multiple leaders across the 82D Combat Aviation Brigade including the 1st Squadron (Air Cavalry), 17th Cavalry Regiment, and the 1st Battalion (Attack), 82D Aviation Regiment. Together, we crafted a coherent training strategy by understanding what we were asking of our teams—mastery of the fundamentals. The basics of **shoot, move, communicate, and survive** are not unique to Army Aviation and are embedded in nearly every task in the ATMs. After achieving an understanding of a unit's capabilities, missions, and METs, commanders should work with other key leaders to craft a simple training plan. The plan should start at the individual level, with carefully selected individual and supporting collective tasks, before culminating in a platoon and subsequently, a troop or company mission. Success is paramount to maintaining a competitive edge.

Biography:

CPT Ty R. Dawson is an AH-64E IP assigned to Company A, 1st Battalion, 14th Aviation Regiment, at Fort Novosel, Alabama. He previously served as the commander of B/1-17th and D/3-82, at Fort Bragg (Liberty), North Carolina, and deployed to Afghanistan in 2021.

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Dawson, T.R. (2022b). *Example of a monthly training calendar.*

Dawson, T.R. (2022c). *Example training flight kneeboard.*

Dawson, T.R. (2022d). *Example platoon MET mission week schedule.*

Dawson, T.R. (2022e). *Example troop or company MET mission week schedule.*

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The 50th Expeditionary Signal Battalion (Enhanced) and 63**D** Expeditionary Signal Battalion conduct a large-scale combat operations communications exercise. U.S. Army photo by CPT Eric Messmer.

A MODERN LOUISIANA MANEUVER:

Training Divisions to Fight Multidomain Operations in Large-Scale Combat Operations

Operational camouflage pattern. U.S. Army National Guard illustration by SPC Di Trolio. Photo overlay shows Soldiers participating in Southern Strike 2021, a large-scale, joint, and international combat exercise. U.S. Army photo by SGT Alexis Washburn-Jasinski.

By CPT Ian A. Greer

United States Army fighting doctrine has experienced two shifts toward a large-scale combat paradigm and accompanying training exercises in the last century. The first occurred prior to entry into World War II, where the Louisiana Maneuvers[1] trained senior leaders to fight at the corps level through maneuvering three corps against one another in a 30,000 square mile training area in Northern Louisiana (Gabel, 1992, p. 5). The second shift occurred almost 50 years later, when the Armed Forces tested Air-Land battle doctrine in Southern California to prepare for combat (Wille, 2019). Presently, the Army faces a third shift toward large-scale combat operations (LSCO) as Army Field Manual (FM) 3-0, "Operations," (2022) changes operational emphasis from counterinsurgency (COIN) operations to multidomain operations (MDO). With the transition to MDO and introduction of ideas such as convergence, brigade combat teams (BCTs) detailed with task forces will no longer be capable of operating as independent entities, and divisions and corps will assume the role as the primary unit of action (Department of the Army [DA], 2022, p. 1-11). The scope and complexity of training required to replicate the tactical operations as outlined by the new FM 3-0 presents a significant issue. Unlike the environments of the Louisiana Maneuvers and Air-Land Battle, training areas that can accommodate consistent, quality, division-level LSCO training do not exist. Despite this, the Army can make steps to improve training at its largest combat training center (CTC), the National Training Center (NTC), Fort Irwin, California, to work toward replicating LSCO as the FM 3-0 imagines. True, the personnel, training, and facilities at the NTC currently prohibit it from conducting consecutive division-level rotations; however, the NTC can overcome this through replacing current opposing force (OPFOR) with a multidomain task force (MDTF) and utilizing distant joint and interagency facilities to extend the training area and replicate warfare in several domains. Additionally, while a solution for division-level rotations is underway, the NTC can enhance MDO training for BCTs through increasing the duration of live-fire exercises, emphasizing the command and control aviation competency during rotations, and incorporating the California-based Naval Air Weapons Station (NAWS) China Lake sensor missions into the rotational scenario.

Observations: What is the Army Asking for?

The new version of FM 3-0 expounds on existing terminology such as MDO and LSCO and introduces a formal definition for convergence (DA, 2022, Glossary-5). The document defines MDO as "combined arms employment of joint and Army capabilities to create and exploit relative advantages to achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders" (Glossary-10). The FM 3-0 then references MDO as the form operations take under LSCO, or "extensive joint combat operations in terms of scope and size of forces" (Glossary-9). Finally, FM 3-0 introduces convergence as "an outcome created by the concerted employment of capabilities from multiple domains and echelons against combinations of decisive points in any domain to

[1] "In 1940 and 1941, American soldiers participated in the Louisiana Maneuvers, a series of war games that forged a common experience, trained them for combat and identified their future commanders." https://www.historynet.com/louisiana-maneuvers-1940-41/

create effects against a system, formation, decision maker, or in a specific geographic area" (DA, 2022, Glossary-5).

Field Manual 3-0 then charges divisions as "the Army's principal tactical warfighting formation during large-scale combat operations" (p. 2-19) and describes them as "the lowest tactical echelon that employs capabilities from multiple domains to achieve convergence during large-scale combat operations" (p. 2-19). This new responsibility has resounding implications for echelons above the brigade level. In short, the increase in echelon from BCT to division as the principal warfighting formation implies a requirement to train divisions to conduct integrated fights in tactical scenarios where they manage each brigade as an organic entity. Moreover, divisions must learn to fight alongside other divisions in multiple domains to remain relevant in the LSCO fight. To do so, however, requires an extensive train-up that no CTC is ready to implement as a continuous program.

Recent training exercises have sought to implement division command and control functions. Warfighter exercises at Fort Leavenworth, Kansas, train division staffs to maneuver brigades on a biannual basis (Howard, 2022). The 1st Infantry Division, Fort Riley, Kansas, recently conducted division-level exercises at the Joint Multinational Readiness Center in Europe as part of a U.S. European Command rotation. The exercises tested the ability to maneuver several brigades and enabled operations at nearby training sites (Talbot, 2020). The NTC has also begun implementing experimental exercises to test MDO and division command and control of multifunctional brigades with events like Project Convergence[2] and rotational models that simultaneously implement security force assistance brigades, combat aviation brigades, and division artillery but do not include a BCT. In every case, however, maneuver space becomes a limiting factor, causing the scenario to rely heavily on synthetic training environments to simulate virtual engagements on what would normally be adjacent unit operations (Talbot, 2020). While these experiments are a step in the right direction for developing a method to train divisions to fight tactically, fighting a virtual battle cannot replicate the sort of crucible experience these units would gain through a CTC rotation. As a result, the Army must seek an answer to how the NTC—as the largest CTC and the one with the most adjacent joint and interagency partners—can transition to the primary training grounds for divisions.

[2] Project Convergence is what the Army calls a 'campaign of learning,' designed to further integrate the Army into the Joint Force." https://crsreports.congress.gov/product/pdf/IF/IF11654

Insights: Where is the NTC now?

To effectively train divisions to maneuver brigades in a fashion congruent with MDO in LSCO, the NTC must first address limitations in its personnel, training, and facilities. The first major limitation the NTC faces is in its OPFOR's modified table of organization and equipment: Not enough personnel are assigned to support consecutive division-level rotations. Presently, the 11th Armored Cavalry Regiment, located at the NTC, provides a squadron-sized OPFOR to fight against rotational BCTs every rotation. Consisting of two maneuver squadrons, this allows for a continuous cycle of one squadron of Soldiers to oppose the rotational unit in the ongoing rotation, while the other recovers from the previous rotation and prepares to fight in the next exercise. However, upsizing the rotational unit requires upsizing the OPFOR to provide a generally accurate representation of a future fight. To obtain the 4:1 ratio generally accepted in Army operations, a division-based rotational model would require the entire OPFOR regiment to fight in each rotation. Without the ability to flex subordinate units between operations in support of the rotation and those in support of unit readiness metrics, the NTC must reduce the number of rotations to provide a meaningful training experience.

Second, with the principal unit providing OPFOR support being a squadron, the OPFOR is not adequately trained or outfitted to conduct MDO. Squadrons are by nature a purely tactical formation, unable to coordinate for joint assets without endorsement and coordination through a parent brigade and echelons above the brigade. On the battlefield, squadron commanders concern themselves with integrating their maneuver to nest within the brigade scheme of maneuver, enabling the brigade to act as a principal tactical warfighting formation. Indeed, threat doctrine differs to varying degrees from U.S. doctrine but in about any LSCO scenario, squadron commanders will find themselves too engrossed in engagements to coordinate joint assets to the extent required to achieve convergence. The 11th Armored Cavalry Regiment provides an excellent threat for rotational BCTs, but its Soldiers and leaders at all echelons are not ready to make the jump to training a division under MDO.

The final limitation of the NTC in conducting division rotations is its footprint. At almost 1,000 square miles, the NTC provides one of the largest maneuver areas in the Army and the largest maneuver area of any CTC (Martin, 2015). Despite its relative expanse, it is less than 1/30th the size of the maneuver area the Army used during the Louisiana Maneuvers prior to World War II (Gabel, 1992, p. 5). With advances in technology since the conduct of the Louisiana Maneuvers, Army units at all echelons require more training space to replicate extended supply and communication lines, thereby further reducing the upper limit for what the NTC can train. Current operations at the NTC utilize the railyards at the neighboring Marine Corps Logistics Base for administrative transport, then BCTs and their attached task forces deploy unopposed either to the rotational unit bivouac area or directly to the brigade support area. A division rotation, however, would require multiple BCTs and multifunctional brigades to deploy into the same area with varying degrees of opposition en route. The NTC footprint is not large enough to accommodate this.

As the NTC expands capabilities for training divisions to fight with organic brigades, several opportunities exist to enhance BCT multidomain training scenarios and develop tactics, techniques, and procedures that will anchor future division-level rotations. To begin, increasing the duration of the live-fire exercise would provide more opportunities for rotational units to develop and implement the real-world control measures required to navigate a complex

An AH-64 Apache sits under the stars at the National Training Center, Fort Irwin, California. U.S. Army photo by SSG Tim Morgan.

battlespace and not interfere with operations of adjacent units. As the capstone crucible training event for BCTs, CTC rotations are designed to induce a level of stress in brigade and battalion commanders commensurate with combat and beyond any previous training event. Typical NTC rotations begin with a week of brigade reception, staging, onward movement, and integration, or RSOI, proceed to 8—10 days of force-on-force, then transition to 3 days of live-fire exercises, with up to a day allocated for after-action reviews and refitting during the transition. The RSOI enables brigade commanders to take accountability of their personnel and equipment, outfit equipment with multiple integrated laser engagement system, or MILES gear,[3] calibrate artillery, and to finalize their scheme of maneuver for the first days of the force-on-force fight. Force-on-force then allows the BCT commanders to engage in a battle against the rotational training units (RTUs), and the BCT maneuvers the NTC concerned with its opponents' every reaction. Finally, live fire forces the BCT commander to evaluate the control measures as their brigade closes in on a synthetic enemy composed of pop-up targets, which is one of several scenarios located in the northern corridor. Despite the effectiveness of the live-fire training, this phase takes up the least amount of time during a rotation.

Additionally, emphasizing the command and control aviation competency during NTC rotations would provide an added dimension to training that will become a necessity as divisions train for LSCO. Currently, BCTs bring an aviation task force which provide aviation support throughout the rotation. These BCTs tailor this task force to fit their operational requirements, and with most rotations consisting of armor, Stryker armored vehicles, and mechanized infantry, many task forces consist of elements from the attack battalion or air cavalry squadron. Some lighter units bring along elements from the assault helicopter battalion (AHB) or general support aviation battalion (GSAB), but many rotations altogether exclude them. Those that choose to bring elements from the GSAB generally bring along a combination of heavy lift aircraft and dedicated medical evacuation aircraft but do not include command and control aircraft. As a result, many command and control companies do not get repetitions flying in a contested or live-fire environment, and those that do seldom have experience in areas as complex as the NTC.

Finally, aviation training at the NTC tends to be compartmentalized and one of its greatest training resources, the China Lake anti-access area denial (A2/AD) emitters, underutilized. While the aviation task force does integrate with the BCT to perform reconnaissance and attack missions—and limited air assaults when elements of an AHB or GSAB are

[3] "MILES gear offers a system of simulating live combat to any Soldier on the road, from the infantryman to the intelligence analyst." https://www.army.mil/article/63098/miles_gear_simulates_live_combat_at_ntc#:~:text=The%20MILES%20gear%20offers%20a%20system%20of%20simulating,road%2C%20from%20the%20infantryman%20to%20the%20intelligence%20

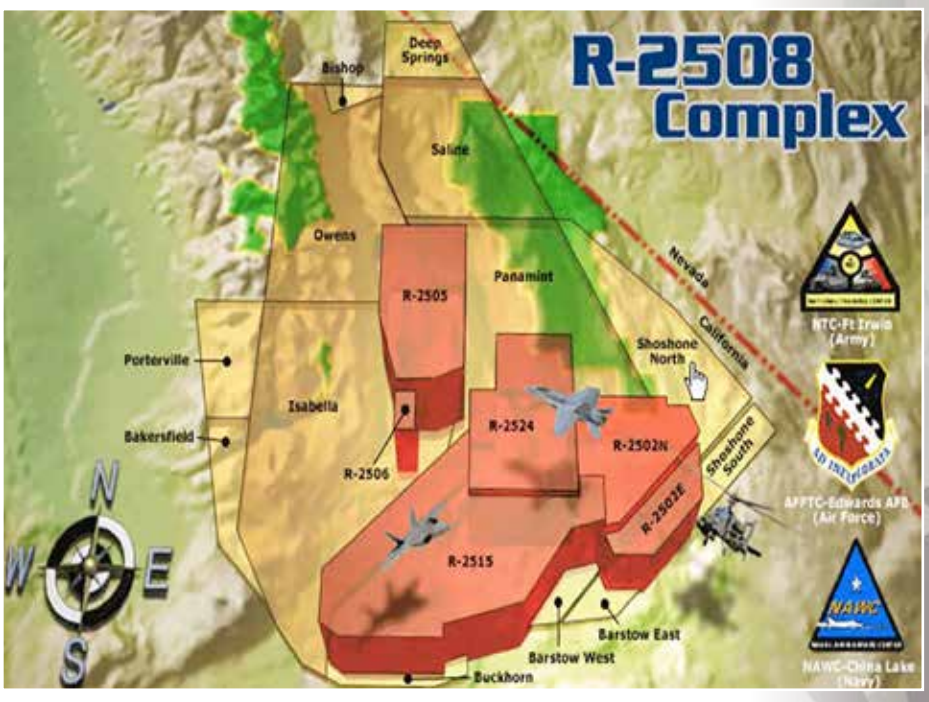
present—they only do so in the presence of notional air defense threats. At other points in the rotation, the task force executes missions at China Lake against emitters that replicate a wide range of threats but it does so without direct BCT integration. Despite the realism of this training, the event does not occur every rotation and when it does, not every aviator gets to participate. Implementing this event at the NTC would make the training more accessible and add complexity to the operating environment.

Lessons Learned: Where can the NTC go?

Current shortcomings for training divisions at the NTC exist from 2 decades of training BCTs to fight in a COIN environment as principal warfighting formations, but this CTC still has the most potential to train divisions to maneuver their brigades as organic formations in MDO. Assigning a MDTF to Fort Irwin and utilizing a BCT from the rotational division would address many of the issues associated with limited personnel and OPFOR training capabilities. Considering joint and interagency infrastructure such as China Lake; the Air Force's Edwards Air Force Base (AFB), California; the National Aeronautics and Space Administration (NASA); and Bureau of Land Management (BLM) land adjacent to the NTC could greatly increase the maneuver area and expand scenarios in multiple domains. Several opportunities also exist to develop expanded training procedures for BCTs and divisions while solutions to shortcomings are underway, such as increasing the duration of live-fire exercises, emphasizing the command and control aviation competency during rotations, and incorporating the China Lake AD missions into the rotational scenario.

The Army has begun creating MDTFs as "theatre-level maneuver elements designed to synchronize precision effects ... in all domains" (Feickert, 2022, p. 1). As a theatre asset, these organizations will provide effects tailored to specific adversarial regions. Presently, the Army plans for a total of five MDTFs covering three major regions: two aligned with Indo-Pacific, one aligned with Europe, one aligned with the Arctic, and one in Joint Base Lewis-McChord aligned with the Pacific (p. 2). Of the five planned MDTFs, only three currently exist or are under active construction, with much debate about where to station the remaining two (p. 2). The MDTF represents the best opportunity for understanding threat capabilities, especially A2/AD, and therefore is the best option for replicating threat capabilities in a training environment. Stationing one of the remaining MDTFs at the NTC would provide an unmatched ability to train the new formation to fight against division-sized elements, albeit the U.S., while the MDTF assuming the role of OPFOR and primary trainers at the NTC ensures that rotational divisions face an adversary well versed in achieving convergence across all domains. True, current composition of the MDTF does not include maneuver elements such as BCTs, aviation, or engineers, but rotational divisions could provide one BCT as additional combat power to integrate with the MDTF and fight as its own OPFOR (Feickert, 2022). This solution makes the current OPFOR at the NTC obsolete and allows for the MDTF to fall in on existing infrastructure. Furthermore, the MDTF constantly integrating with rotational units ensures relationships with subordinate units that may one day operate alongside it in theatre.

To address limitations associated with maneuver space, the NTC should look outward toward its joint and interagency partners in both adjacent and distant facilities. Procedures exist for joint training around the range complex, with much of the Southwestern ground force activity occurring on Edwards AFB land and Western aviation activity at the NAWS China Lake site (R-2508 Central Coordinating Facility, 2023). Administratively, most rotations already utilize the Marine Corps Base at Yermo, California, for railhead operations. Despite this ongoing coordination, more opportunities exist to further expand training beyond the NTC, which would be useful in training divisions to fight as tactical units during LSCO. The Goldstone Deep Space Complex (NASA) could also provide opportunities to integrate the space domain into rotational scenarios to an extent that is not possible at other CTCs, thereby exposing the rotational unit and MDTF to more realistic MDO operations. Furthermore, thousands of acres of BLM land surround the training complex to the south and east, and the Department of the Defense has already demonstrated the ability to coordinate using BLM land in its exercises with expanded National Guard training areas in Idaho (BLM, 2018). Integrating this land need not be contiguous, as smaller pockets of unimproved land southeast of the training area could represent disjointed operations spanning over multiple islands that FM 3-0 describes in its chapter



The R-2508 Complex. Graphic courtesy of the Edwards Air Force Base website.

on the maritime domain (DA, 2022, p. 7-2 and 7-18). Finally, several distant facilities exist that could help simulate division deployment from the deep to the close fight and add complexity to the rotational experience. For example, railheads close to China Lake (near Trona, California), could replace those at Yermo and make better use of the 2508 complex to simulate RSOI as rotational divisions deploy into a contested environment (Military Surface Deployment, 2018).

While improvements to facilitate divisions are underway, increasing the duration of live fire poses one opportunity to develop MDO training scenarios during ongoing BCT rotations. If the force-on-force phase of the rotation serves as the capstone event for how well the BCT can maneuver against a genuine threat, the live-fire exercise is the capstone event for implementing control measures that allow maneuver among subordinate elements of the BCT and its enablers, while not conflicting with one another. While the MILES gear and observer-coach/trainers adjudicate kills during the force-on-force phase, the live-fire exercise poses the least margin for error, as mistakes during this portion of the exercise could prove catastrophic for its participants. As a result, this phase of the rotation provides the best environment to training BCT commanders, staffs, and subordinate unit leaders to implement and follow control measures. With consecutive division-level LSCO rotations years on the horizon, more indepth training of junior officers and noncommissioned officers will provide a starting point and basic understanding of control measures that will be required in MDO. In short, longer and more robust live-fire scenarios will contribute to leaders who are better able to operate and deconflict operations in LSCO as these scenarios provide the most pressure for leaders to do so.

Additionally, emphasizing the command and control competency of aviation provides another area to expand the rotational scenario. Command and control will become even more important in LSCO than it has been the past 20 years. Much of the deep and close fight will occur in degraded communications environments, and commanders will become less and less able to rely on communication equipment that is currently central to maneuver with anticipated battles in the cyber domain (DA, 2022, p. 2-1 and 2-2). Moreover, the concept of convergence at the division level further increases the need for clear communications. Divisions will be unable to synchronize maneuver across land and air without communicating with their subordinate commanders, and the disciplined initiative central to a mission command philosophy could have self-disruptive implications—should commanders apply it—with even the smallest margin of error. As a result, BCTs and the NTC should both strive to exercise this critical aviation function at every opportunity to train command and control companies and develop best practices to take into the future fight.

Finally, the China Lake emitters are among the most valuable training resources at the NTC, but their inaccessibility and distance from the rotation makes them inaccessible to every unit and aviator. A potential solution for this is to integrate similar emitter capabilities into the NTC and make them a part of the training scenario. Moving or replicating an A2/AD threat lane at the NTC would allow for use of this resource with less coordination and therefore increase the number of repetitions per aviator. Additionally, adding the sensors to the rotational scenario would allow more opportunities for future rotational divisions to practice achieving convergence in the air, land, and cyber domains as commanders experiment with varying combinations of close air support, field artillery, and electronic warfare suppression methods.

Multiple Integrated Laser Equipment System gear issue and training at the NTC. U.S. Army photo by SPC Julia Dennard.

Conclusion

As the Army undergoes its third shift in paradigm to a near-peer fight this century, the NTC must adapt to facilitate sufficient train-up at the appropriate echelon. With FM 3-0 introducing and redefining concepts of MDO, LSCO, and convergence, the division will play a more robust role in the future operating environment. Assigning one of the five MDTFs to Fort Irwin and utilizing a rotational BCT to fill the OPFOR role would address current limitations in its manpower and training, while looking to distant joint and interagency organizations could greatly increase maneuver space. Additionally, extending the duration of live fire, emphasizing the aviation command and control core competency, and integrating emitters similar to those at China Lake into ongoing BCT rotations would help refine leader skills and create lessons learned to help build future division-based rotations. With 20 years of training to fight in COIN, conducting modern exercises like the Louisiana Maneuvers at the NTC is a starting point for providing the training necessary to win the first fight in armed conflict against a near-peer threat.

Biography:

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Multinational partners conduct medical training as a part of Project Convergence 2022. U.S. Army photo by SPC Collin S. MacKown.

The IMPORTANCE of AVIATION SUSTAINMENT in LARGE-SCALE COMBAT OPERATIONS

By CPT Madison A. Maguire

A Black Hawk flies over the Pacific Ocean after participating in a mission to refuel AH-64s during the Joint Pacific Multinational Readiness Center at Barking Sands, Kaua'i, Hawaii. U.S. Army photo by SPC Kelsey Kollar.

Every aviator, maintainer, and fueler has observed the same friction point while conducting a field training exercise—there is a logistical issue that arises and negatively impacts, or even halts, aviation operations. Some examples of this could be a maintenance fault found on an aircraft that needs to be fixed in order to make the aircraft flyable. Another sustainment element that could severely hinder training if not functioning properly is forward arming and refueling point (FARP) operations. From my own personal experiences and observations at the Joint Readiness Training Center (JRTC) at Fort Johnson, Louisiana, I can attest to the importance that the sustainment warfighting function plays in being able to successfully conduct aviation operations.

While jumping into the training area, also known as "the box," the battalion FARP element, along with its vehicles, got stuck in the mud several times during convoy movements. By the time the FARP had finally reached our tactical assembly area, several hours had gone by, and it had become dark. It took FARP personnel even longer to finally establish the heavy expanded mobility tactical truck (fuel servicing truck) and hoses and begin fueling aircraft. These observations demonstrated that in order to be an effective combat multiplier on the battlefield, especially during large-scale combat operations (LSCO), the aviation community must address and improve the way we conduct sustainment operations as a whole. This article seeks to provide insight into FARP operations and aviation maintenance and suggests that we must give special attention to the areas of training, personnel, organization, and materiel in order to be successful in a LSCO fight.

After decades of fighting a counterinsurgency in Iraq and Afghanistan, the U.S. Army has grown accustomed to operating and fighting in geographically small areas with unlimited access to depot-level supply systems. For the last 30 years, the Army has been able to establish and operate out of large sustainment and logistical nodes with almost little to no threat from its adversaries. In the Middle East, we enjoyed a joint operations area that had a "green zone" composed of built-up forward operating bases and outposts where contracted personnel and host nations provided support and security (Fogg et al., 2019, para. 20). As the Army of today readies itself to fight a near-peer competitor, however, these large nodes will soon become high-value targets as the enemy will seek to destroy and disrupt our sustainment operations. In a near-peer conflict, all domains will be contested, and we will be the ones responsible for providing our own security and area defense. It will be imperative that we reduce our logistical footprint in order to be mobile and reduce the demand on supply line transportation. In recent events, Russia's logistical challenges in Ukraine highlight the important role that sustainment plays in LSCO. Russia's deep attack in the early days of the war came to a halt after units burned through supplies and their higher headquarters were unable to resupply them (Vershinin, 2022, para. 2). The Russian army's failure to properly maintain supply lines is a prime example of the crucial effect that sustainment has on the maneuver unit's ability to

successfully conduct operations deep in enemy territory.

In U.S. Army Aviation, the availability and access to fuel, ammunition, and maintenance parts are key to enable aviation units to accomplish their missions and sustain operations on the battlefield. In a LSCO environment, aviation units may be called upon to execute large-scale air assaults, medical evacuations, resupply missions, deliberate attacks, gun raids, and countless other tasks. Additionally, in such a dynamic environment, sustainment operations will most likely also include "air evacuation and air-land, airdrop, sling-load, and precision-guided deliveries of supplies and equipment" (Fogg et al., 2019, para. 16). In a LSCO fight, we can expect that delivery using fixed and rotary-wing air assets will become the norm rather than the exception (2019, para. 16). The number one goal in Army Aviation is to support the ground force. Therefore, in order for the ground force to be successful in LSCO, aviation units must be ready to overcome the logistical challenges that will undoubtedly present themselves. Most notably, the conducting of FARP operations and aircraft maintenance are the two biggest sustainment tasks that will either make or break the success of aviation in a LSCO fight. The Army Aviation force of tomorrow must be agile, adaptable, and modernized in order to achieve success against a more robust and complex enemy (Francis, n.d., para. 1). When identifying lessons learned and making recommendations for how to move forward, we must focus our efforts on training, personnel, organization, and materiel.

Steady, reliant, and rapid FARP operations play a vital role in the success of the maneuver force. However, as displayed by my personal experience at JRTC, most aviation FARPs within the combat aviation brigade (CAB) tend to be very large, slow to move, and positioned in rearward consolidation areas (Gill & Day, 2021, para. 4). In order to ensure that the LSCO fight does not outrun the CAB's refueling capability and ability to extend its operational reach, we must conduct effective training at the lowest level and make sure that personnel are qualified. To get to this point, brigade combat teams (BCTs) must begin training their forward support companies and brigade support battalions how to conduct aviation-specific FARP operations (Gill & Day, 2021, para. 4). The 101st Airborne Division, Fort Campbell, Kentucky, serves as a prime example of the type of training that needs to occur across the Army as a whole. In the past 18 months, the 101st purchased the necessary FARP equipment to certify every 92F Petroleum Specialist in pumping aviation-grade fuel (Gill & Day, 2021, para. 5).

U.S. Army Soldiers prepare to conduct a forward arming and refueling point at Mihail Kogălniceanu Air Base, Romania. U.S. Army photo by SPC Alexander Chatoff.

Moreover, each 92F conducted several iterations of familiarization and hot refuel operations that the CAB safety officer then certified (2021, para. 8). To conclude the training and certification of the 92Fs, the 101st conducted a validation exercise where Soldiers were given "a date, time, and grid coordinate to tactically convoy to, find cover and concealment, establish communication with the aviators, and expeditiously conduct FARP operations under the security of organic gun truck crews" (2021, para. 8). This culminating exercise ultimately validated that the 101st Airborne Division could safely and efficiently provide FARP capabilities without assistance from the CAB. By certifying and validating these 92Fs within the BCTs, the 101st created capabilities throughout the formation to rapidly support aviation assets and extend the division's reach, thus giving the commander multiple options while presenting the enemy with multiple dilemmas (2021, para. 4). Overall, conducting training such as this across the Army and certifying the right personnel will create redundancy within the BCTs and allow for more flexible and agile sustainment operations to take place on the LSCO battlefield.

The second key logistical task that will be of extreme importance in large-scale combat is aircraft maintenance. The Army Aviation community must develop doctrine that promotes adaptable sustainment operations and allows aviation units to conduct maintenance without relying on contract support and lengthy supply chains. To get to this point, however, aviation units must do everything they can to ensure Soldiers are receiving a high level of technical training guaranteeing their success in austere environments. Additionally, the Army must consider a restructuring of aviation maintenance delta companies as an organization.

In a LSCO fight, the area of operations will be vast, geographically dispersed, highly contested, and scattered across complex terrain. In order to prevent lags in supply lines and maximize efficiency, maintainers must be trained and prepared to operate and conduct maintenance operations in small teams. Major General David Francis emphasizes the importance of preparing aviation maintainers to rapidly regenerate combat power forward during LSCO operations when he states, "Instead of a robust maintenance company with 300 Soldiers, we may need to disperse 10 teams of 30 Soldiers throughout the battlefield" (n.d., para. 3). This statement highlights the need for well-trained, adaptable Soldiers and suggests that an organizational shift may be necessary to achieve stealthy, more dispersed sustainment operations in a LSCO environment.

In an effort to modernize aircraft maintenance, Army Aviation must also look for ways to improve the materiel that our units are equipped with to carry out maintenance tasks. It is essential that we create alternative solutions and ways to conduct maintenance in order

to be successful in the harsh environments we will be facing in a near-peer conflict. One way we can do this is by improving the way we get aircraft parts and materiel through what is known as additive manufacturing. Additive manufacturing is a process of advanced manufacturing that joins materials to make parts from 3D model data (Myers, 2022, para. 2). As an example, the U.S. Army Combat Capabilities Development Command Aviation & Missile Center recently used additive manufacturing to successfully create a prototype T700 engine inlet swirl frame, which is used on UH-60 Black Hawks and AH-64 Apaches (Sarantinos, 2020, para. 2). Some of the many advantages of additive manufacturing include fewer delays when conducting repairs, reduced wait time on back-ordered parts, increased performance, and lower costs.

By improving the materiel realm of Army Aviation through additive manufacturing and 3D printing, we will not only be able to minimize down time on critical pieces of equipment, but we will also be able to facilitate the production of parts and components further forward on the battlefield at the time and place they are needed (Myers, 2022, para. 7). Overall, this will reduce the maintenance burden on our maintainers, improve readiness, increase combat power, and make us more successful in large-scale combat.

In summary, the success of aviation sustainment operations during combat is vitally important to the success of the ground force. The ability to conduct rapid, forward FARP operations and adaptable aircraft maintenance on the LSCO battlefield will increase overall combat power and enable aviation units to perform any task assigned to them. In order to fully implement lessons learned, we must take a closer look at the areas of training, personnel, organization, and materiel. By becoming a more agile, adaptable, and modernized force in terms of sustainment, Army Aviation will be capable of providing the reliable, lethal, and timely support the ground force needs to accomplish its mission (Francis, n.d., para. 5).

Biography:

CPT Madison Maguire is a UH-60M pilot and graduate of the Aviation Captain's Career Course at Fort Novosel, Alabama. Her most recent assignment was in the 82D Combat Aviation Brigade at Fort Liberty, North Carolina. She served as a PL for the 82D Combat Aviation Brigade, 2D Assault Helicopter Battalion, and deployed to Poland as an unmanned aircraft system detachment leader for the 1st Squadron, 17th Cavalry Regiment at Fort Liberty.

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A U.S. Soldier performs routine maintenance on a UH-60 Black Hawk helicopter at an airfield in the Middle East. U.S. Army photo by SGT Francis Calabro.

UNDERSTANDING MUNITION FLIGHT PATHS AND CLEARANCE OF FIRES

By Mr. Nick A. Niewadomski

"What's the status of BB1035?!" "Still waiting on airspace, sir." Sound familiar? If you've worked in a command post at a brigade or higher echelon, you've no doubt heard these words yourself many, many times. Never in the history of warfare has the air domain seen as much activity and received as much attention as today. Unmanned aircraft systems are being employed in record numbers at every echelon by both friendly and enemy forces. The development of Extended Range Cannon Artillery and Precision Strike Missile weapon systems are increasing the effective range of our organic surface-to-surface (S2S) fires capabilities. Artillery munitions are travelling farther and higher than ever before, through increasingly congested airspace. Safely integrating S2S fires with friendly airspace users is a major concern for commanders. How do we mitigate the risk of fratricide while simultaneously providing effective S2S fires? While there is no perfect answer to this question, there are tactics, techniques, and procedures (TTPs) we can employ to assist commanders and their staffs in planning for and employing S2S fires without unnecessarily shutting down huge blocks of airspace. Utilizing munition flight path (MFP) geometry produced by the Advanced Field Artillery Tactical Data System (AFATDS)[1] in planning and execution can significantly reduce the time required to clear airspace for S2S fires.

> **"*Clearance of fires* is the process by which the supported commander ensures that fires or their effects will have no unintended consequences on friendly units or the scheme of maneuver"**– Field Manual 3-09, "Fire Support and Field Artillery Operations," (Department of the Army [DA], 2020, p. 3-17).

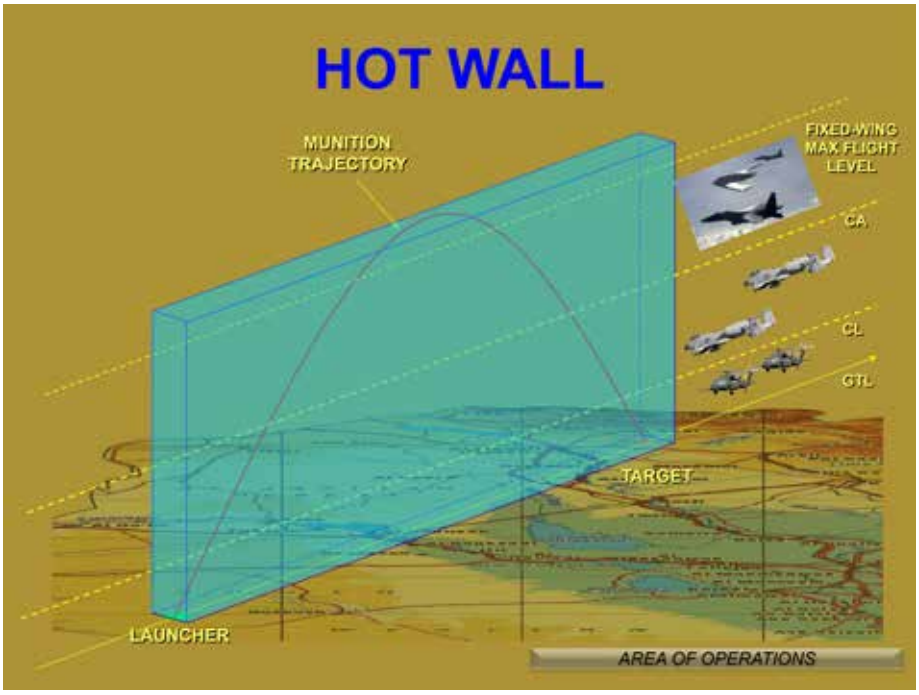

Figure 1. Example of the hot wall clearance method (Niewadomski, 2023c).

You might ask why I submitted an article to *Aviation Digest* that seems to have more of an artillery focus. Army Aviation, field artillery (FA), and joint airpower have more in common than one may think. Employing any of these capabilities requires the use of airspace. Inefficient clearance of fires procedures limits our ability to safely integrate S2S fires with friendly airspace users, ultimately decreasing our combat effectiveness. I'm not a pilot, but I can imagine the anxiety a pilot may feel knowing that cannons and rockets are firing while they're flying nearby. Regardless of your duty position or echelon, if you're involved in clearance of fires, I believe understanding the information, processes, and TTPs presented in this article will benefit you.

AIRSPACE CLEARANCE METHODS

The data required to clear airspace when conducting a S2S fire mission (FM) are the firing unit location, maximum altitude of the munition (MAX-

[1] "The AFATDS is an automated fire-support command, control, and communications system. It uses multiple-source information, such as situational awareness data, intelligence information data, and targeting data, to provide effective targeting decisions" (Bisht, 2022).

ORD), and target location. With these data, one of three methods is commonly used to clear airspace:

Hot Wall—Firing unit location, target location, and MAXORD data are relayed via voice or chat to affected airspace users. Airspace users are required to move away from the gun-target line (GTL) from surface to MAXORD until FM is complete. This process is fast but consumes a large amount of airspace and limits the airspace user's ability to maneuver in the air domain. Additionally, if aircraft are already operating along the GTL below the MAXORD, the FM may be delayed until the aircraft are mission complete, depending on commander's guidance and targeting priorities (Figure 1).

Goal Post—A restricted operations zone (ROZ) is established over the firing unit large enough to account for the area that the munition may use as it travels along its trajectory toward the target area up to the coordinating altitude (CA). A similar ROZ is established over the target. Above the CA, a ROZ is constructed from CA altitude to MAXORD altitude along the GTL, beginning and ending between the firing unit ROZ and target ROZ. This process takes more time and effort but allows friendly aircraft freedom to maneuver between the two established ROZs from surface to CA altitude along the GTL (Figure 2). Field Manual 3-52, "Airspace Control," (DA, 2016) provides additional information on CA.

MFP—A geometry produced by the AFATDS to visually represent the trajectory of the fired munition. The MFP is made up of 50 data points that depict the elevation the munition will be at as it passes through each point. The AFATDS operator can view MAXORD in feet-mean sea level in the MFP geometry details. The MFP can be sent to the Tactical Airspace Integration System (TAIS) via United States Message Text Format (USMTF), 2004 messaging. The TAIS receives the MFP as a special use airspace/surface-to-surface missile system (SUA/SSMS). The MFP minimizes the amount of airspace consumed and maximizes integration with other airspace users by accurately depicting the airspace consumed by the munition, cutting out the guess work and estimation employed by the hot wall and goal post techniques (Figure 3). The MFP also supports digital integration with the Army's TAIS, which reduces the chance for human error by maintaining data integrity. More information on airspace types and usages, such as the SUA/SSMS, may be found in Field Manual 3-52 (DA, 2016).

CREATING THE MFP

Minimizes the amount of airspace consumed, maximizes integration with other airspace users, and supports digital integration with TAIS…the MFP sounds great, right? You might even be asking yourself, "why haven't we already incorporated the use of MFPs across the force and solved the problem of clearing airspace?" While the MFP can provide benefits over the

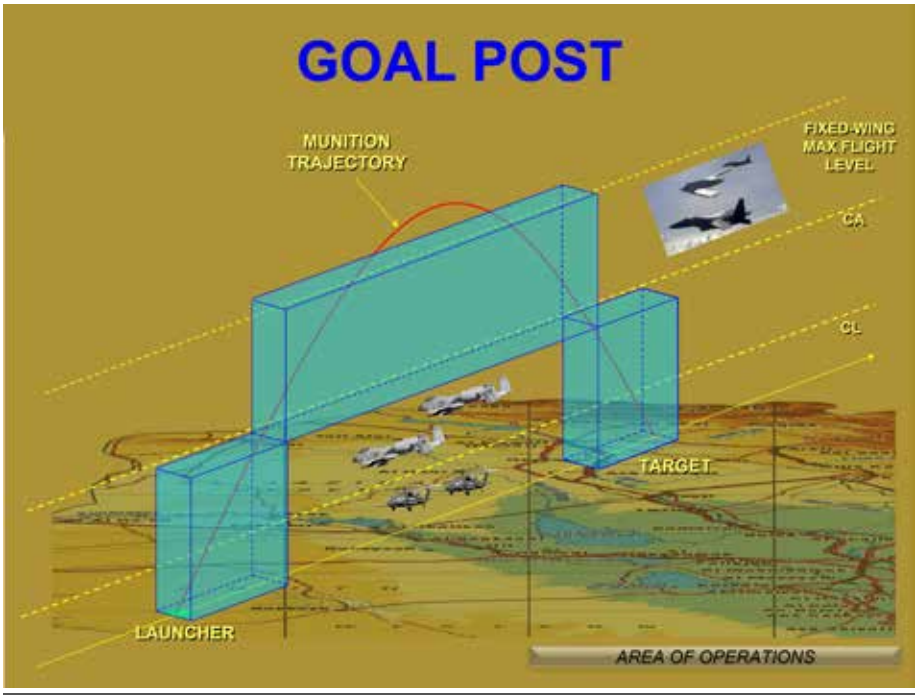

Figure 2. Example of goal post clearance method (Niewadomski, 2023b).

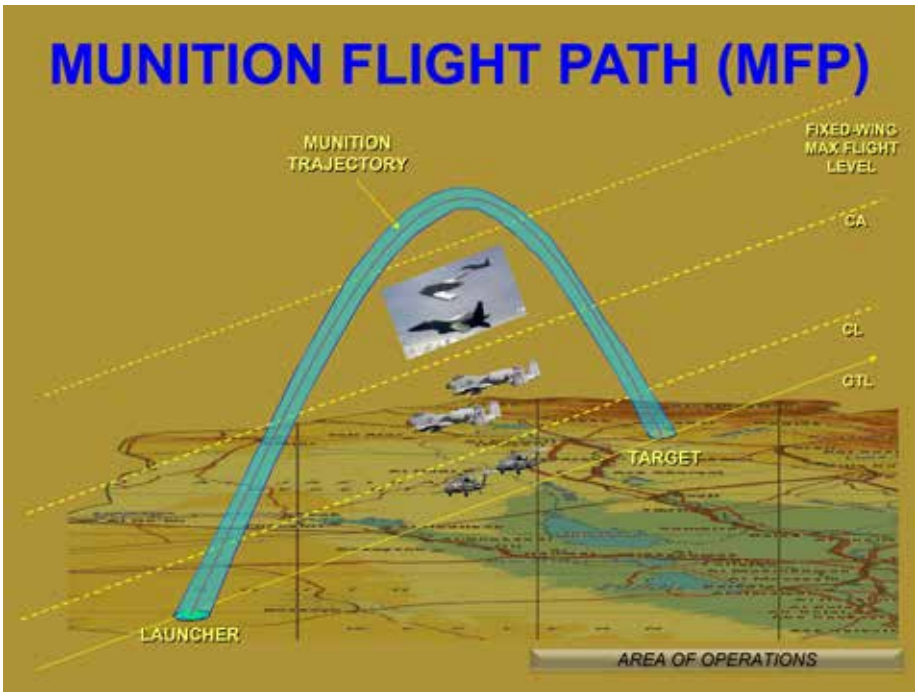

Figure 3. Example of MFP clearance method (Niewadomski, 2023d).

use of hot walls and goal posts, not everyone who uses AFATDS understands how to make the system produce MFP geometries (Figure 4).

As a Joint Fires/command and control (C2) systems instructor for the Army Joint Support Team (AJST), I often have students tell me that their systems never produce MFPs or that the fire support element (FSE) AFATDS at echelon never receives the MFP from their supporting fire direction center (FDC). There are numerous AFATDS configurations and user preferences that can hinder the MFP from being seen, but the most common issue I see is a simple lack of understanding on how and why the AFATDS creates MFPs. Ultimately, this is a training and education problem. Keeping that in mind, I'll explain the process in detail here.

The AFATDS creates MFP geometry only when it sends FM data to a firing unit. This can be a cannon unit or a rocket unit. The AFATDS will also create platoon area hazard (PAH) and target area hazard (TAH) geometries for rocket/missile munitions. If we were to trace a typical FM from initial creation to execution in a division (DIV) FSE, it would look like this:

1. Fire mission creation on DIV FSE AFATDS; sent to DIV artillery (DIVARTY) fire control element (FCE).

2. The DIVARTY FCE selects supporting FA battalion (BN) and sends FM to BN FDC.

3. The BN FDC chooses firing battery and sends FM to battery/platoon FDC.

4. Battery/platoon FDC computes technical firing data and sends to cannon/rocket launcher.

5. The FDC AFATDS creates MFP and automatically sends MFP back to the AFATDS that created FM.

Provided there is no break in digital communications, the MFP will be routed back through the BN FDC, DIVARTY FCE, and be received by the DIV FSE. Now that the DIV AFATDS has the MFP, it can be sent to DIV TAIS for airspace clearance. As you can see in step 5 (Creating the MFP), the MFP was not created until the FM was sent from an AFATDS to a firing unit. How much time did it take to process that FM at each echelon before it was sent down to the next FDC? That depends on other variables. How many other active FMs was the DIVARTY or the FA BN processing? Was there a higher priority FM taking place, such as a counter-fire mission? Was the AFATDS operator on guard duty and checking identification cards for 1SG? (I jest, but you would be surprised how often I have seen this). Allowing for only 20 seconds at each echelon, that's 1 minute and 20 seconds on the clock before the data required for airspace clearance are created and sent to the DIV. How can we speed this process up but still be safe, while providing a permissive environment for both S2S fires and friendly airspace users? Consider the following TTP:

Using Ghost Guns to Create MFPs

The term ghost gun refers to an artillery piece that does not actually exist. It's a gun created in the AFATDS and used to produce technical firing data for other guns. Ghost guns have been used to assist FDCs in checking data for safety, computing firing data for artillery platoons, and executing smoke missions. Ghost guns can also be used for plan-

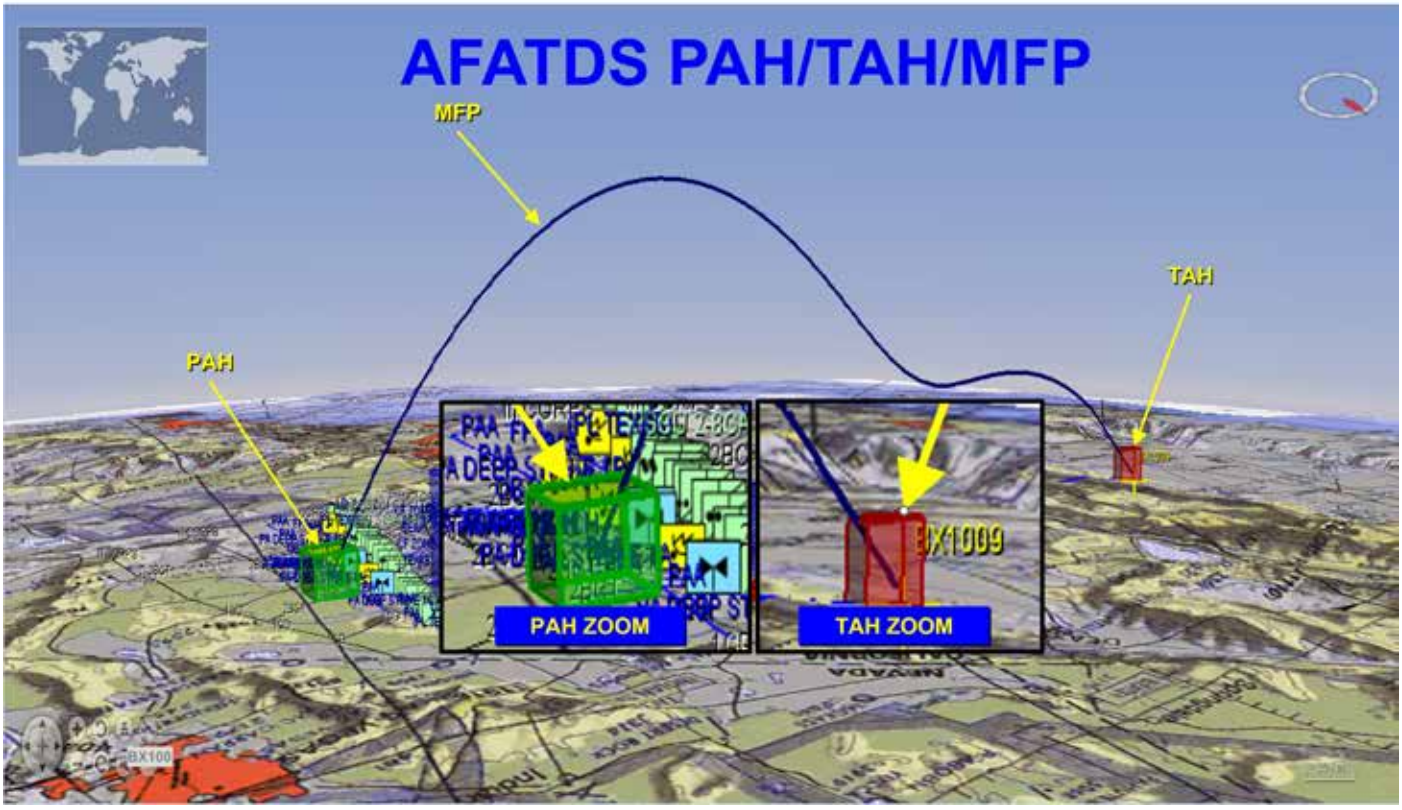

Figure 4. Example of AFATDS MFP geometry details (Niewadomski, 2023a).

ning and clearing airspace. By building a ghost gun on a higher echelon AFATDS and sending FM data to that ghost gun, the AFATDS will produce an MFP the same as it would at the FDC when sending data from the AFATDS to a real firing unit. Understanding how this process works and implementing its use in a CP can reduce airspace clearance times and enhance the integration of S2S fires with friendly airspace users.

There are two conditions that must be met for this TTP to be effective:

> Condition 1. Each ghost gun requires the same location, altitude, and ammunition data as the real firing unit.
>
> Condition 2. Ghost gun command and support relationships in the AFATDS unit database must be correctly configured, or the FM will not process down to the next echelon.

Is it realistic to expect tactical echelons below company/battery to have their unit location accurately displayed above a BN echelon 100% of the time? Field artillery cannon and rocket units conduct survivability movements after every FM to prevent enemy counter-fire. Artillery pieces may also move after being stationary for a certain amount of time or after receiving intelligence on enemy positions and movements. How then, do we meet the criteria required in condition 1? By using *Position Areas for Artillery (PAAs)*.[2] While a higher echelon FCE may not track the exact location of every gun/launcher, they should, at a minimum, have every planned PAA plotted on their AFATDS. By clearing the airspace from PAA-to-target rather than from gun-to-target, individual weapon location doesn't matter. Calculating data with a single ghost gun placed in the center of the PAA is sufficient for clearance of airspace. The ghost gun should use the average or maximum altitude of the PAA in its unit location. Use of this TTP requires supporting FA BNs to report which PAAs are active, or "hot," to their DIVARTY or FA brigade (FAB).

[2] PAA is defined in Field Manual 3-90-1 as, **"An area assigned to an artillery unit where individual artillery systems can maneuver to increase their survivability. A position area for artillery is not an area of operations for the artillery unit occupying it"** (DA, 2013, p. A-17).

The DIVARTY/FAB then chooses which PAA to shoot from. Training scenarios conducted with DIV/DIVARTY and CORPS/FAB staffs at AJST had great success executing this TTP.

As mentioned in condition 2, ghost guns must have the correct command/support relationships built in the AFATDS unit database. The ghost guns in the FCE AFATDS need to have the BN FDC listed as their command/support unit, NOT the battery/platoon FDC. After receiving an FM, the FCE will recalculate it and select the correct ghost gun as the unit to Fire for Effect (FFE). The AFATDS analyzes the command/support relationship during FM processing, so even when the FCE chooses "Send Selected" to ensure the FM is sent to the ghost gun, the AFATDS will also push the FM to the unit listed in the command/support relationship—in this case—the BN FDC. The BN FDC will process the FM as usual.

Let's retrace the FM thread from earlier using the ghost gun TTP now:

1. Fire mission creation on DIV FSE AFATDS, sent to DIVARTY FCE.

2. Division artillery FCE recalculates FM, chooses ghost gun in active PAA as unit to FFE, makes sure ghost gun option is selected, chooses "Send Selected." Fire mission is sent to ghost gun, triggering creation of the MFP. The MFP is automatically sent back to the AFATDS that created FM (DIV AFATDS). Simultaneously, FCE AFATDS sends FM down to FA BN FDC based on command/support relationship of ghost gun.

3. Battalion FDC sends FM to battery or platoon FDC for active PAA.

4. Battery/platoon FDC computes technical firing data and sends to cannon/rocket launcher.

5. The FDC AFATDS creates an MFP and automatically sends it back to the AFATDS that created the FM.

Now the MFP is available immediately after DIVARTY is done processing the FM. Data required for airspace clearance are available to the DIV FSE while the FM is still being transmitted through the lower echelons to the firing unit.

*Note: The AFATDS **DOES NOT** produce PAH/TAH/MFP for Rocket Munitions M26 and M26A1/A2. Tabular firing tables (fire control information in a tabular format) will need to be used to derive MAXORD without sending the FM to the launcher. Launcher or PAA elevation will need to be added manually.*

GHOST GUN TTP USED AT AJST DURING JAGIC TRAINING

The AJST provides Joint Air Ground Integration Center (JAGIC) training to Army DIV staffs and Air Support Operations Center (ASOC) personnel. The JAGIC is a modular and scalable center designed to fully integrate and coordinate fires and air operations over and in the DIV commander's area of operations (AO). The JAGIC conducts clearance of fires and control airspace users inside the DIV AO and the DIV commander's assigned volume of airspace. In a DIV target of opportunity battle drill resulting in a S2S fires solution, the JAGIC AFATDS operator initiates an FM on AFATDS and sends the FM to DIVARTY. The DIVARTY FCE AFATDS receives the FM and is expected to provide the JAGIC with PAA, MAXORD, and GTL. The DIVARTY FCE uses the ghost gun TTP to produce the MFP, which is automatically sent to the JAGIC AFATDS. The JAGIC AFATDS uses a data distribution feature to automatically send the MFP to TAIS.

The JAGIC AFATDS operator can also open the MFP geometry, view MAXORD and time of flight by selecting the "Details" tab, and manually send the MFP to TAIS and other C2 systems.

The benefits of using ghost guns to create MFPs are threefold. First, the time from receipt of FM to producing the required data is greatly reduced. Second, airspace clearance procedures are started before the firing unit receives the FM, reducing the amount of time the weapon system will be exposed on a firing point in At My Command status. Finally, MFPs are sent digitally to TAIS

U.S. service members participating in the first VIRTUAL FLAG exercise dedicated to training the Joint Air Ground Integration Center's command and control at the 705th Combat Training Squadron's Distributed Mission Operation Center, Kirtland Air Force Base, New Mexico, Aug. 23-27, 2021. U.S. Air Force photo by Debora Henley.

and reviewed by the DIV airspace element and the ASOC air space manager, which further assists in timely airspace clearance.

MFPS AND PREPLANNED FIRES

Munition flight paths enhance the ability of commanders and staffs to plan S2S fires. By understanding the capability of the AFATDS to produce MFPs without needing to send data to a real gun or launcher, FSEs can configure their AFATDS to use the ghost gun TTP to produce MFPs prior to an exercise or operation. During planning, FMs can have their associated MFPs digitally sent to TAIS to be added to the unit airspace plan (UAP). An Army UAP contains planned airspace coordinating measures (ACMs). Unit airspace plans are merged into a single UAP at each echelon and sent to the next higher headquarters; the merged UAP will eventually be digitally transmitted to the Theater Battle Management Core System (TBMCS)[3] by the Battlefield Coordination Detachment's TAIS. Airspace coordinating measures in the UAP will be added to the airspace control order (ACO), providing visibility across the joint force. Exercising this process guarantees airspace is formally planned and approved for preplanned FMs.

How do we apply this planning TTP to mobile targets or account for enemy actions that have yet to occur? Plans are great until it's time to execute and you realize that your plans have been rendered ineffective by unforeseen enemy movements or extreme weather conditions, etc. Despite our best efforts to plan for every possible scenario, things can and will go wrong. It is for this very reason that our planned fires need to be effective and timely, with enough flexibility built in to account for a rapidly changing combat environment. A way to get after planning for S2S fires utilizing MFPs is to identify target areas by creating target areas of interest (TAI). Using ghost guns to create MFPs by firing into TAIs where we expect enemy activity, adding these MFPs to our UAP, and getting the Army UAP on the ACO is how we communicate to the joint force what our airspace requirements are. It is not necessary to build an MFP to every target; one MFP from each PAA used to engage targets in that TAI will suffice. Another method is to shoot each corner of a TAI with a ghost gun, send the MFPs to TAIS, then use those MFPs to deconflict and build ACMs for friendly aircraft to operate in. If the planned ACMs don't interfere with the MFPs and pilots are disciplined enough to stay within the approved ACMs, there should be no reason to clear the airspace over the target area in execution unless by exception for unforeseen reasons. The goal of planned MFPs is to identify and

[3] "The TBMCS warfighting system integrates a suite of C2 applications, and a full range of air mission functions, sensor data and intelligence gathering, and automates many elements that comprise the planning and execution phases for theater air operations" (Lockheed Martin, 2000).

display the airspace we expect to use during FMs and prevent ACMs from being created that would conflict with future FMs.

BIG SKY, LITTLE BULLET? CORRECTION: BIG SKY, LOTS OF BULLETS

Our government realized many years ago the value of air power and how critical it is to control the air domain. That's why we have the largest air force in the world. Do you know which country claims the second largest air force? We do, via the Navy. That's right, we have the two largest air forces in the world. Our airpower is a major reason we are recognized as a global military superpower. The importance of clearing airspace before shooting long-range artillery cannot be understated. In addition to loss of life concerns, losing an aircraft greatly diminishes our overall combat power and drastically reduces our effectiveness long-term. But what happens when we're unable to establish immediate and lasting air superiority in future conflicts? How do we operate within a contested air domain? As we train for large-scale combat operations against a peer or near-peer threat, the value of long-range artillery is becoming more and more obvious. The ability to achieve effects on targets at great ranges with minimal risk to friendly forces is an asset to commanders at every echelon. Long-range FA fires directly support air-ground operations and enhance the lethality of maneuver commanders within their assigned AOs.

Soldiers with 2D Battalion, 11th Field Artillery, 25th Infantry Division work with M119 Howitzers to enhance their basic artillery skills on Schofield Barracks, Hawaii, June 14, 2020. U.S. Army photo by 1LT Stephanie Snyder.

"FA supports ground and air operations by attacking the enemy force throughout the depth of its formations and provides specific target engagement such as SEAD [Suppression of Enemy Air Defense]. ***FA fires can provide simultaneous precision strikes of targets at long ranges that other means cannot attack without significant risk ... FA is the maneuver commander's principal means for providing continuous and responsive indirect fires in support of large-scale ground combat operations*** *… it is the most potent and responsive, 24-hour, all weather combat multiplier available to maneuver commanders* [emphasis added]" (DA, 2020, p. 4-2, section 4-8; DA, 2020, pg. 4-1, section 4-4).

As the need for FA fires continues to increase, so too must our ability to safeguard friendly forces in the air domain. Understanding how to efficiently conduct clearance of fires increases the effectiveness of both S2S and air-to-surface fires by reducing the time it takes to coordinate and achieve effects against enemy targets.

Biography:

Nick Niewadomski enlisted in the Army as a Field Artillery Forward Observer in 2004. He was stationed at Fort Cavasos, Texas and Fort Carson, Colorado. He completed two combat tours in Iraq—Operational Iraqi Freedom (OIF) 05-06 and OIF 08-09. His awards include the Purple Heart Medal and Army Commendation Medal with Valor for his actions in combat. After separating from the Army in 2010, Nick worked as an AFATDS Field Software Engineer, based out of Fort Liberty, North Carolina. He supported Army units both inside the continental U.S. and outside the continental U.S., and he was the regional lead for AFATDS support in Afghanistan for Operation Enduring Freedom 10-11, 12-13, and 13-14. Nick currently teaches air-ground operations with the Army Joint Support Team in Hurlburt Field, Florida.

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Niewadomski, N. (2023a). *Example of the AFATDS MFP geometry details* (Figure 4).

Niewadomski, N. (2023b). *Example of a goal post clearance method* (Figure 2).

Niewadomski, N. (2023c). *Example of a hot wall clearance method* (Figure 1).

Niewadomski, N. (2023d). *Example of an MFP clearance method* (Figure 3).

Letter to the Editor

Dear Editor,

I appreciate SSG Perricone's article, *The Fix,* in the October-December 2022 issue of *Aviation Digest*. This was a great story but a terrible idea, unless you want the Army to go backward in time. The philosophy with the Army has been for quite some time, do more with less. The problem with specs, for example, is they receive E-6 pay for doing an E-4 job. They are very good at their job, overpaid, and don't feel it's their job to do some unit basic functions like run a range or to be responsible for anything outside their shop area. That promotes a negative attitude for senior enlisted in the unit. The hard stripe NCOs are expected to maintain high Army standards and to take charge when told to do so, unlike the specs.

In order to pursue any research on the history of this you would have to deal with retirees, since specs were phased out just before my time of enlistment in 1985. Good story, but would be a shot in the foot if it came back.

Mr. William (Bill) M. Storrs

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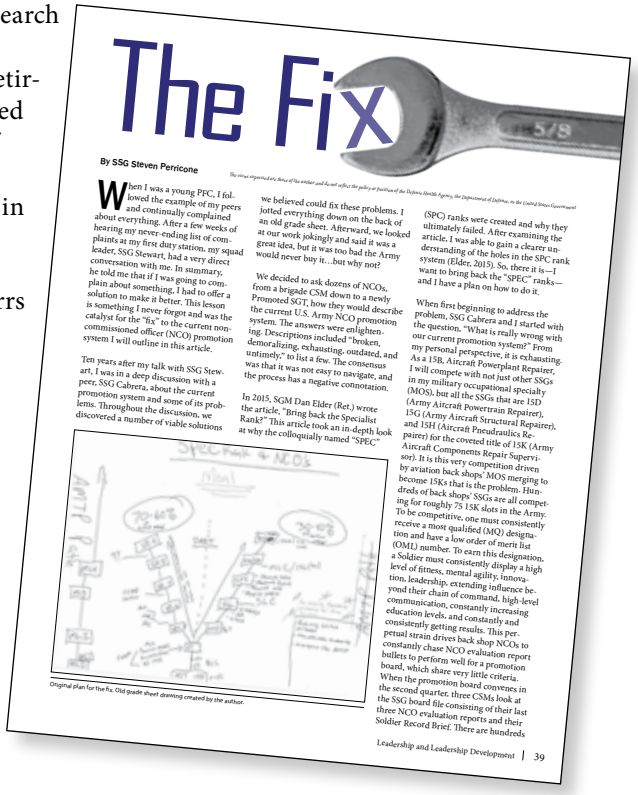

The Fix

By SSG Steven Perricone

The views expressed in this Point of View are those of the author and do not reflect the policy or position of the Defense Health Agency, the Department of Defense, or the United States Government.

When I was a young PFC, I followed the example of my peers and continually complained about everything. After a few weeks of hearing my never-ending list of complaints at my first duty station, my squad leader, SSG Stewart, had a very direct conversation with me. In summary, he told me that if I was going to complain about something, I had to offer a solution to make it better. This lesson is something I never forgot and was the catalyst for the "fix" to the current noncommissioned officer (NCO) promotion system I will outline in this article.

Ten years after my talk with SSG Stewart, I was in a deep discussion with a peer, SSG Cabrera, about the current promotion system and some of its problems. Throughout the discussion, we discovered a number of viable solutions we believed could fix these problems. I jotted everything down on the back of an old grade sheet. Afterward, we looked at our work jokingly and said it was a great idea, but it was too bad the Army would never buy it…but why not?

We decided to ask dozens of NCOs, from a brigade CSM down to a newly Promoted SGT, how they would describe the current U.S. Army NCO promotion system. The answers were enlightening. Descriptions included "broken, demoralizing, exhausting, outdated, and untimely," to list a few. The consensus was that it was not easy to navigate, and the process has a negative connotation.

In 2015, SGM Dan Elder (Ret.) wrote the article, "Bring back the Specialist Rank?" This article took an in-depth look at why the colloquially named "SPEC" (SPC) ranks were created and why they ultimately failed. After examining the article, I was able to gain a clearer understanding of the holes in the SPC rank system (Elder, 2015). So, there it is—I want to bring back the "SPEC" ranks—and I have a plan on how to do it.

When first beginning to address the problem, SSG Cabrera and I started with the question, "What is really wrong with our current promotion system?" From my personal perspective, it is exhausting. As a 15B, Aircraft Powerplant Repairer, I will compete with not just other SSGs in my military occupational specialty (MOS), but all the SSGs that are 15D (Army Aircraft Powertrain Repairer), 15G (Army Aircraft Structural Repairer), and 15H (Aircraft Pneudraulics Repairer) for the coveted title of 15K (Army Aircraft Components Repair Supervisor). It is this very competition driven by aviation back shops' MOS merging to become 15Ks that is the problem. Hundreds of back shops' SSGs are all competing for roughly 75 15K slots in the Army. To be competitive, one must consistently receive a most qualified (MQ) designation and have a low order of merit list (OML) number. To earn this designation, a Soldier must consistently display a high level of fitness, mental agility, innovation, leadership, extending influence beyond their chain of command, high-level communication, constantly increasing education levels, and constantly and consistently getting results. This perpetual strain drives back shop NCOs to constantly chase NCO evaluation report billets to perform well for a promotion board, which share very little criteria. When the promotion board convenes in the second quarter, three CSMs look at the SSG board file consisting of their last three NCO evaluation reports and their Soldier Record Brief. There are hundreds

Original plan for the fix. Old grade sheet drawing created by the author.

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.

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At the end of each year, DOTD and the *Aviation Digest* team review articles from the year's four issues and award its top choice the *Aviation Digest* Annual Writing Award. The winning author will receive a Certificate of Appreciation designating their article as the *Aviation Digest* Article of the Year.

The *Aviation Digest* Annual Writing Award for 2022 is presented to **CPT Ashley Hendrickson Howard** for her contribution in penning, **"Family Planning for the 21st Century Aviatrix"** published in Volume 10/Issue 4 (October-December 2022, pp. 44-46).

Congratulations, CPT Howard!!

Read it online in our issue archive:
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Has the author recommended revised tactics, techniques, and procedures for commonly accepted operational practices that simplify and increase efficiencies?

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

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

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

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

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

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

Did you understand the author's message?

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The runner-up for the *Aviation Digest* 2022 Annual Writing Award is presented to **LTC Steven P. Sevigny and CPT Caroline E. Smith**, for their contribution in penning, **"Lessons Learned for the Force: Battalion Field Training Exercise,"** published in Volume 10/Issue 4 (October-December 2022, pp. 33-38).

Congratulations, LTC Sevigny and CPT Smith!!

Read it online in our issue archive:
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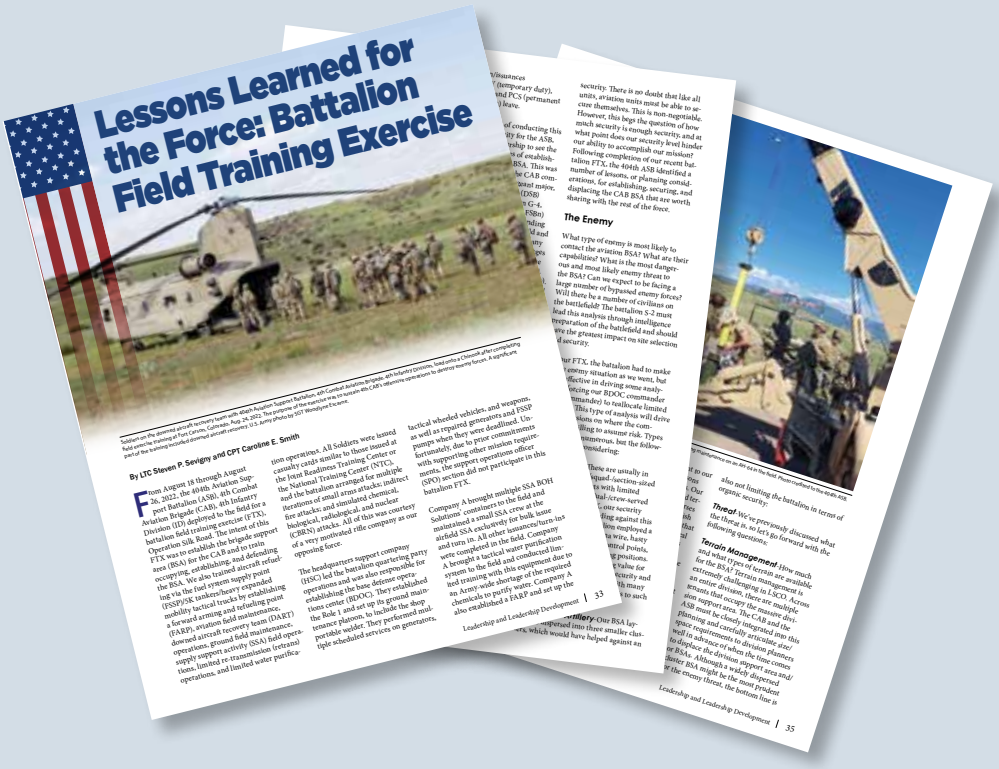

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Army Aviation

Tactical Communications and Airspace Management

By CPT Kenneth D. Dailey

U.S. Army Black Hawks take off in a multi-ship formation for Army Aviation training in New Jersey. Photo by U.S. Air National Guard MSgt Matt Hecht.

Multidomain operations require the Army to operate with increased precision over an unpredictable battlefield. This battlefield will be highly complex with an increased use of technology to provide high-fidelity information to numerous users across greater depths. The airspace is of critical importance as it will likely be overpopulated with users ranging from large fixed-wing assets, rotary-wing assets, and a plethora of small unmanned aircraft systems (sUAS). Although conventional airspace deconfliction methods will be used, there will be a need to minimize risk at the highest point of friction within the first 100 feet of airspace from the ground where the majority of rotary wing and sUAS will be operating. Currently, Link 16 provides the critical data link capable of increasing precision for the Army to successfully operate in a dynamic, joint environment both on the battlefield and within the airspace. Link 16 equipment fielding and training to all company-level Army Aviation formations in the next 5 years will make us capable of safe operability and deconfliction within the joint airspace environment.[1]

Observation

Currently, the Army's AH-64E fleet is equipped with a Link 16 Small Tactical Terminal (STT), two-channel software-defined radio. Unfortunately, this is the only Link 16 equipment within Army Aviation, except for minimal ground command post terminals existing at the brigade level. Additionally, the equipment is often severely outdated with software that's unable to be used with the current version of STTs. During the Defender-Europe 21 (Defender 21) training exercise in Estonia (northern Europe), AH-64E crews relied on Link 16 and its J-Voice[2] capability to integrate with the Italian F-35 stealth multirole combat aircraft, Estonia Defense Force, and the Estonia Link 16 network. Apache crews viewed the fighter aircraft on digital displays to view their flight profiles, simulated engagements, and simulated targeting before even taking off for the integrated attack. During the attack, crews were able to send and receive both secure digital and voice communications back and forth, drastically improving their awareness and lethality. The AH-64E air mission commander could simultaneously observe AH-64E crews' sensor positions, laser designations, and engagements without any voice communications within the flight. Crews could view the altitude, airspeed, and trajectory of all aircraft straight from the digital map display in the cockpit. This operation exemplified the AH-64E's Link 16 tactical capability in a joint environment during a simulated, dynamic fight.

Link 16 is also capable of enabling timely and accurate situational awareness to command posts critical to synchronizing efforts across the battlefield. Traditionally, Army Aviation relies on an Execution Checklist (ExCheck) usually relayed through unreliable, over-the-horizon communication platforms. This capability is outdated—often lagging in time—and does not provide a clear pic-

[1]"**Link16** is a standardized communications system used by U.S. NATO, and Coalition forces for transmitting and exchanging real time tactical data using links between allied military network participants."
https://www.baesystems.com/en-us/definition/what-is-link-16

[2]"The Terminal Voice Control Unit (TVCU) has both local and remote J-Voice capability allowing Link 16 voice to be connected to a remote handset/headset over a secure IP network." https://www.curtisswrightds.com/products/networking-communications/tdl-processing/network-simulation/terminal-housing-case

ture of the battlespace. Additionally, this takes away from the lethality and functionality of the aircrews during critical stages of the operation by creating a task to report to the command post. Link 16 eliminates the work on the aircrews and creates real-time tracking of the entire battlespace. During Defender 21, the Air Force provided joint terminal attack controllers (or JTACs) to our task force that operated with a ground-based Link 16 terminal. This terminal provided the command post with the most accurate, high-fidelity information about each aircraft flying instead of just a poorly communicated word from an ExCheck.

Insight

Multidomain operations critically rely on the Army's ability to integrate and synchronize assets in a joint environment requiring a secure tactical data link to provide increased situational awareness for all users. Henry Kenyon stated in his article, *Improving the Reach, Resiliency and Relevancy of Link 16*, "As military operations become more dependent on networked sensors and shooters seamlessly working together, there is a greater need for sharing critical information in real time to meet today's and tomorrow's challenges" (Kenyon, 2022, para. 1). In October 2022, it was announced that L3Harris Technologies would buy Viasat's Link 16 portfolio for $1.96 billion to improve and expand its capability for future warfighters (Demarest, 2022, para. 1). Link 16's ability to provide all users with real-time data makes us more lethal in the fight. Unfortunately, Army Aviation is lacking the materiel equipment fielding, training in multidomain operations, and Army doctrine necessary for uniform standards of use across all echelons of Army Aviation command.

Materiel shortcomings lie primarily with Army Aviation command posts not being equipped with the proper Link 16 ground systems and software updates to integrate with updated AH-64E STTs. The command post is a critical command node that needs to obtain real-time information without degrading the performance of the aviator fighting the fight far away. The Army focuses too narrowly on its aviation capability fighting in conjunction with Army ground force equipment and its ability to talk without neglecting the essential integration in a joint environment. Additionally, Link 16 relies on line-of-sight capability. "Link 16 is a frequency-hopping, jam-resistant, high-capacity data link … Link 16 operates on the principle of Time Division Multiple Access (TDMA)" (Keysight Technologies, 2022, para. 4). Link 16 can operate over similar ranges compared to over-the-horizon communication with more accuracy, reliability, and clarity due to its network. Each user allows the ability to extend the network's range. After command post equipment fielding, Army Aviation should focus on equipping UAS and lift assets with Link 16 to extend the network range and to increase the ability to synchronize all aviation assets in one integrated and reliable system.

Unfortunately, Link 16 is underutilized due to a lack of user knowledge and training. Training often neglects the use of Link 16 at lower echelons because crews rely on the internal Longbow networks, and Link 16 requires daily communication security loads to ensure the highest level of security. This was alleviated with a recent software update, allowing the STT to hold an entire month's security keys, which makes it easier for the user to access the equipment during training and operations. Although Longbow networks are convenient, they don't provide the essential awareness to higher echelons that Link 16 is capable of. Link 16 not only provides real-time data to crewmembers at the forefront of the fight but also relays that information far away to command nodes in support of the integrated fight. With an increase of equipment, the Army needs to priori-

Army command and control systems integrators use Link 16 cyber domain-aligned communication capabilities during a unilateral joint training exercise designed to refine systems and concepts in order to enhance tactical planning, coordination, and interoperability in a multidomain environment. U.S. Army photo by SGT Raquel Birk.

U.S. Army Aviation supports Sensor-To-Shooter training via Link 16 capability in the multidomain battlespace during exercise Orient Shield 21-1, Okinawa, Japan. Photo courtesy of U.S. Marine Cpl Carla Elizabeth O.

tize training to ensure users understand the full capabilities and importance of the system.

Army doctrine is severely lacking with respect to Link 16. Link 16 can only be found in the AH-64E operator manual (access is common access card-enabled).[3] This requires aviators to rely on Boeing's AH-64E Link 16 presentation and the Army's Link 16 Aviation and Missile Command's logistics assistance representatives, who are "stationed or deployed with Soldiers to support aviation and missile systems" (Hawkins, 2015). This shortcoming leads units to disregard the Link 16 system. If Army doctrine emphasized Link 16 and the need for a tactical data link, aircrews would be more capable of using the system and standardizing the use of it. Army Aviation gunnery doctrine does not mention Link 16 creating the need for unit master gunners and senior aviators to take the initiative to incorporate the use of Link 16 in their own simulated training. If the Army standardized the training of Link 16 through doctrine, all aviators would be trained and capable of using the system.

[3] https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1026214

Lessons Learned

Although Link 16 is an extremely capable system in its current format, there are two functionalities that could be added to significantly increase the safety and lethality of Army Aviation. The first includes the capability to provide airspace alerts for sUAS and other airspace users in proximity. The second capability is creating simulation messaging from the ground-based terminal in order to allow command posts the ability to simulate better training against threats for the aircrews.

Link 16's safety and lethality would dramatically increase with the addition of advanced airspace awareness. Currently, Link 16 enables the AH-64E pilot to see symbology in the Integrated Helmet and Display Sight System (IHADSS). AH-64E pilots rely on forward-looking infrared (FLIR) imagery through the IHADSS to safely fly and navigate the aircraft. The FLIR displays imagery detected from infrared light released by heated objects. This is used to depict other aircraft flying and is especially important for pilots when flying in formation, often closely, behind another aircraft. Link 16 enhances pilot situational awareness by enabling the pilot to see other aircraft flying in the airspace with a symbol in the eye display. In the settings, the pilot can select specific parameters to filter out symbols above a certain entered altitude value and distance from their own aircraft. Currently, the icons displayed within an aircraft are found from other aircraft using Link 16 in the network. Two viable additions exist to increase pilot awareness for condensed airspace. The first would include adding a Link 16 terminal into UAS that would enable manned aircraft to view them through symbology. The second option would be to add a robust Link 16 radar system, like the current ground-based radars, to an airborne aircraft like a forward air controller–Airborne, or FAC(A), which "is the airborne equivalent of a joint terminal air controller" (Benitez, 2017). This system would then automatically integrate with Link 16 users in the network and provide airspace alerts for safety in congested airspace. A combination of these two additions to Link 16 would provide superior situational awareness to pilots in the future congested airspace.

The next addition to Link 16 includes enabling simulated threat messaging from a ground command post Link 16 system. Too often, pilots train against threats with no cockpit indications. Adding this capability would enable the command posts to train with aircrews in simulated environments, sending simulated threats to the cockpit through the Link 16 system. This would require the aircrews to react to a realistic threat and provide more applicable training in missions. In addition, this would incorporate the command post into flight tracking and training, improving their ability to integrate the fight.

Conclusion

Link 16 is a vital tactical communications platform that needs to be trained for future multidomain operations. In its current form, Link 16 is a proven system within the AH-64E that drastically improves the integration in the joint tactical environment. It would be in Army Aviation's best interest to expand the materiel fielding of Link 16 systems, improve the training of multidomain operations and tactical exercises using Link 16, and develop clear doctrine that incorporates the use and uniform standards of use for Link 16. Finally, Link 16 needs to continue to develop capabilities to maintain its functionalities for the future fight, targeting low-altitude airspace and training against realistic threats. I am confident the Army will continue to improve its training and use of Link 16, while Link 16 continues to improve the critical data link capabilities for future warfighters.

Soldiers load a CH-47 Chinook for air assault training during Swift Response 21, a linked exercise of Defender-Europe 21. Defender-Europe 21 is a large-scale U.S. Army-led exercise designed to build readiness and interoperability between the U.S., NATO allies, and partner militaries. U.S. Army photo by SSG Christopher Muncy.

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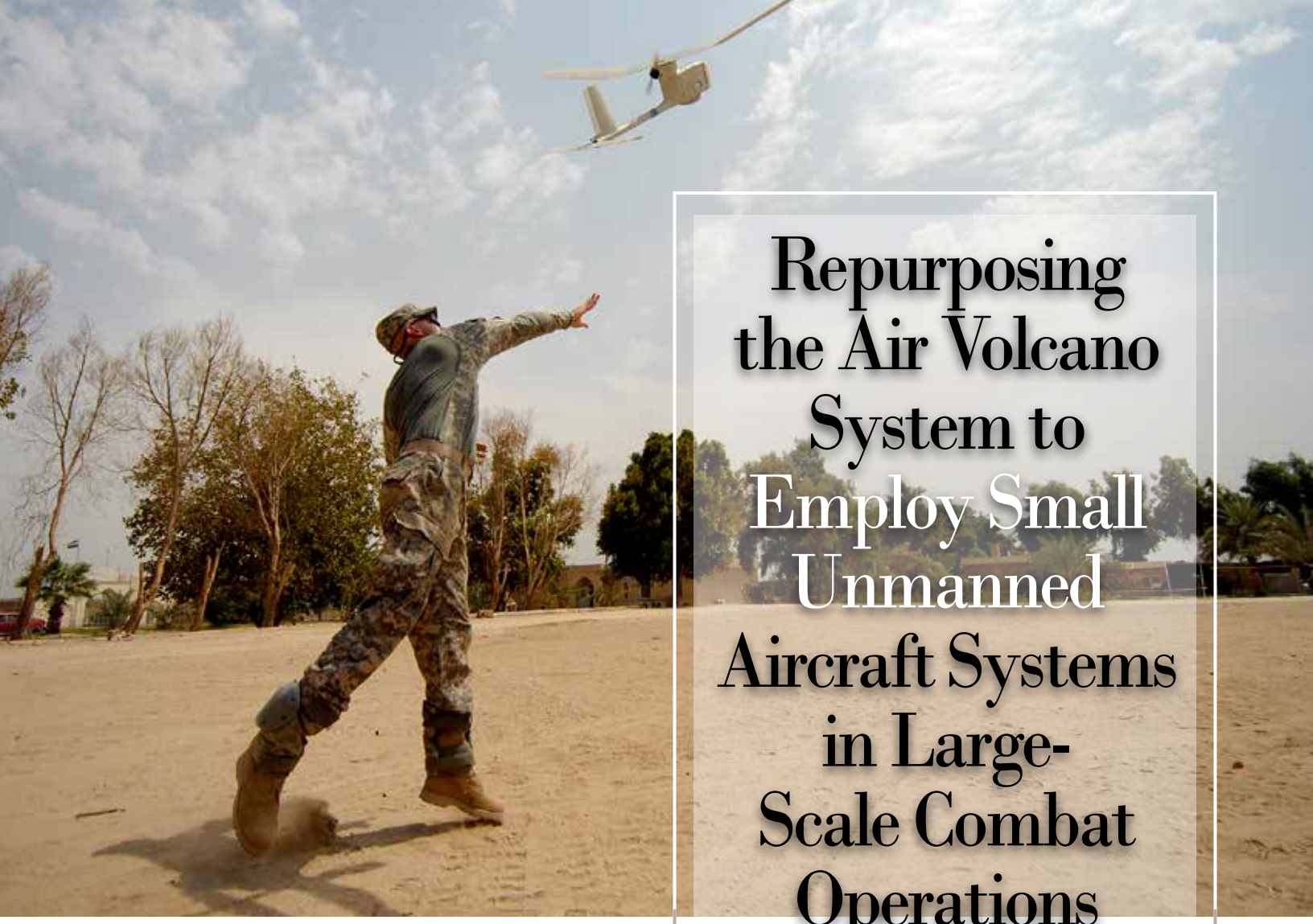

Repurposing the Air Volcano System to Employ Small Unmanned Aircraft Systems in Large-Scale Combat Operations

A U.S. Army Soldier launches an RQ-11B Raven, a small unmanned aerial system, at the Joint Security Station Doura, Baghdad. U.S. Navy photo by PO2 Joan Kretschmer.

By CPT Daniel R. White

The modern large-scale combat operations (LSCO) battlefield will be filled with a multitude of advancing technology that can ultimately give the decisive advantage to the side most effectively utilizing that advanced technology.

In the past 5 years, the main piece of technology proven to be a crucial asset, a devastating weapon, and low-cost piece of equipment is unmanned aircraft systems (UAS). As both military and commercial UAS become smaller, cheaper, and more capable, they also provide many capabilities to the military such as Intelligence, Surveillance, and Reconnaissance (ISR) and even direct attack platforms. In the past 3 years, UAS have proven to be crucial assets that have won wars (Antal, 2022; Yunis, 2021). One challenge the U.S. military faces that can be answered by the use of small UAS (sUAS) is the ability to extend a commander's influence across the battlefield as far as possible. Army Aviation already has the assets to push sUAS even further and allow commanders to emplace those unmanned systems deeper by repurposing an underused system. Army Aviation should configure and utilize the Air Volcano system[1] to launch sUAS, enabling the ground force commander to have sensors, and even offensive capabilities, deeper into the battlespace.

Effects of competent UAS use were seen in the 2020 Second Nagorno-Karabakh War, where Azerbaijan utilized UAS that had little-to-no radar cross section to identify Armenian high payoff targets for either indirect fires or to be attacked with armed UAS. In about a week, Azerbaijan had destroyed almost all their high payoff targets with their ground forces seeing little-to-no close combat (Antal, 2022, pp. 50-58). In 2021, Israel fought and won what they called "The first AI war" during Operation Guardian of the Walls . They destroyed key Hamas positions and personnel in 11 days with the use of artificial intelligence (AI) assets conducting reconnaissance and discriminating targets, thus speeding up the kill chain exponentially (Dar, 2021).

These recent examples show the effectiveness of unmanned systems, and I believe that utilizing the Air Volcano to employ such systems in a LSCO environment

[1]"The [Air Volcano] system is designed to rapidly scatter mines to create large minefields, meant to delay/disrupt enemy movement and protect the flanks of friendly units on the ground, by laying 960 mines in under one minute." https://www.businessinsider.com/new-army-units-training-to-use-volcano-mine-delivery-system-2021-1

will give the Army an advantage over the enemy by being able to place sensors farther than before. This capability will give ground force commanders the ability to see and strike the enemy further, without the need of establishing line-of-sight ground control stations.

The Volcano system "can be loaded with up to 160 canisters that each hold six mines, both antitank and antipersonnel, for a total of 960 mines. The Volcano alternately deploys the canisters from the right and the left sides of the unit, scattering mines across a vast area" (Ross, 2014). Further, "The M139 Volcano can be fitted with two types of canisters including M-87 Canister loaded with 1 AP (anti-personnel) mine and 5 AT (anti-tank) mines or M-87A1 Canister with 6 AT (anti-tank) mines" (Air Recognition, 2020). While the current Volcano system limits the size and type of UAS available for use, there are a wide variety being developed to smaller sizes and capabilities. Another option is to utilize a larger UAS that would require the entire length of the canister. This would still provide an immense saturation of the objective area.

Aside from ISR, an example of how this can be used is by employing these UAS around an area to prevent the use of enemy rotary-wing aircraft. An enemy airfield or avenue of approach that was previously inaccessible due to distance behind the forward line of troops or enemy protections can now be targeted by flying a UH-60 as close to the area as safely possible before launching the UAS. The UAS then proceed to the objective relatively undetected, due to their small size and virtually nonexistent radar cross sections (Department of the Army, 2016, p. 1-6, section 1-28). The swarming UAS would then present both a hazard to enemy flight, as well as a determent to the enemy's morale upon seeing those systems in an area they previously believed to be relatively safe.

Unmanned aircraft systems can be utilized in three main roles: **surveillance, indirect attack, and direct attack** (Department of the Army, 2016, p. 3-12). Currently, at a tactical level, those capabilities are usually limited to line-of-sight between the UAS and a ground control system and therefore limit a commander's ability to conduct surveillance and reconnaissance deep into enemy territory. This is where the ground controller may be dangerously close to the enemy, and thus chooses to operate farther away. However, if those systems were able to begin their employment at the maximum distance a UH-60 could fly to, their range has just been extended well beyond where a ground control station would have been statically emplaced. Also, many new group 1 or group 2[2] systems could be preprogramed and utilize AI to conduct their mission—whether gathering intelligence, identifying targets for indirect fire, or even armed with small munitions and conduct direct attacks—all without a human operator maintaining line-of-sight communication with such systems. The sUAS could be preprogrammed with specific flight paths and targets to engage, similar to Azerbaijani tactics in 2020 or with AI software, that could discriminate targets without requiring a human operator, thus rapidly speeding up the kill chain, similar to the Israeli tactics in 2021 (Antal, 2022, pp. 50-58; Dar, 2021). An alternative to relying solely on AI or preprogramming would also be to pair the UAS with another current system, such as the Army Airborne Command and Control System (A2C2S) mission equipment package or the Airborne Battle Command and Control (ABC2) System. Ideally, the A2C2S would be integrated onto an aircraft that would accompany the launching aircraft due to weight considerations of both the A2C2S and the Volcano. This also includes the smaller and much lighter

[2]Army Techniques Publication 3-01.81, "Counter-Unmanned Aircraft System Techniques," classifies **group 1** UAS as mini/micro weighing less than 20 pounds and **group 2** UAS as small tactical weighing between 21 and 55 pounds. Each group also has associated altitudes and airspeeds they operate within" (Department of the Army, 2017, p. 1-2).

Soldiers conduct Volcano system training using a UH-60 Black Hawk at Makua Range, Hawaii. U.S. Army photo by SGT Sarah D. Sangster.

ABC2 System, which could potentially be on the launching aircraft. This could allow a commander both deep employment of their UAS, as well as a means to control and direct their actions closer to the enemy than they would have been able to with a ground control station.

Lastly, the Air Volcano could be utilized to employ loitering or smart munitions, such as the WB Group's Warmate or the AeroVironment's Switchblade 300 miniature loitering munition and the Roketsan MAM-C/L smart munitions, to provide a commander another direct strike capability deeper into the battlespace than if they were to launch the munition from the safety of a rear ground control station. These munitions could again be paired with an onboard command and control system, such as another aircraft with A2C2S or even the launching aircraft with ABC2, or they could be preprogrammed to identify and engage predetermined targets through global positioning system or inertial navigation (Asian Military Review, 2019). Depending on the munition used, there may need to be some slight modifications for the initial launch, mainly on loitering munitions, such as the Warmate, featuring "folding wings, and a special-purpose multiple-use pod is used for launch" (Sabak, 2021), but would provide a greater warhead to be utilized rather than using only group 1 UAS designed to impact a target. However, the Switchblade 300 Block 20 "lightweight, miniature, precision-guided lethal missile," (AeroVironment, 2023) could fit inside a Volcano canister[3] and is already designed to unfold its wings upon launch (Army Recognition, 2019). The Switchblade would therefore be a simple change in the tactics, techniques, and procedure to employ it from a UH-60 with the Air Volcano.

In conclusion, while there are many technological advances on the horizon that will enable commanders to see and strike further, the M139 Volcano should be repurposed now to employ sUAS, which will give our commanders an immediate technological advantage. By employing mini, micro, and tactical UAS or loitering munitions from the Air Volcano system on a UH-60, a ground commander's ability to sense and strike deeper into the battlespace can be immensely improved. Whether those systems are conducting reconnaissance, directing indirect fires, engaging targets themselves, or simply denying an enemy use of a specific area due to a swarm of small drones, a commander will have a greater advantage by being able to employ those systems from an aircraft, as opposed to a rear positioned ground control station. Once employed, those systems could be controlled with the A2C2S or ABC2, or could even be fire-and forget-assets with preprogrammed flight paths and targets or autonomously controlled with AI. Regardless of the method of control chosen, the key aspect of utilizing the existing Air Volcano to employ those sUAS will give commanders deeper capabilities in the battlefield today by simply repurposing equipment that is already on hand.

The Warmate loitering munition is fully designed and manufactured in Poland by WB Group. Photo courtesy of WB Group.

Biography:

CPT Daniel White is a UH-60 pilot currently in the Aviation Captains Career Course. He was previously assigned to the 1st Air Cavalry Brigade at Fort Hood (Cavazos), Texas, where he served as a Component Repair Platoon Leader in the 615th Aviation Support Battalion, a Flight Company Platoon Leader in Company A, 3/227th Assault Helicopter Battalion (AHB), an Assistant S3, and the Home Station Mission Commander for the 3/227th AHB during its recent Operation Atlantic Resolve rotation. He has a B.A. degree in History from California State University, Fullerton, where he commissioned in 2017.

[3] "The Switchblade 300 is designed as an expendable UAV to increase precision firepower for platoon-sized infantry units. It has a length of 610 mm and weighs 2.7 kg including the carrying case and launcher, making it small and light enough for one soldier to carry. The name switchblade comes from the way the spring-loaded wings are folded up inside a tube and flip out once it gets airborne" (Army Recognition, 2019).

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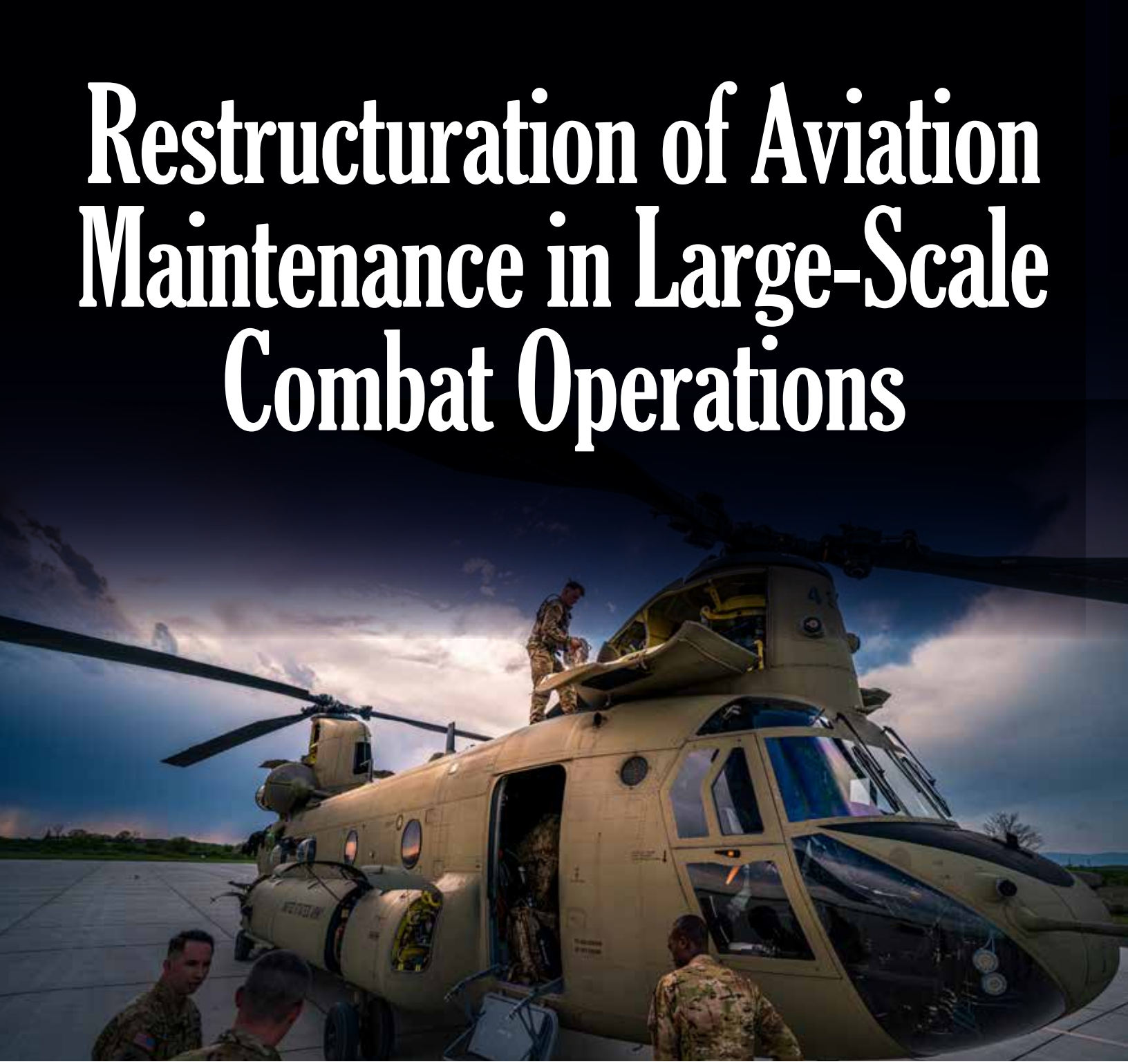
Restructuration of Aviation Maintenance in Large-Scale Combat Operations



A CH-47 crew performs post-flight maintenance checks for Exercise Swift Response, part of DEFENDER-Europe 21. U.S. Army photo by MAJ Robert Fellingham.

By CPT Virginia M. Jahr

Large-scale combat operations (LSCO) will require aviation brigades (BDEs) to operate in a decentralized organizational structure. To withstand the capabilities of our peer/near-peer adversaries, the current practice of placing an entire task force or BDE-size element into a single Tactical Assembly Area (TAA)[1] is no longer feasible. Individual companies and platoons will be required to operate while detached from the main headquarters element. This will have a negative impact on an already overstressed logistical system. With aircraft dispersed across the area of operations (AO), maintenance teams will need to travel further to support maintenance efforts, resulting in additional transportation and security requirements and increasing aircraft non mission-capable time. The impact of this

[1]The DoD Dictionary of Military and Associated Terms (2022) defines the tactical assembly area as, "An area that is generally out of the reach of light artillery and the location where units make final preparations (pre-combat checks and inspections) and rest, prior to moving to the line of departure." https://jdeis.js.mil/jdeis/new_pubs/dictionary.pdf

A U.S. Army Soldier responds to a crashed helicopter scenario at Fort Hunter Liggett, California. U.S. Army photo by 1LT Kevin Braafladt.

delay could be detrimental to the success of the mission. To mitigate this delay and preserve combat power, maintenance operations must be immediately executed efficiently and effectively across the battlespace. This can be best accomplished if each company possesses internal capabilities to conduct field-level aircraft maintenance autonomously within their individual TAAs.

Field Manual (FM) 3-0, "Operations," urges leaders to think critically and creatively today to better prepare for tomorrow's operational environment (OE). Army units operating in armed conflict against peer/near-peer adversaries will see increased difficulty when preparing for and navigating the OE. Doctrine states that, "to succeed, the U.S. joint force must create its own relative advantages, preserve combat power, and rapidly exploit what opportunities it creates. Commanders must assume risk to create opportunity and sequence their operations because they cannot defeat enemy forces in a single decisive battle" (Department of the Army, 2022, p. 6-2).

Aviation units must create their own opportunities, and leaders must acknowledge that risk will be inherent in all operations. Peer/near-peer enemy capabilities will no longer permit single location TAAs for an entire task force or BDE-size element. This old-school way of arranging aviation assets will provide the enemy with a larger target and be easier to identify and attack. Spacing out the units into smaller assembly areas is essential to reduce the overall risk assumed conducting TAA activities in LSCO. Furthermore, as the operational tempo (OPTEMPO) increases, so do aircraft maintenance requirements. The tempo and lethality of LSCO will overwhelm maintenance efforts, and maintaining the ability to sustain operations over a long period of time will be crucial. There will no longer be direct access to maintenance teams as the BDE is forced to spread out across the AO to preserve combat power and reduce overall risk. This decentralization of aviation will be necessary in LSCO but it will consequently increase the strain on maintenance support requirements. The increased OPTEMPO is going to result in an increase in aircraft utilization, thus increasing aircraft maintenance requirements. The current task organization of the aviation BDE cannot support the expected demands.

"To prolong maintenance endurance of the operational unit, aviation commanders and staffs are required to plan and adhere to the principles of logistics contained in FM 4-0" (Department of the Army, 2020, p. 1-2). Three key principles include ***improvisation, simplicity, and economy***.

Restructuration allows for implementation of ***improvisation*** to maximize capabilities through "creating, inventing, arranging, or fabricating resources to meet requirements," (Department of the Army, 2019, A-2; Department of the Army, 2020, p. 1-3) identifying the limitations of our maintenance capabilities in the current task organization, and creatively arranging forces to meet the needs of LSCO.

Simplicity is imperative in a high tempo, large-scale OE. The current maintenance flow has three paths of responsibility organic to the BDE (Department of the Army, 2020, 1-4). The line company is the ***first path***, conducting field-level maintenance utilizing the available unit assigned tools and test equipment; however, the primary focus for maintainers in this company is immediate action maintenance and non-rated crewmember (NRCM) duties. The ***second path*** of maintenance is the aviation maintenance company, responsible for scheduled and unscheduled maintenance in direct support to the line company.

The ***third and final path*** of field maintenance support is the aviation support company within the aviation support battalion. This company serves as the pass-back element for any maintenance that requires sustainment level repairs. The proposed restructuration simplifies this process by eliminating the unnecessary second path and reassigning where specific responsibilities lie. The path of responsibility would become a two-level path, simultaneously applying the principle of ***economy*** through the elimination of redundancies, and achieving "efficient management, discipline, prioritization, and allocation of resources" (Department of the Army, 2019, A-2; Department of the Army, 2020, p. 1-3).

The proposal is to adjust and mold current unit standard operating procedures, modified tables of organization and equipment (MTOEs), and tables of organization and equipment (TOEs) to create

and maintain a self-sustaining force at the company level.

Current MTOE/TOE[2] for aviation battalions assigns a single company the responsibility to support field-level maintenance on all aircraft within that battalion. Despite the line unit's responsibility to conduct maintenance at their level, within the scope of the equipment and personnel assigned, most tasks are pushed to the maintenance company to allow maintainers to focus on their NRCM duties. Current practice in a tactical environment is to send maintenance teams, when requested by line units, to assist with repairs and inspections. As companies and platoons begin to disperse across the battlespace, it will be increasingly difficult and require more time for maintenance teams to reach the broken aircraft, causing a gap in the prompt execution of maintenance tasks.

To streamline and expedite both scheduled and unscheduled maintenance efforts, companies and platoons need to possess the capability to conduct maintenance and repair activities on their aircraft quickly and efficiently with minimal wait times. To best meet these needs, battalions can dissolve their maintenance company, absorb the personnel and equipment into the line companies, and create smaller individual maintenance platoons within the line companies. The increase and additions to the MTOE/TOE for each line company will be backfilled primarily from dissolving the maintenance company that currently exists within their respective battalion, equipping these companies with their own organic maintenance platoon capable of supporting scheduled and unscheduled maintenance.

The proposed platoons would possess the bench stock; petroleum, oils and lubricants; tools; aviation ground support equipment; and personnel required to maintain the company aircraft at the field level. Each maintenance platoon would be outfitted based on mission requirements by airframe. The company commander would have full oversight of all maintenance conducted on their aircraft, both in garrison and in theater. Additionally, the line company would absorb the ground equipment necessary to support the increased personnel including vehicles, trailers, tents, and generators. With this change, aviation BDEs can operate in a more efficient, decentralized manner and extend their operational reach further forward to support the ground force.

Large-scale combat operations are chaotic by nature, and the strain imposed on maintenance efforts is further complicated in the dislocated, rapidly changing OE (Department of the Army, 2020, 1-2). Aircraft systems will need to be serviced, inspections will be required, and repairs to damage must be made to keep aircraft fully mission-capable. Our current task organization will result in increasing wait times and unnecessary delays to effective maintenance in LSCO. Anticipating this and understanding the complexity of responding to aircraft requirements will better prepare us to meet the maintenance demands that are inherent of rotary-wing aircraft. With the proposed restructuration plan, companies will have access to the necessary personnel and tools to conduct field-level aircraft maintenance operations. Assigning a maintenance platoon to each flight company allows nearly full autonomy of aircraft operations within the company and provides a streamlined maintenance effort in the tactical environment.

Biography:

I am CPT Virginia Jahr from Memphis, Michigan. As a CH47F Aviation Officer, my first active duty assignment was the 1st Combat Aviation Brigade, Fort Riley, Kansas, where I was a flight company platoon leader, maintenance platoon leader for the aviation support company (ASC), and company commanding officer for the ASC.

[2]"A table of organization and equipment (TOE or TO&E) is a document published by the U.S. Department of Defense which prescribes the organization, staffing, and equipage of units" https://www.part-time-commander.com/army-mtoe-tda-unit-information/

A Black Hawk flies over Tactical Assembly Area Victory, the home of the 347th Regional Support Group, while conducting a combat support training exercise. U.S. Army photo by SSG Patrick Loch, Minnesota National Guard.

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THE ADVANCE SCOUT— A NEW HARD LOOK!

By MAJOR GENERAL DONN A. STARRY
Commander, U.S. Army Armor Center, Fort Knox, Ky.

I have good news and bad…The good news is I'm going to talk about a new airplane; the bad news is that it's going to be talked about by a non-aviator. Since you've just heard from three distinguished (AMC) Project Managers and since this (ASH) project has no manager, I guess that's appropriate for the Godfather of Armor to speak about it in being the equipment proponent.

I think I ought to say to you also that contrary to the fears of many people the assignment of proponency for aviation assets to Armor, both the *Attack Helicopter* and the *Scout Helicopter*, has, we believe at least on our side, drawn us closer to the aviation community and has made us a little bit more dependent upon it than we might like to be sometimes. In any event, it's suggested new dimensions to be explored in pursuing Armor's and cavalry's traditional battlefield roles.

Unlearning bad habits

For example, after some extensive testing, we've learned that the integration of air cavalry and attack helicopter units into the combined arms team basically requires no significant revision in the proven principles of doctrine. What is required, however, and I'd like to emphasize this, is that we unlearn some bad habits acquired during almost ten years of involvement in Vietnam.

The present demands some fresh thinking – the future demands a *New Direction*. To accomplish this change we have already begun trying to infuse, at least, in our Armor leaders the idea that they now have an additional, highly responsive and flexible maneuver element organic to the branch, one that is ready, willing and able to bear a lion's share of the battle.

One of our problems, in my opinion, is that we've treated these things like airplanes too long. They're not (airplanes), in my judgement – at least those that fly nap-of-the-earth live in the ground battle environment. It's true that they don't always sit on the ground to do their job, but they live in the ground battle environment, and that's the philosophy with which we look at both the *Attack Helicopter* and the *Scout Helicopter*.

We at Knox are currently taking a hard look at the cavalry side of Armor for we believe there are some basic questions to be re-asked and some basic functions to be re-defined. There is some evidence, we believe, that the so-called "fighting to gain information" part of the cavalry function may have overshadowed the development of materiel, tactics, and techniques designed to acquire information by other means.

If this is so and you follow this logic, then we must ask ourselves if the new advanced reconnaissance helicopter should be armed to fight for information, or should depend primarily on sensors, visi-optics and the cunning of its crew. The answer to this question is significant for future equipment design.

So far, I suggest that our track record in developing scout aircraft is not good. Quite frankly, I believe that we have to stop developing equipment which, because of its limitations or shortcomings, requires the soldier to alter his mission,

Presentation made by MG Starry at the 1973 AAAA National Convention in Washington, D.C.

purpose, and perhaps, in the final analysis, his overall worth on the battlefield.

Equip the man for the mission! We must *not* continue to alter the mission to fit equipment that was designed for other purposes. We've been asked several times at Ft. Knox in the last few years to prepare documents to bring about product improvement of the current LOH fleet. Normally, by the time these directives reach us as the user, so many people have hung their favorite projects on these poor airframes that little or no space, weight, power, or money are left to add anything that really improves the ability of the bird to accomplish its primary mission – that of collecting information.

I simply suggest that we return to some fundamentals. *What is the primary reason for building the machine? What role will it fill in the combat vehicle family? What devices will aid it in accomplishing these tasks? Lastly, what can we add to make it more survivable?*

Please note that I have placed survivability after mission. The instinct to live is in us all but if we allow this instinct to drive system development we may make our aircraft completely crashworthy but we just won't be able to afford what's really required to perform the basic mission, or, on the other hand, the bird will be so large or so heavy that it won't be able to perform as required.

INTRODUCTORY REMARKS

We've got to have a scout helicopter that can run with the big guns. By that we mean a light, agile aircraft that can move out, pick up targets, and work them over to the *Advanced Attack Helicopter*. This is an aircraft that'll have much better target acquisition capabilities than our current *Light Observation Helicopters*, and we're calling this aircraft the *Advance Scout Helicopter (ASH)* that right now is a concept solidifying into a rock.

The paper will go to the Chief of Staff this week in hopes that he'll buy the rock and we'll get underway with the task force leading to a proposal. *The Scout Helicopter*, just as the *Advanced Attack Helicopter*, is in the equipment proponency of the Armor Center at Fort Knox, KY. On this basis we would like to hear now on the ASH from the Commandant of the Armor Center, Major General Donn Starry…

– MG William J. Maddox, Jr.

Besides, I would submit to you that if we are flying nap-of-the-earth like we all claim we are but few of us really are, then what is required to survive a crash at five, ten, or 30 feet…at five, ten, or 30 knots?

Now, what has all of this got to do with the development of an advanced reconnaissance helicopter? I suggest it has a great deal. The Army has an acute need for this aircraft but only if the aircraft we design can do its job. It has to be designed from the beginning to perform as a vehicle whose sole purpose is the collection of information. It has to be compatible with the rest of the combat vehicle family, especially with the *Advanced Attack Helicopter*. For if we eventually field an *Attack Helicopter* that outperforms its reconnaissance counterpart we are no further ahead than we are today.

The AH-1Q, for example, which we're testing at Knox right now can see and shoot – right now! – further than his little friend, his reconnaissance eyes and ears. The whole concept is in jeopardy if both scout and attack birds have to expose themselves to hostile fire for any length of time while we're trying to hand off the target using the old *"Three fingers to the left of the dead oak tree"* technique which is the current state of the art, a state which I might remind you is vulnerable to smoke, haze, the confusion of the English language, and terrain.

The ranges at which we need to see and to shoot today dictate a requirement for complete system compatibility. Reconnaissance and attack helicopters should be designed as a system family.

We are already moving to this concept in developing our ground combat vehicles, incidentally.

Another area that we believe demands serious consideration during the development of new systems is that of simultaneous development of maintenance and training simulators. The budgetary constraints which the Army faces now and for the foreseeable future, in our judgment preclude the allocation of significant numbers of vehicles out of an operational fleet into the training base.

Simulators a "must"

Realism that is now available through simulation can greatly reduce the need for operational equipment for training. The aviation industry, as most of you know, and Fort Rucker have led the way in this new approach to training. There simply has to be more of it. Simulation devices must be designed right along with the major end item so as to reach the field hopefully ahead of, but at least concurrently with the new system to allow smooth, rapid, and less costly transition.

We're insisting upon this approach at Ft. Knox in our other vehicle programs, even ground vehicles. We're working now to try to define what I call a transfer function, that is, how much simulation training is transferred to the real item with little or no proficiency loss, and how much of the total procurement can be transferred to simulators to release how many more operational vehicles to the user fleet.

It's mathematically possible within the state of the art but very little has been done on it so far in the context that I'm talking about now.

The urgency of insuring that Armor and the Army get a reconnaissance helicopter that will meet our basic needs is the reason I'm pressing hard to have the advanced reconnaissance helicopter task force sited at Ft. Knox, the home of the cavalry. Having most of the Main Battle Tank task force, we have a little experience in this. We welcome the opportunity to aid in designing this system which we believe is very important to the future of our branch and the future of aviation.

Finally, training. The best, most costly equipment is of little value unless the operator knows and understands how to use it and can get the most from it. We believe that it takes a special type of person to be a scout. This is true in the air and it's true on the ground.

Not every aviator makes a good cavalry aviator, I'm sorry to report to you. Air cavalry aviators are required to earn their pay using more than the normal flying techniques. They have to be masters at handling their aircraft in this unique environment. The air cavalry aviator has to be a master in the art of scouting and scoutcraft; he must fully understand the employment of the weaponry carried by his big brother, the attack helicopter.

A costly approach

In the past we have given this gentleman a basic flying education and we have depended on his unit to teach him to be an air cavalryman. We believe that this approach is and has been far too costly in both lives and aircraft. I intend to approach *General Maddox* and the Aviation School shortly to ask help in finding and training a few selected aviators to high levels in those skills we believe an air cavalryman needs – skills that will enable him to seek out and find the enemy and to gather the necessary information – and together I believe that we can do just that.

As *General Maddox* pointed out to you a while ago we have an advanced reconnaissance helicopter on paper, and a required operational capabilities document soon the be evaluated by a task force whose purpose it is to provide the Army with the right combination of aircraft and subcomponents. We just have to have this if we are going to move in any new direction.

No one has more at stake in this than Armor and cavalry. Reconnaissance is our life blood so I ask you to join with me in hoping that this task force does its job well.

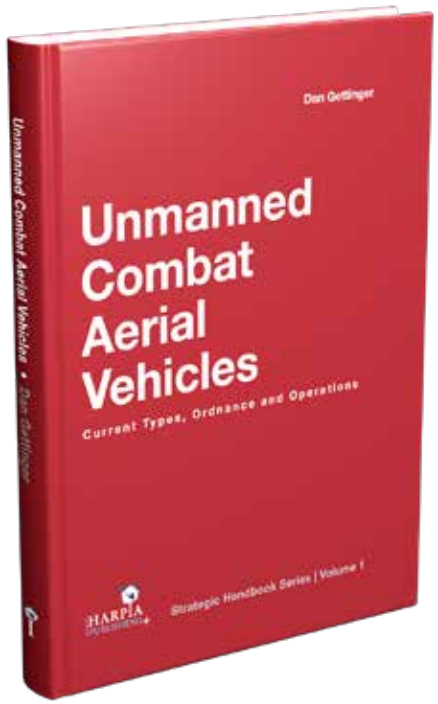
Unmanned Combat Aerial Vehicles–Current Types, Ordnance and Operations

Author: Dan Gettinger, Harpia Publishing, September 1, 2021, 144 pages

A book review by COL Jayson A. Altieri (Ret.)

Unmanned Combat Aerial Vehicles–Current Types, Ordnance and Operations, by Dan Gettinger, is the first volume of Harpia Publishing's Strategic Handbook Series that is a perfect reference to help provide background on the complexity of modern warfare. For example, the recent Russo-Ukrainian conflict, a war that began with Russian tanks rolling across Ukraine's borders, First World War-style trenches carved into the earth, and Soviet-made artillery pounding the landscape now has taken on a more modern dimension. With hundreds of reconnaissance and attack unmanned combat air vehicles (UCAVs) flying over Ukraine each day, a conflict that set off by a land grab befitting an 18th-century emperor has transformed into a digital-age competition for technological superiority in the skies using UCAV platforms—one military annals may mark as a turning point and that requires military and civilian analysists to have a full understanding of the diversity of UCAV and loitering munition systems.

The earliest application of UCAVs in modern combat occurred in 1848 during the Italian War of Independence, when Austrian forces used remotely triggered bombs from unmanned balloons on the Italian-held city of Venice. Nearly 70 years later, during the First World War, several pursued the development of what were known as "aerial torpedoes," early cruise missiles based on radio-controlled biplanes. During the Second World War, both the Allied and Axis powers experimented and utilized UCAVs with some success, the most famous being the German V-1 "Buzzbomb" used against cities in the United Kingdom. By the middle of the Cold War, unmanned aerial systems (UAS) proliferated with aircraft like the U.S. Navy's QH-50 Drone Anti-Submarine Helicopter (DASH) and the U.S. Air Force's BQM-34 Firebee jet-powered reconnaissance platform. Following the Vietnam War, Western interest in UCAV platforms waned for nearly 30 years until the Global War on Terrorism, when militaries began showing a renewed interest in unmanned systems like the RQ-1 Predator for use against insurgents in locations from Africa, Asia, and the Middle East. Since that time, UCAVs have become a dominant operational weapon system due to their low cost and elimination of risk to aircrews. The recent Russo-Ukrainian conflict has seen these advantages manifested in the first large scale by both sides on a contemporary battlefield.



Today, nearly 96 UCAV vehicles are produced by 59 entities in 27 countries, and *Unmanned Combat Aerial Vehicles–Current Types, Ordnance and Operations*, documents the combat UCAV systems that are in development or deployed, as well the Global operations in which they have been used. In doing so, this book provides readers with a professional, academic style guidebook to navigate today's world of combat UCAV platforms. The author provides three chapters that include definitions and analysis of UCAVs and loitering munitions, system profiles by producer countries, and a detailed description of the theaters of operation in which UCAVs are currently operating. Useful to readers is the author assessment of trends in the variety of UCAVs, loitering munitions, UCAV operations, and

the future of UCAV technological and doctrinal developments like the development of the so-called "loyal wingman" UCAV systems.

Printed by Harpia Publishing, *Unmanned Combat Aerial Vehicles–Current Types, Ordnance and Operations*, is an excellent book and worth the read. Since the surge of UCAV development in the past 20 years, unmanned air technologies have changed the character of warfare. Unmanned combat aerial vehicles and loitering munitions will test the vulnerability of other military technologies such as tanks, as well as the preparedness of air defense systems and strategies. Far from making warfare unmanned, the surge of UCAV systems on the modern battlefield points to a future in which military and civilian personnel are at greater risk without having a clear understanding of the capabilities, doctrine, technologies, and trends of these systems.

Dan Gettinger is founder and the co-director of the Center for the Study of the Drone, an interdisciplinary research and education institution at Bard College, Annadale-on-Hudson, New York. His research concerns a variety of issues related to unmanned systems, including the commercial drone industry and regulations, defense research and procurement, and international trade and security. Dan is currently engaged in a study of drone proliferation and global unmanned systems capabilities and employments. Dan is an expert at the Forum on the Arms Trade and the co-founder of the Drone Research Network. He holds a bachelor of arts degree in Political Studies from Bard College.

Army Soldiers prepare to launch the RQ-11 Raven. The Raven is a hand-launched, remote-controlled unmanned aerial vehicle that can be used for surveillance and reconnaissance, enabling units to gather information with reduced risk to Soldiers. U.S. Army photo by SGT Liane Hatch.

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Dustoff: The Memoir of an Army Aviator

Author, Michael J. Novosel; Ballentine Publishing Group; 1999; 370 pages

Reviewed by CW4 Charles J. Boehler

Fort Rucker (Alabama) has been renamed Fort Novosel in honor of CW4 Michael J. Novosel, Sr. (Ret.) (3 September 1922—2 April 2006). There isn't a more worthy name for the home of Army Aviation, as his book *Dustoff: The Memoir of an Army Aviator,* so well illustrates. CW4 Novosel's story is one of devotion to duty, resilience, and most certainly courage.

There are a few books that I feel should be required reading for Army pilots, such as *Chickenhawk* by Robert Mason and Hugh Mills' *Low-Level Hell*, along with *Dustoff*. These books have many things in common, not the least of which is that they are all written by Army pilots in Vietnam and tell the story of the pivotal years of Army Aviation. They show how far we've come but also that we have a lot to live up to considering the incredible accomplishments of our predecessors.

As a MEDEVAC (medical evacuation) pilot, Michael "Mike" J. Novosel, Sr., saved more than 5,000 lives. Army photo.

Michael Novosel enlisted in the U.S. Army Air Corps in February of 1941, when the U.S. was quickly building up its Armed Forces in the event the country joined WWII. The story of Novosel's attempt to pass a flight physical in order to become a flight cadet is pretty humorous, as he didn't quite make the minimum height of 5'4" and his friends had some unique ideas on how to make him taller. A sympathetic flight surgeon made him promise to grow taller, and with that, off he went to flight training. Instead of being shipped off to either theater in the war, 1LT Novosel was sent to Laredo, Texas, to instruct new pilots in a variety of aircraft, eventually ending up in B-24 Liberators.

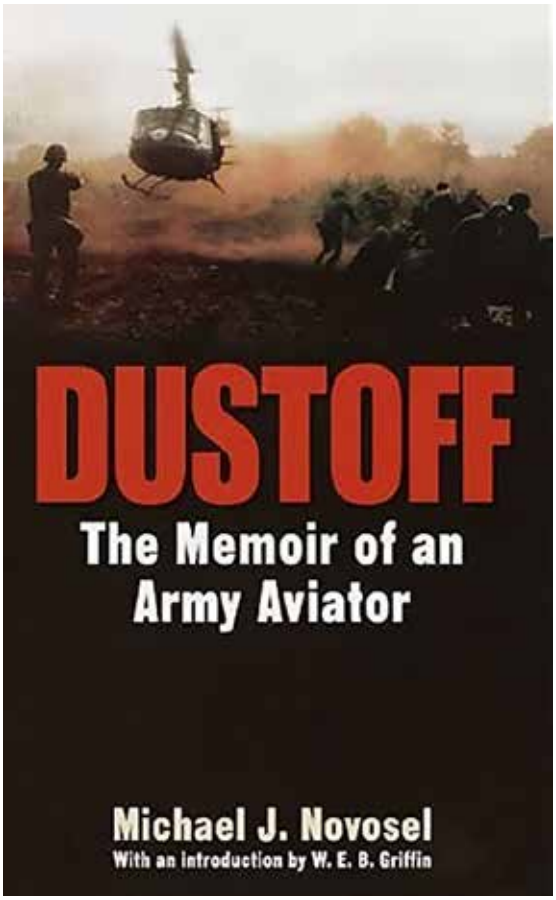
While this was great experience and gave Novosel a chance to build hours and fly many different types of airplanes, it wasn't until the end of WWII that he finally got his wish and deployed to Tinian, Northern Mariana Islands, with a B-29 squadron and flew a few combat missions over Japan. When the war ended, Novosel stayed in the Air Force—wanting to make a career in the military—and became commander of his own B-29 squadron.

The Air Force had other ideas, however, and Novosel was discharged as part of a Reduction in Force in 1950. Novosel joined the Air Force Reserves during the Korean Conflict (although he never served in Korea) and had several civilian jobs, including a flight instructor for the military, which eventually included helicopter flight instruction at Fort Wolters, Texas.

Vietnam was underway by this time, and LTC Novosel wanted to fly for the Air Force in that theater. When this was disapproved, he resigned his commission and became a Warrant Officer (WO) in the Army.

Novosel's career as an Army Aviator takes up the bulk of this book, and rightfully so. Everything from his accession into the Army until his retirement was unusual. Much to Novosel's surprise, he simply took a checkride in an H-23 to prove he could fly helicopters, no aircraft qualification course needed. The entire process wasn't exactly streamlined and he ended up in Fort Bragg (Liberty), North Carolina, working with the Green Berets flying a variety of aircraft carrying out different missions in several locations. He ended up being sent to Tan Son Nhut in Vietnam on 28 January 1966, and was assigned to the 283D Medical Detachment (Air Ambulance) flying UH-1D Hueys.

As one might guess, stories of hazardous missions abound in this book. The 283D primarily supported the 1st and 25th Infantry Divisions. One of the most interesting aspects of Novosel's time as a helicopter pilot was his use and advocacy of instrument flying. Instruments weren't yet formally taught in flight school in 1966, but CW4 Novosel's background flying bombers gave him a somewhat unique ability during bad weather in Vietnam. He was safely able to complete missions and other flights when others couldn't. Novosel trained and mentored the other pilots in his unit in this important skill set.



Some of the most dangerous missions Novosel flew in this timeframe were in support of the 1st Infantry Division's 1-4 Cavalry Squadron. On one particular mission, Novosel's crew evacuated 66 Soldiers from an intense firefight with several aircraft damaged and shot down and CWO Novosel himself having to get another aircraft midway through the mission due to engine trouble. All MEDEVAC crewmembers involved in that mission received a Distinguished Flying Cross.

He returned home to his wife Ethel, after his year-long tour was up. Ethel was more than busy raising their four kids: sons, Michael Jr. and John and daughters, Patty and Jean. During this—what he planned to be the last part of his military career—he helped set up flight school at Hunter Army Airfield since Fort Rucker, Alabama, was unable to keep up with the Army's demand for new helicopter pilots. He was tasked with standing up an instrument training portion of flight school, clearly a job he was well suited for. CWO Novosel took a separation physical in July of 1968 en route to a pilot job with an airline. However, during the physical, he was diagnosed with glaucoma. After confirming with the Federal Aviation Administration that there was no waiver process to fly as a civilian with this disease, he decided to pursue and was granted a medical waiver to continue flying with the Army.

Of course, this eventually meant serving another tour in Vietnam. He stayed in MEDEVAC, this time with the 82D Medical Detachment (Air Ambulance). Things were no easier or less busy during this deployment. Perhaps his most notable mission during this tour was one where his crew responded to a MEDEVAC request by an Army of the Republic of Vietnam (ARVN) unit that had been hit hard by the Viet Cong. The ARVNs were forced to retreat but left behind many wounded soldiers in an area consisting of tall elephant grass with numerous small hills nearby, giving the Viet Cong good firing positions. CWO Novosel and his crew ended up hover-taxiing around the area in an effort to encourage the wounded ARVN to stand up and be pulled in the helicopter as it hovered by. This process was repeated several times, mostly without friendly fire support, until 29 wounded were evacuated. CWO Michael Novosel was awarded the Congressional Medal of Honor for his actions on this mission.

In a unique circumstance, Mike Novosel, Jr., graduated Army flight school and was assigned to the 82D Medical Detachment in Vietnam. His father gave him his initial orientation flight in country and they flew together on missions several times. Even more extraordinary, they ended up rescuing one another during the course of the deployment as each suffered sufficient damage to their aircraft so that they couldn't fly away themselves.

This is a well-written book; however, it can be somewhat dry at times. This isn't a surprise, as I believe Novosel was not prone to embellishment and was matter-of-fact about most every event that he recounted. He does spend a small amount of time explaining the difficulties of dealing with the dead and wounded on a daily basis in such an unforgiving environment. His obvious love of his wife and kids is often understated, but it's clear that he had much admiration for his wife and pride in his son being a pilot in the Army.

CW4 Novosel retired from the Army at the age of 62 in November 1984 after serving for 44 years. Amazingly, he attended and graduated the air assault course shortly before retiring, just to prove he could. His combat totals as an Army pilot were 2,038 flight hours and a staggering 5,589 wounded evacuated. This is a great way to sum up a career that would seem unbelievable if it was written by Hollywood. He persevered in many instances that a lesser person would've given up and found a different path to pursue. I give this book the highest recommendation, and it is likely the best way to learn about the person that the Home of Army Aviation is named for.

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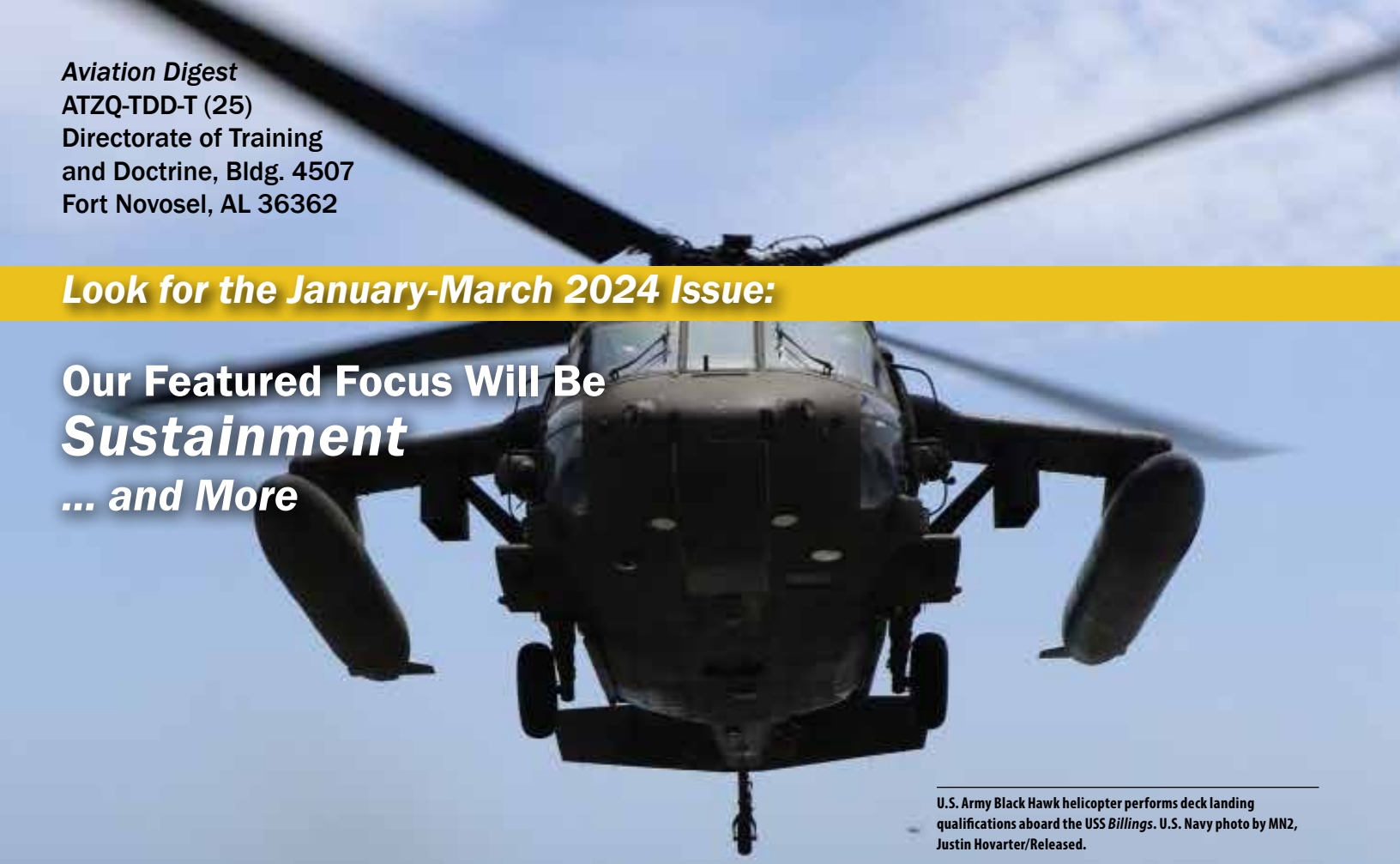

U.S. Army Black Hawk helicopter performs deck landing qualifications aboard the USS *Billings*. U.S. Navy photo by MN2, Justin Hovarter/Released.

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Focus Topic: How we Fight in Large-Scale Combat Operations
April-June 2024 (published May 15, 2024)

Focus Topic: Training for Large-Scale Combat Operations
July-September 2024 (published August 15, 2024)

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