Field Artillery

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Purpose

Originally founded as the Field Artillery Journal, the Field Artillery Professional Bulletin serves as a forum for the discussions of all U.S. Army and U.S. Marine Corps Field Artillery professionals, Active, Reserves and National Guard; disseminates professional knowledge about progress, development and best use in campaigns; cultivates a common understanding of the power, limitations and application of fires, both lethal and nonlethal; fosters fires interdependency among the armed services, all of which contribute to the good of the Army, joint and combined forces and our nation. The Field Artillery Professional Bulletin is pleased to grant permission to reprint; please credit Field Artillery Professional Bulletin, the author(s) and photographers.

Cover: *Artillerymen with the 1st Infantry Division perform a live-fire gunnery, Sept. 16 at the National Training Center in Fort Irwin, California. NTC's decisive action training environment and live opposing force recreate the realism and rigor of Large-Scale Combat Operations. (PFC Jared Simmons/U.S. Army)*

BG Phil Brooks
Field Artillery School Commandant

FIRES FIFTY #39

Leadership is a contact sport; it requires daily interaction.

A lot is happening in the world, within our ranks and within our branch.

Despite all of this change and upheaval, one thing remains clear, we cannot lose sight of how to lead Soldiers and take care of each other. As we go about our Army business we must never forget that trust, integrity, and respect between Leaders and the led are critical components of Army readiness.

The findings of the Fort Hood investigation are both disheartening and upsetting. One major conclusion did emerge, we must put our people first. As we go about our Army business we must never forget that trust, integrity, and respect between Leaders and the led are critical components of Army readiness.

Project Athena

We know that Army leaders grow through education, training, and experience. Feedback is an integral component that can accelerate development by bringing attention to areas of individual strengths and weaknesses. Project Athena introduces standard assessments that complement specific instructional or training goals to provide greater insight into capabilities and tendencies that leaders do or do not have. The Army, through the Center for the Army Profession and Leadership, initiated this assessment program throughout all of it Basic Officer Leader Courses this past summer. Here at Fort Sill, we started with Basic Officer Leaders Course (BOLC) Class 6-20, and this is just the beginning. There will eventually be batteries of assessments tailored to each level of Professional Military Education from initial entry through Command and General Staff College. In fact, we are now piloting the program within our cadre certification course, WOBC and 13 series SLC.

The objective of Project Athena is to promote self-awareness through assessment, feedback, self-regulated performance, and developmental action. Leaders who are self-aware and actively work to improve themselves stand apart from their peers with the potential to become top Army leaders who create ready and resilient units that can accomplish the Nation's critical missions in complex operating environments. Project Athena provides comprehensive, progressive, standardized assessments of individual tendencies and abilities. Each assessment has a feedback report customized to the assessed individual and provides suggestions for development. Lists of additional resources corresponding to the assessed areas are also available to the assessed leaders.

The first Lieutenants to complete Project Athena are already reporting to operating forces with Academic Evaluation Reports and an Individual Development Plan of action. We want Commanders to be aware of this so the individual's development plan can be integrated into developmental counseling at their first unit of assignment.

Master Gunner Course

To address current and future training gaps based on emerging capabilities across the Field Artillery community and feedback from the Operational Force, we are making improvements on the Field Artillery Master Gunner (FA MG) Course and our goal is implementation in FY24.

A gunner with C Battery, 1-119th Field Artillery Regiment, Michigan National Guard, views the deflection and quadrant alignments before firing the M777 Lightweight 155mm howitzer. Soldiers with the 1-119th FA regiment conducted direct fires training during Northern Strike 20 at Camp Grayling, part of the National All-Domain Warfighting Center in Northern Michigan during Northern Strike 20, July 26, 2020. Northern Strike fills Joint All-Domain training and task iteration gaps in both the Army/Air National Guard training strategies, which sustains and enhances reserve component proficiency. (Master Sgt. David Kujawa/U.S. Air National Guard)

This redesign incorporates all of our MOSs and this is the only FA Course for our enlisted personnel that trains the entire sensor to shooter system of systems. What has changed in the FA MG Course Curriculum?

We have added the role of the FA Master Gunner as a member of the CDR's battle staff; combined the FA Master Gunner "warfighter like exercise" as the culminating training event; added a virtual attachment of non-organic fires assets and emerging capabilities (LRHW, MRC, PrSM, ERCA) and are addressing CTC observed gaps. Lastly, the course was designed as unit training management, integration, and interoperability in competition and conflict, providing more applicable instruction.

The course will develop master trainers who can design and create training, safety, and qualification/certification programs to enable units to effectively integrate Field Artillery fires into the Combined Arms Team. Once they have graduated the course they will also become troubleshooting subject matter experts on weapon, sensor, and mission command systems and will enhance unit maintenance processes and procedures. Lastly, we have requested additional annual training seats to meet operational force demands.

Thank you for all your hard work in such unprecedented times.

CSM Michael J. McMurdy
Field Artillery School
Command Sergeant Major

A message from USAFAS Command Sergeant Major

Redlegs,

BG Phil Brooks and I want to wish you a Happy New Year - 2021 promises to be another exciting time across the Field Artillery community for our Redlegs and capabilities! We also want to thank you for your leadership across the branch during difficult times, requiring difficult and necessary conversations. One thing is for certain, we will be a stronger and better Army because of it. For anyone who has yet to see the Fort Hood Independent Report, you can download it at: https://www.army.mil/e2/downloads/rv7/forthoodreview/2020-12-03_FHIRC_report_redacted.pdf

What you should expect to see from me based on the Commandant's published priorities:

- Working with HRC and stakeholders to ensure we get the right Redleg, in the right place, at the right time.
- Flat, synchronized, and habitual information sharing in written and virtual forums from and across the Operational/Generating/Institutional Field Artillery Community that is systematic and enduring.
- Re-vamping the FA Master Gunner (Facility, Duration, Allocation, and Composition) as our premier cornerstone course to ensure Enlisted SMEs are able to advise Commanders and units as new capabilities and platforms mature.
- Ensuring the AIT/NCOPDs POI retains or increases the rigor necessary to produce the best trained Field Artillery Soldiers and Leaders possible.
- Be accessible to all members and units for dialogue, discussion, and visits. This includes virtual, in person when able, and on Social Media Platforms.
- Reviews of our Career Maps to ensure we maintain relevancy in the future, enable leader development at echelon, and provide opportunities to compete at the most senior levels.

In closing, we are here to serve. We want to hear from you, get your input, and help solve your challenges. The Field Artillery has a bright future, and we look forward to seizing and exploiting opportunities with you. Time to do work, Guns Up. KING OF BATTLE

CSM Michael McMurdy

AFATDS Can be Leveraged to Clear Battlefield Airspace

MAJ Alpheus M. Davis

Clearing airspace has become a critical and at times slow, cumbersome event. This article will not focus on the "how to plan airspace" task, instead it will focus on the technical aspect of automating the airspace clearance process. This article intends to identify how our automated systems work and to leverage them to save seconds and increase the responsiveness of fires.

As fire supporters, we must execute the timely employment of all Joint fires assets. This means that

Figure 1. Current process to clear air. (Courtesy illustration)

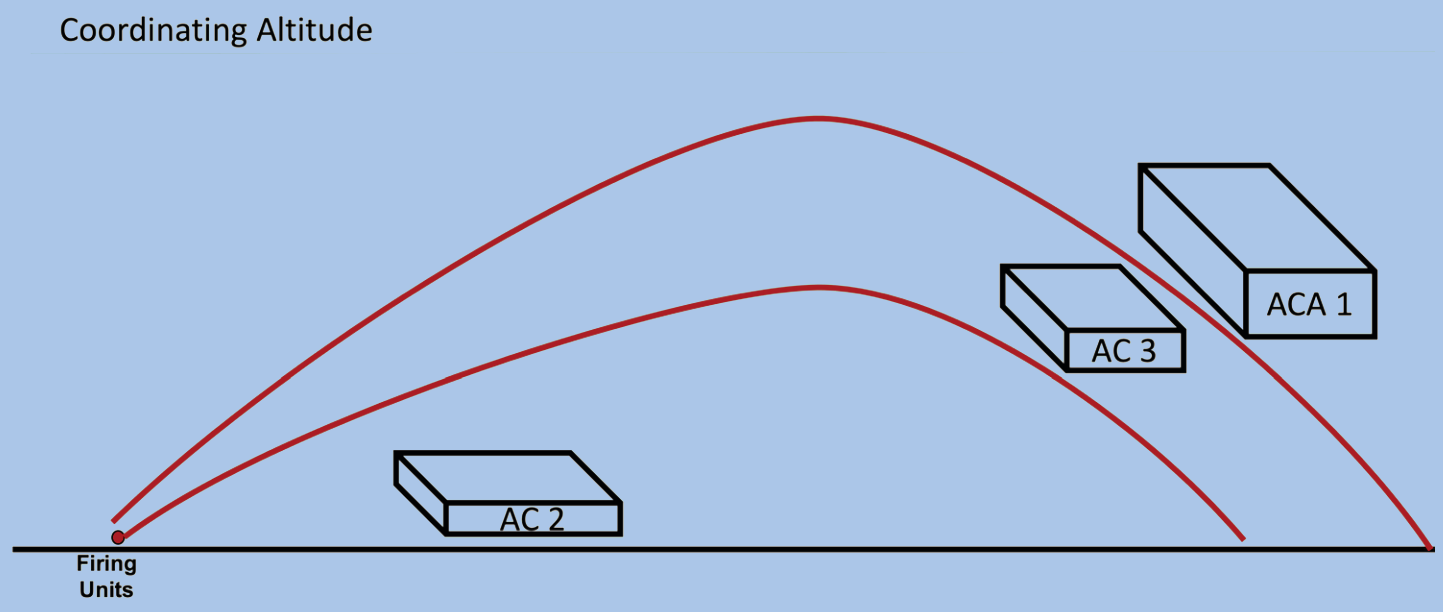


Figure 2. How do you know air is clear? (Courtesy illustration)

both surface-to-surface fires and air-to-ground fires operate and execute targets simultaneously without stopping, one method of fire. Unfortunately, with an increase in airspace users, this task has become complex and unwieldy at times. Trend reports from the Combat Training Centers (CTCs) and Mission Command Training Program (MCTP) continue to show that clearing airspace and deconflicting fires and aircraft is an issue year after year at all echelons. The Field Artillery Commandant has recognized this issue and included it in his Counterfire Imperatives. Imperative #3 focuses on battlefield design, geometries, Fire Support Coordination Measures (FSCMs), and automation to increase fires and shorten the "flash to bang."

Clearing airspace is ensuring that surface-to-surface fires do not violate Airspace Control Measures (ACMs). This lowers the risk that an artillery round and aircraft meet. The intent for fires planners and airspace planners is to create a Unit Airspace Plan (UAP) that is permissive for both surface fires and airspace users.

Partially to blame for units struggling to clear airspace is the lack of doctrine on how to clear airspace. FM 3-09, *Field Artillery Operations and Fire Support* states that clearance of fires is a staff process. The Joint Air Ground Integration Center (JAGIC) manual (ATP 3-91.1) states that the JAGIC needs a firing unit location, a target location, and a maximum ordinate (max ord) to clear fires. The methodology of ATP 3-91.1 does not identify which, if any, ACM violations occur and does not account for aircraft's ability to fly below the trajectory. The ATP 3-91.1 method results in a "hot wall" that uses the entire airspace from along the gun-target line from the surface to the max ord. This "hot wall" is discouraged due to unnecessarily restricting airspace. Yet, this is the method described and endorsed by doctrine. The "hot wall" method is what units and individuals use as the default method to clear airspace.

A Brigade Fire Support Element (BDE FSE) or JAGIC does not have the information required by ATP 3-91.1 readily available. It means that every mission requires clearance, instead of only missions that violate an ACM. In order for a BDE FSE or Division JAGIC to get the firing unit location and max ord data, the mission routes to the appropriate firing Battalion Fire Direction Center (FDC) or battery/platoon FDC and then the appropriate information is sent back through the chain to the BDE FSE Division JAGIC to await airspace clearance (see Figure 1, previous page).

The information provided from a firing FDC to the JAGIC does not identify any ACM violation occurrences or if airspace is clear or not. It does not state where along the gun-target-line the max ord occurs nor does it show if an ACM along the gun-target-line is above or below the round at that particular point (see Figure 2, above). The BDE FSE or JAGIC does not have enough information to either move aircraft or allow the fire mission to proceed.

Despite the gaps in our formal education and FM 3-09 and ATP 3-91.1, there are doctrinal solutions available to automating and improving our airspace clearance process. The AFATDS Manual (TB 11-7025-354-10-7) lays out and explains how AFATDS reviews and checks ACMs. In short, AFTADS in a Fire Support

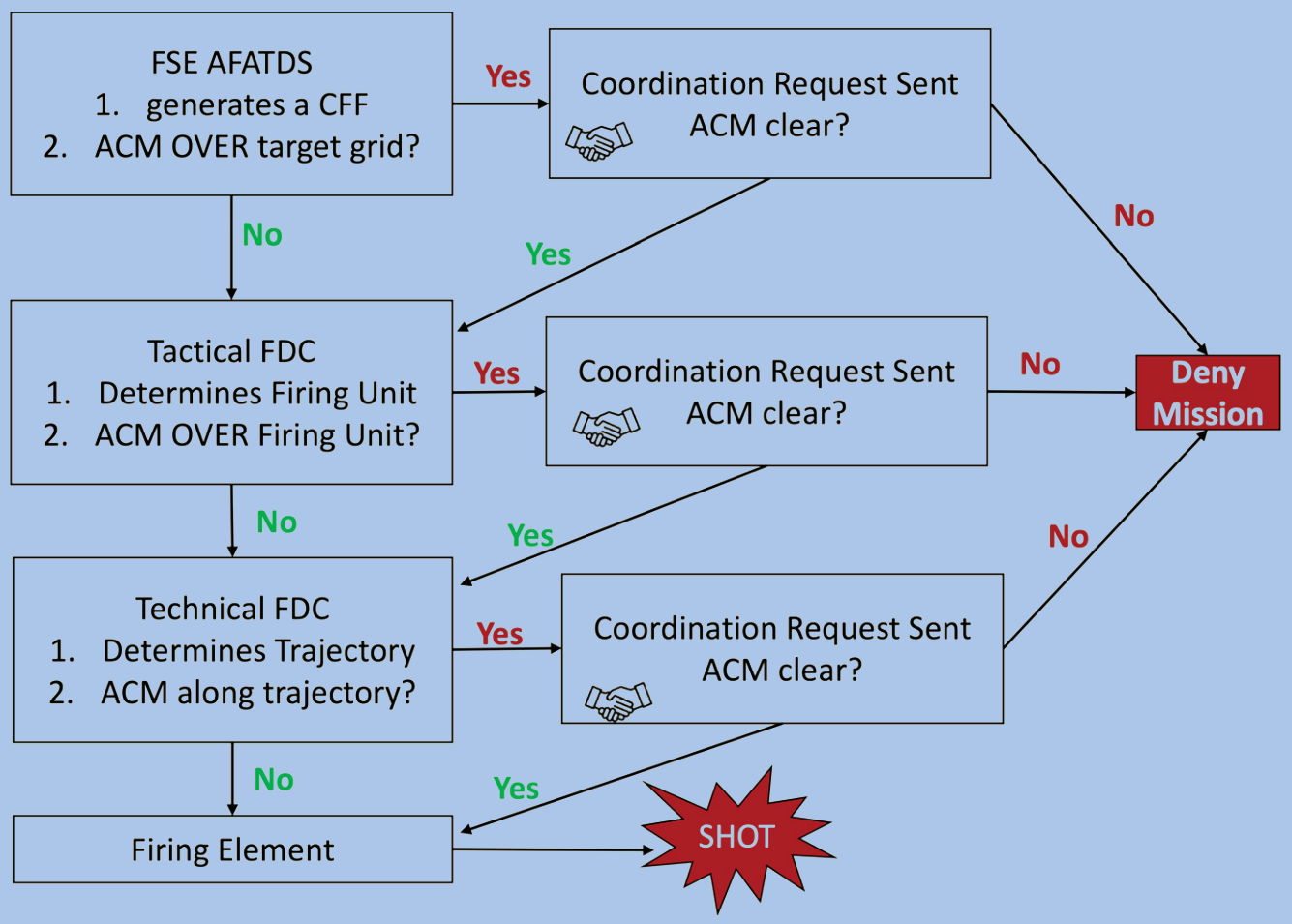


Figure 3. AFATDS ACM automated checks. (Courtesy illustration)

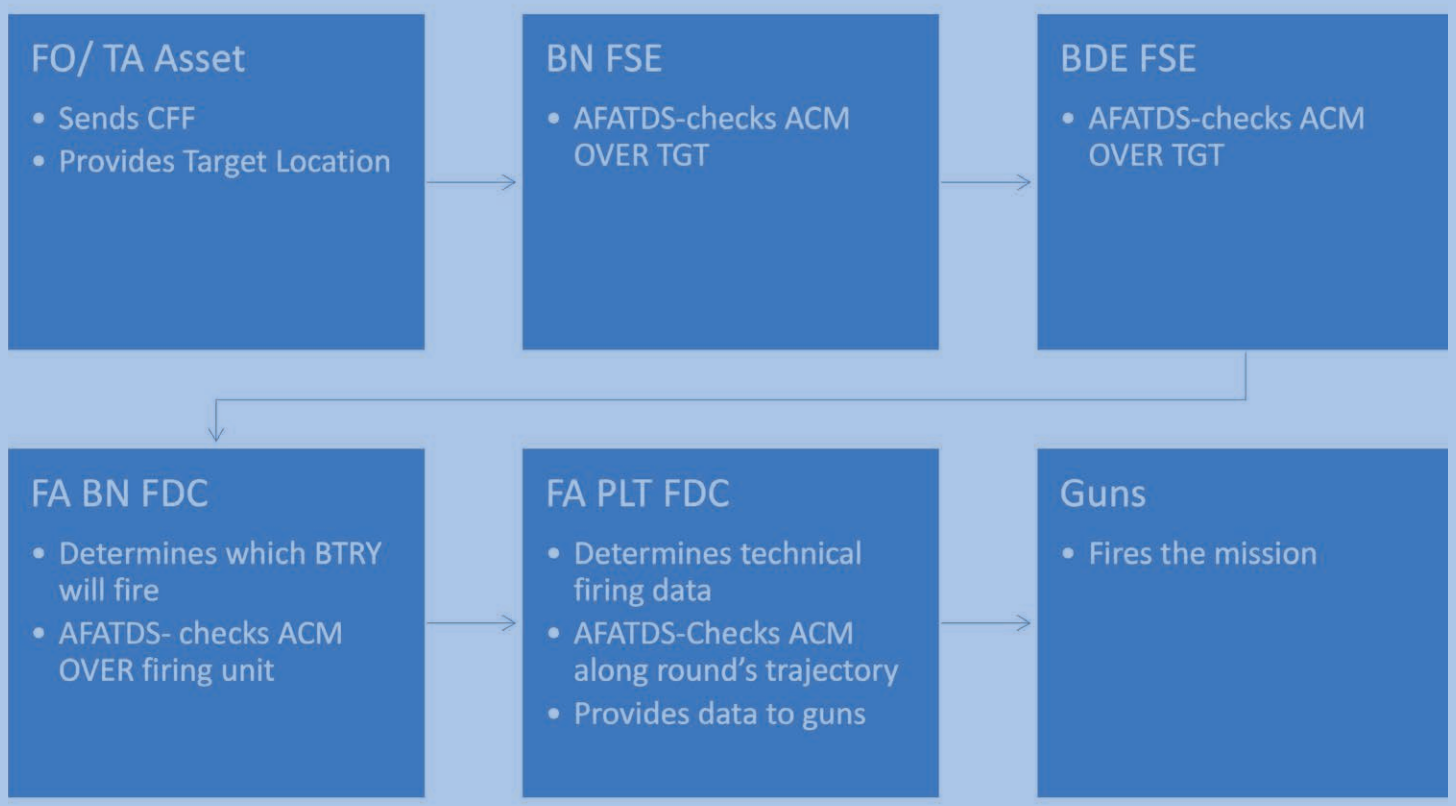


Figure 4. Proposed methodology. (Courtesy illustration)

role only identifies if the target plots under an active ACM. If the target is not under an active ACM, the fire mission continues to be processed. If the target is under an active ACM (a violation of ACM), AFATDS generates a coordination request. The platoon FDC analyzes the trajectory for violation as the AFATDS computes technical firing data. Once again, if no violations occur at the Position Area Artillery (PAA) or along the flight path, the mission proceeds to the guns. If a violation occurs, the mission pauses and sends a coordination request (see Figure 3, previous page).

ATP 3-52.1, *Multi-Service Tactics, Techniques, and Procedures for Airspace Control*, lays out that airspace clearance with the AFATDS occurs when a technical FDC AFATDS determines that a mission violates an ACM. This manual identifies that airspace clearance can be done with automated systems. This manual is consistent with the AFATDS TM on stressing the automation and allowing our electronic systems to determine if fire missions require clearance. This also ensures that only those missions that require airspace clearance go through the clearance process. This prevents unnecessarily slowing down fire missions to clear airspace for missions that do not violate any ACM.

With a slight change to how airspace is used and viewed, this methodology applies to clearing airspace above the Coordinating Altitude. The Army and artillery do not control the air above the Coordinating Altitude, but we are a user and need a defined airspace for rockets and missiles. The simplest and most efficient method is for the Army to request a slice of airspace from the Airspace Controlling Authority. This sounds hard but it is relatively easy. The way to request control of this slice of airspace is through the creation of a Restricted Operating Zone (ROZ). This ROZ is planned and coordinated and runs from a firing unit location to areas of planned targets (i.e. Objectives, Call For Fire Zones).

During my experience as an NTC OC/T, one rotation had such bad weather that during half the rotation no aircraft were flying. A review of acquiring to fire times for counterfire during this rotation showed that missions were on average 10 minutes faster during the periods of red weather. Ten minutes is a long time to clear air and potentially slow fires. This shaped how I, as a Brigade FSO, wanted to clear air during my NTC rotation. I informed my Brigade Commander, BDE FSCOORD, and supporting aviation elements that I was not going to clear the air for every mission, only those that violated an ACM. After explaining and teaching how AFTATDS views ACMs and how this method is safe and will speed fires; the BDE Commander and FSCOORD approved this methodology (see Figure 4, previous page).

To leverage the AFATDS and procedural control to clear airspace, it is essential and required to have three items; a thoughtful and complete UAP, a consistent method to distribute FSCMs and ACMs, and discipline to conduct technical rehearsals. To execute this our Brigade made a comprehensive UAP that routed aircraft away from artillery positions and presented some limitations on fires assets to enable air assets maneuver space. The BDE AFATDS built ACMs and utilized a data distribution for geometries that automatically updated all AFATDS when ACMs updated or changed. Pilots, both fixed and rotary wing, were briefed and understood that areas inside ACMs are cleared and the air outside ACMs that are not cleared and had a higher risk. Before each battle, all ACMs were active during the fires technical rehearsal to identify if any mission would violate an ACM. Our rehearsals showed that no mission violated an ACM. The only ACMs active contained aircraft at that specific time. The AFATDS operator sat between the BDE Air Element and the Tactical Air Control Party to dynamically activate and inactivate ACMs while aircraft operated in the battlespace. During the rotation, both force-on-force and live fire, we only received coordination requests and cleared three missions. An incorrectly built ACM caused these three clearance and coordination requests.

Airspace clearance is necessary on today's modern battlefield. There are automated systems and procedures that enable this action. Units should understand and leverage the automated systems and procedures to reduce airspace clearance frequency and times. By building a thoughtful and complete UAP, electronically distributing ACMs, and trusting automated systems, units can reduce the amount of missions that require airspace clearance and speed the time it takes to clear missions.

MAJ Alpheus M Davis is a graduate of the Command and Staff College. He has served as a Brigade FSO and a BN XO supporting a STRYKER Brigade Combat Team. He has served as an OC/T with NTC and currently with MCTP. He has deployed in support of Operation Iraqi Freedom and Operation Freedom's Sentinel.

Asymmetric Artillery

Achieving Economical Operational Effects in an Era of Austerity

COL Brian P. Duplessis

Throughout its illustrious history, Field Artillery has enjoyed a well-deserved reputation as the arm of decision for destroying, neutralizing, and suppressing enemy units and capabilities which threatened our maneuver forces. Fittingly, General George Patton once remarked, *"I do not have to tell you who won the war. You know, the artillery did."*[1]

Despite such glowing endorsements, we cannot remain content to sit on our laurels; we must aggressively strive to influence the action beyond traditional close support to maneuver forces. We can and should endeavor to provide low-cost operational effects in support of Joint Force Commanders. Programmed advances in munitions, firing platforms, command and control (C2) systems, and target acquisition can yield heretofore unimaginable ranges with enhanced effects against non-traditional targets such as enemy maritime capabilities. Alluring as this is, however, we cannot wait for next year's promises to come to fruition; we must act boldly today. Furthermore, given an ongoing economic decline, we must assume reduced future defense spending further delaying attainment of these enhanced capabilities. These delays do not, however, equal irrelevancy.

Artfully employed, with prudent risk acceptance, conventional Field Artillery firing today's munitions can achieve operational effects to include sea control,[2] sea denial,[3] and air superiority at relatively low-cost. Three historical vignettes from the Middle Ages, World War II, and the Cold War Era provide salient examples.

Figure 1. The Ottoman Empire in 1451. (Courtesy illustration)

The Ottoman "Throat Cutter," Sea Control Facilitating a Land-Centric Campaign (1453)

"Hey, Constantinople! Either I take you, or you take me!" [4]

By 1451, the Ottoman Empire was in ascendancy having occupied or subjugated most of Anatolia and the Southern Balkans (see Figure 1). The Byzantine Empire, the chief Ottoman competitor, was conversely in decline. The once-powerful Byzantines were reduced to a sclerotic rump state centered on their capital city Constantinople.[5] Strategically located, Constantinople links Europe and Asia as well as connecting the Black and Mediterranean Seas via the Bosporus Strait, the sole Byzantine link to their Black Sea and Anatolian exclaves. Nevertheless, the Byzantines believed they could

1 https://www.azquotes.com/quotes/topics/artillery.html

2 Sea control operations are seek to secure use of the maritime domain by one's own forces and to prevent its use by the enemy. JP 3-32: Joint Maritime Operations.

3 Sea denial operations seek to prevent enemy use of the maritime domain without controlling it for one's own use. Sea denial is inherent to sea control. JP 3-32: Joint Maritime Operations.

4 Source: https://quotepark.com/authors/mehmed-ii/

5 Constantinople is modern Istanbul Turkey

Figure 2. Fortresses along the Bosphorus strait. (Courtesy illustration)

indefinitely hold Constantinople protected by the city's seemingly impenetrable walls and confident of uninterrupted resupply from the sea. These assumptions were reasonable as seven previous Sultans had floundered on Constantinople's walls while largely ceding the maritime domain.[6]

This was soon to change as a young aggressive Sultan assumed the throne. Undeterred by his predecessors' failures, Mehmet II resolved to seize Constantinople without delay. He meticulously analyzed the operational environment and astutely assessed the key Byzantine lifeline - the Bosporus Strait - which was also a major liability, a critical vulnerability by modern terms. Mehmet sought control of the Bosporus as a key shaping action before besieging and ultimately seizing Constantinople.[7] Deprived of this lifeline, Constantinople would lack the grain, revenues, and reinforcements desperately needed and unobtainable elsewhere. Weakened as such, Byzantine resolve would not last as it had during previous sieges.

To achieve this goal, Mehmet ambitiously decided to build a fortress at the Bosporus's narrowest point using his newly-acquired artillery to interdict vessels failing to halt. The plan was audacious as the fortress was sited on nominally Byzantine territory but lay directly across from an Ottoman fortress on the Bosporus' Asian shore (See Figure 2).

Despite his Viziers' warnings,[8] Mehmet was willing to risk this provocative action correctly assuming the Byzantines were too weak to react. Secretly, he amassed the required building materials, laborers, and artisans. Once all pieces were set, the fortress was erected in four months, a herculean effort for the era.[9] This Middle Ages expeditionary advanced base sealed Constantinople's fate.

Rumeli Hisari, literally "Fortress in the Land of the Romans," was outfitted with heavy cannon and garrisoned by 400 first-line Janissary troops.[10] In November 1452, the garrison was first tested when two Venetian ships successfully ran the blockade. The next challenger was not so lucky and was summarily sunk by artillery fire with the survivors executed as an example to others. No further vessels tested the blockade, effectively solidifying Ottoman control of the Bosporus.[11] The resulting lack of Black Sea-sourced provisions, revenues, and reinforcements gravely impacted Constantinople. Given Mehmet's eventual thin margin of victory, Rumeli Hisari was the key shaping action that set conditions for

Figure 3. The Crimean peninsula. (Courtesy illustration)

6 Crowley, Roger; 1453: The Holy War for Constantinople and the Clash of Islam and the West.
7 Rise of Empires: Ottoman, Episode One
8 Ottoman Viziers were the Sultan's primary ministers and advisors
9 Crowley.
10 Janissaries were formerly Christian young men (principally from modern Albania, Serbia, and Bosnia) taken as youths, converted to Islam, taught Turkish, and trained as full-time professional soldiers maintaining a Spartan-like existence. They constituted the Sultan's elite.
11 Crowley.

future operational success; the fortress fully earned its colloquial nickname, "The Throat Cutter."

Land-Based Sea Denial: Sevastopol (1942)

"...in the hands of an enemy with command of the sea, the Crimea was liable to become a serious menace deep in the flank of the Eastern Front, quite apart from the fact that the air-bases would continue to threaten the Rumanian oilfields."[12]

The Crimean peninsula also constitutes strategic terrain (See Figure 3, previous page). Site of the fabled Charge of the Light Brigade, English, French, Sardinian, Greek, Turkish, and German invaders have all sought this prime real estate; World War II was no different. Three weeks after Hitler's invasion of the Soviet Union, Crimea-based bombers successfully raided Rumanian oil facilities, Germany's sole petroleum source.[13] Consequently, Hitler directed this "unsinkable aircraft carrier" to be seized without delay. Additionally, the Crimean port of Sevastopol hosted the powerful Black Sea Fleet.[14] Directed to capture the Crimea, Field Marshall Erich von Manstein correctly saw the Black Sea Fleet as the Soviet center of gravity.[15] Specifically, the fleet provided theater-wide reinforcement and evacuation, naval gunfire, and amphibious assault capability. Conversely, due to Montreux Convention restrictions, Germany was barred from sending ships into the Back Sea and was forced to rely on the Luftwaffe to counter the fleet.[16] Finally, the Germans sought to deter Turkey from joining the Allies and protect the flank of a planned advance into the oil-rich Russian Caucasus.[17]

Figure 4. The German conquest of Sevastopol. (Courtesy illustration)

Manstein's initial attack into the Crimea was overwhelmingly successful as his 11th Army rapidly seized the peninsula, less Sevastopol.[18] For the final attack, he elected to make his main effort in the north (See Figure 4), despite its daunting defenses, as possession of Severnaya Bay's north shore would place the harbor under effective observed artillery fire denying the Black Sea Fleet's anchorage, a critical requirement.[19] [20]

On the verge of seizing the north shore, Manstein was placed in a dilemma when the Black Sea Fleet conducted amphibious assaults in his rear. Despite crushing both lodgments, Manstein settled

12 Manstein, Erich von. Lost Victories. Pg 129.
13 Soviet Storm, War in the East, Episode Three: The Defense of Sevastopol
14 In 1941, the Black Sea Fleet consisted of: 1 Battleship, 6 Cruisers, 16 Modern Destroyers, 6 Old Destroyers, 44 Submarines, and numerous freighters and transports.
15 https://ludwigheinrichdyck.wordpress.com/2017/01/22/sturgeon-catch-1942-the-siege-of-sevastopol
16 The 1936 Montreux Convention governs passage through the Bosporus and Dardanelle Straits. Per the convention, only Black Sea states are permitted to have capital ships in the Back Sea. Turkey, as owner of the straits, is also permitted to close the straits in time of war. Ultimately, the only axis vessels in the Black Sea were motor torpedo boats which navigated the Danube River to its Black Sea estuary.
17 Manstein. Pg 127.
18 Manstein. Pg 134.
19 Manstein. Pgs 136 & 148.
20 When the Soviets recaptured the Crimea in 1944, they undertook a similar scheme of maneuver to deny German evacuation by sea. In our own history, Henry Knox's artillery surreptitiously occupied Boston's Dorchester Heights threatening Boston Harbor and forcing the British fleet and occupying army to evacuate, the first expulsion of British forces from a major city during the War of Independence.

in for a siege as his army recovered and refit.[21]

Once ready to resume the offensive, Manstein again cast his main bid in the north. Attainment of the north shore was even more urgent as the attacking Germans faced an eminent loss of critical air support to higher priority operations. Additionally, the Luftwaffe was running critically low on aerial ordnance, forcing riskier and more numerous attacks for maximum accuracy.[22] After brutal fighting, Manstein's forces seized key observation posts facilitating observed fire against the harbor. Faced with this new threat, the fleet withdrew to lesser Caucasian anchorages and largely ceased to be a threat. Without naval support, Soviet positions became untenable and Sevastopol soon succumbed.[23]

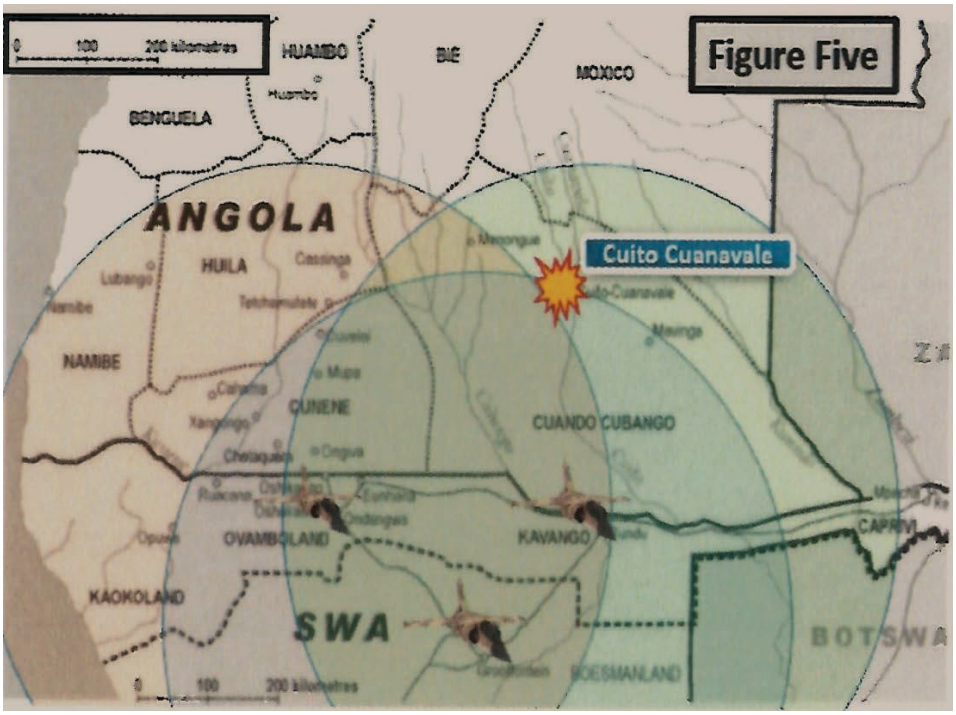
While the Luftwaffe terrorized the Black Sea Fleet, dropping more ordnance on Sevastopol than was dropped on the entire United Kingdom throughout the war,[24] they were unable to nullify this enemy's center of gravity. For example, during the siege's final month, the fleet brought in 24,000 reinforcements, 15,000 tons of cargo, and evacuated 25,000 wounded.[25] Only when the main harbor became subject to artillery fire was Admiral Oktyabrsky forced to cease operations. Artillery fire further interdicted makeshift harbors, such as Cape Khersones.[26]

Once again, Field Artillery proved to be the arm of decision-achieving operational effects with tactical weaponry.[27] With the capture of Sevastopol, the Soviet threat to the Rumanian oil fields was removed, Turkey was deterred, and the German flank was secured.[28]

Air Superiority through Artillery: Cuito Cuanavale (1987)

"The G5 artillery groups ... commenced bombarding Cuito. The South African Air Force sent in four Mirages as a decoy and while the MiGs were being rolled out ...the G-5s pounded the runway with shells. Within a short space of time, the airfield was destroyed and the remaining MiGs were forced to move back to Menongue."[29]

Figure 5. The range of limitations of SADF forward Air Fields. (Courtesy illustration)



Throughout the 1980s, the South African Defense Force (SADF) fought an undeclared war against Angola's Soviet and Cuban backed People's Movement for the Liberation of Angola (MPLA) regime. In 1987, this imbroglio exploded as SADF 20 Brigade counterattacked deep into Angola. The campaign's climactic battle of Cuito Cuanavale demonstrated the potential of Field Artillery fires to disrupt, in some cases deny, air operations.

After this deep pursuit, SADF formations operated at the extreme range margins of friendly air support which could provide only three minutes on the station.[30] Figure 5 depicts the range of limitations of SADF forward Air Fields. Conversely, MPLA's MiGs were based close to the front lines.

SADF forces found themselves increasingly under air attack and often limited to night operations. In response, SADF Commanders creatively employed their tactical center of gravity against the MPLA air arm: a grouping of G5 and G6[31] 155mm Howitzers. boasting 40 km range and high accuracy, the G5/G6s were the gold-standard of 155mm Howitzers in 1987-88. Accordingly, a 1989 Defense Intelligence Agency assessment rated these weapons as the most effective employed by either side.[32] Accepting risk, SADF Commanders positioned their G5/G6 group

21 Manstein. Pgs 136 & 137.
22 Manstein. Pgs 148 & 153.
23 https://ludwigheinrichdyck.wordpress.com/2017/01/22/sturgeon-catch-1942-the-siege-of-sevastopol
24 Hayward, Joel. Stopped at Stalingrad: The Luftwaffe and Hitler's Defeat in the East, 1942–1943. PG 96
25 https://ludwigheinrichdyck.wordpress.com/2017/01/22/sturgeon-catch-1942-the-siege-of-sevastopol
26 https://ludwigheinrichdyck.wordpress.com/2017/01/22/sturgeon-catch-1942-the-siege-of-sevastopol
27 During the siege of Sevastopol, the Germans employed artillery behemoths such as the 800mm "Dora" rail gun and a pair of 660mm Mortars "Thor" and "Odin." These leviathans had little practical effect and did not impact the Black Sea Fleet's operations.
28 https://ludwigheinrichdyck.wordpress.com/2017/01/22/sturgeon-catch-1942-the-siege-of-sevastopol
29 Morris, Michael. Fighting Columns in Small Wars: On OMFTS Model. Pg 53
30 http://samilitaryhistory.org/vol091ig.html
31 The G5 is towed while the G6 is wheeled self-propelled. Both feature a 52 caliber cannon tube and fire a wide suite of ammunition to include Extended Range Full Bore (ERFB) base bleed HE.
32 1989 Defense Intelligence Agency: The 1987-88 Combat in Southern Angola: Lessons Learned.

within range of Cuito and Cuanavale airfields placing devastating fires on aircraft, runways, and support infrastructure denying air operations and, on at least one occasion, destroying taxiing aircraft.[33]

In response, MLPA aircraft shifted from defensive counter-air and close air support to armed reconnaissance against the G5/G6 group without success. Furthermore, these low altitude flights rendered the MiGs vulnerable to stinger missiles with multiple aircraft lost and prohibitively raising the cost to the MPLA. On the horns of a dilemma, MPLA relocated their aircraft, abdicating air superiority and thus limiting their close air support edge.[34] Field Artillery fires once again proved an asymmetric avenue to defeating the enemy center of gravity delivering low-cost operational effects.

Conclusion

The preceding case studies demonstrate the operational potential of Field Artillery against enemy units/capabilities outside our tactical core competency of close support. Possibilities for future applications are limited only by imagination and reasonable risk acceptance. A hypothetical confrontation with Russia provides an illustrative example of how Field Artillery today can create low-cost operational effects.

Russia is not the Soviet Union but faces the same naval dilemma of four geographically separated fleets incapable of mutual support[35] and susceptible to interdiction. Specifically, the Black Sea, Baltic Sea, and Pacific Fleets are vulnerable to confinement in the Black and Baltic Seas and the Sea of Okhotsk. Field Artillery, positioned on key maritime terrain and working with other Joint capabilities, could threaten these close and confined waters allowing the Maritime Component Commander to concentrate against the North Sea Fleet, the most dangerous formation. Such an economy of force concept of employment matches the Commandant of the Marine Corps' direction for, *"exploiting positional advantage and defending key maritime terrain that enables persistent sea control and denial operations forward."*[36]

While we are not optimized for engaging maritime targets today, the mere threat of Field Artillery can cause an adversary to modify his operational calculus. For example, the threat emanating from North Vietnam's meager artillery park caused U.S. naval gunfire ships to increase offshore distance and conduct evasive maneuvering to avoid this unsophisticated threat degrading the quality of gunfire support to forces ashore. [37]

While the pursuit of Multi-domain Task Forces and Theater Fires Commands combined with the pending acquisition of anti-ship missiles are positive steps for the future, we need to be ready to fight tonight. We cannot drop our proverbial pack during this widening window of vulnerability, idly awaiting the arrival of "wunderwaffen" while simultaneously facing inevitable defense budget austerity. The U.S. Field Artillery has been world-class for 75+ years not due to equipment prowess, but due to superior doctrine, C2, training, and leadership. Upon these pillars rests the outcome of tomorrow's fights. While the character of war has dramatically evolved, the nature of war has not. Mehmet, Manstein, and the SADF defeated their enemies' center of gravity via a natural bias for action, creativity, and assumption of risks their opponents discounted. I sincerely hope we demonstrate the same mettle as tomorrow's victory will demand it.

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33 http://samilitaryhistory.org/vol091ig.html
34 Morris. Pg 53.
35 https://nationalinterest.org/blog/buzz/russia-not-soviet-union-it-has-same-navy-nightmares-91851
36 38th Commandant of the Marine Corps' Planning Guidance
37 From October 1966 to October 1968, at least 21 U.S. cruisers and destroyers were hit by NVA surface fires. https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/b/by-sea-air-land-marolda/chapter-3-the-years-of-combat-1965-1968.html

Radar Survivability in an Electronic Warfare Contested Environment

CW2 Jerrad Rader

As the Army shifts focus from counterinsurgency (COIN) to large-scale combat operations, it is imperative that the Army relooks how it employs Radars in an Electronic Warfare (EW) contested environment. As the United States Army has become more reliant upon the electromagnetic spectrum (ES), Russia has been developing, refining, and perfecting their TTP's using ES to target their adversaries. During the Russo-Ukrainian war, Ukrainian commanders complained about taking indirect fire (IDF) seconds after making a radio transmission.[1] Due to the Field Artillery and Target Acquisition community's inability to evolve with the ever-changing EW threat, new ways need to be identified in which the Target Acquisition Platoon (TAP), and its Radars, can survive in this type of an environment.

(Figure 1)

In June of 2020, 2nd Battalion 32nd Field Artillery TAP began running tests with Brigade EW platforms to determine ways to increase survivability (Figure 1). These tests were conducted with both AN/TPQ-50 and AN/TPQ-53 Radars at a distance of 4 Kilometers from Brigade EW platforms. Both of these Radars were positioned with an initial downward slope of 200-300 meters in front of the Radar then a sharp rise to a screening crest, which is considered an optimum site for a Radar.[2] The training encompassed various scenarios including:

- AN/TPQ-50, EW inside Radars max range; continuous cueing
- AN/TPQ-53, EW inside Radars max range; 360-degree mode continuous cueing
- AN/TPQ-53, EW inside Radars max range 90-degree mode; 30 seconds on 30 seconds off

None of these scenarios, or the use of an optimum site, prevented the Radar from being detected. In fact, the Radar was detected in less than a second each time it began radiating.

(Figure 2)

(Figure 3)

1 Scales, R. H. (2016, August 15). Robert H. Scales: While the U.S. chased political correctness, Russia chased the edge on the battlefield. Retrieved August 02, 2020, from https://nationalpost.com/opinion/robert-h-scales-while-the-u-s-chased-political-correctness-russia-chased-the-edge-on-the-battlefield

2 Field Artillery Target Acquisition ATP 3-09.12, 24 July 2020 p.28

(Figure 4)

The TAP conducted additional training in July of 2020 (Figure 2) with both Brigade EW and Division Cyber-Electromagnetic Activities. This training included multiple scenarios at greater distances between the Radars and EW Platforms. The training included an AN/TPQ-50 and AN/TPQ-53 at a distance of 8.5 Kilometers and at a distance of 16 Kilometers. Each Radar was in a position to maximize screening crest (Figure 3) and tunneling (Figure 4). The TAP ran through multiple scenarios which included:

- AN/TPQ-50, EW outside Radars max range; continuous cueing
- AN/TPQ-50, EW inside Radars max range; continuous cueing
- AN/TPQ-53, EW inside Radars max range 90-degree mode; continuous cueing
- AN/TPQ-53, EW inside Radars max range 90-degree mode; 30 seconds on 30 seconds off
- AN/TPQ-53, EW inside Radars max range 360-degree mode; continuous cueing
- AN/TPQ-53, EW inside Radars max range 360-degree mode; 30 seconds on 30 seconds off

The exact Radar operating frequencies were not provided to increase the validity of results. The ranges of 1215 to 1390MHz and 3.1 to 3.5 GHz were used. These frequency ranges were selected because they are found via open source. Due to the positioning of the Radars, with both tunneling and screening crests, there was some success to prevent detection. However, by simply moving the EW platforms a couple of hundred meters, the Radars were easily identified. In an environment in which we face adversaries utilizing a networked direction-finding system, detection from one sensor may be avoided, but ultimately will not avoid detection of all sensors. During each of these scenarios, when the Radars were found, their

(Figure 5)

System	Screening crest	Tunneling	Electronic warfare threat	Position has screening crest and tunneling	Position has screening crest only	Position has neither screening crest and tunneling
AN/TPQ-36/37 AN/TPQ-53 in 90 degree modes	Less than 1 kilometer of the position in friendly territory 15-30 mils.	The use of foliage, berm, or buildings to reduce side lobe radiation	Counterfire officer provides the current electronic warfare status for their area of operations. Continuous radiation time should not exceed two minutes when the enemy has electronic detection capabilities	>15 minutes of accumulation	>15 minutes of accumulation	>8 minutes of accumulation
				Continuous radiation criteria– • Tactical situation • Electronic threat (high, medium, low) • Mission driven situation (close air support)		
AN/TPQ-50 AN/TPQ-53 in 360 degree mode	Mask angle not greater than 100 mils.	Any building or vehicle less than 20 meters distance may degrade operation of or damage equipment		Never position in a deep depression or valley between hills. The performance will be severely degraded.		

EMCON Status	Protocol to enforce	Radio Power Transmission	Radar Cueing	Radar guidance	Example Authorized Reports
5	N/A	Power amp authorized, Re-trans as needed to conduct operations	N/A	Neither screening crest nor tunneling required	Any
4	Ensure comms are encrypted and black keys loaded	Power amp authorized, Re-trans as needed to conduct operations	Any cueing combination authorized, survivability moves conducted upon 15 minutes of radiation	Screening Crest Required	All Acquisitions, SPOT, SALUTE, PERSTAT, LOGSTAT, MEDEVAC, Equipment Slant
3	Evaluate EW threat to determine frequency range of ENY EW Assets. Minimize use of RADAR's operating in the frequency range of ENY EW Assets	Power amp authorized no closer than 10K from the FLOT, power amp not advised	Combination of both situational and demand cueing authorized, radiate for no longer than 8 minutes. Monitor previous locations and add time to cumulative radiation based on EW analysis	Screening crest and tunneling required	All Acquisitions, SPOT, SALUTE, PERSTAT, LOGSTAT, MEDEVAC, Equipment Slant
2	Cease all non-essential transmissions, turn off JBCP's, switch Radios to high	Power amp not authorized, de-centralize RADAR's to units that can receive acquisitions with radios on high	Demand cueing prefered, situational cueing during decisive points. Radiate no longer than 8 minutes and conduct survivability move	Screening crest and tunneling required	All Acquisitions, SPOT, SALUTE, MEDEVAC
1	COMMS Silence	COMMS Silence	Demand cueing only, radiate no longer than 8 minutes and conduct survivability move	Screening crest and tunneling required	All Acquisitions, MEDEVAC
*Total radiation time will be consecutive without breaks to maximize RADAR coverage					

(Figure 6)

signatures were located within one second from the onset of radiating. There is a misconception across the Field Artillery community that multiple seconds will lapse before a signature is detected. As evidenced by conducting testing, factual data confirms Radars can be detected immediately upon radiation without dwell time.

Documented reference from the Russo-Ukrainian War in which indirect fire followed radio transmission within seconds[3] has led the TAP to question the validity and relevance of the survivability matrix in ATP 3-09.12, *Field Artillery Target Acquisition* (Figure 5).

As stated in ATP 3-09.12, and depicted in the survivability matrix, is that continuous radiation time should not exceed two minutes when the enemy has electronic detection capabilities.[4] The issue with the survivability matrix is that it keeps the Radar in position for an extended period of time, ultimately increasing the risk of being targeted. In a high EW environment, it is common practice to radiate for 30 seconds on and 30 seconds off to avoid detection, or a similar combination, not to exceed the two minute timeline outlined in ATP 3-09.12. Once the Radar meets the 15 minutes of accumulated radiation, they then conduct a survivability move. As previously stated, this causes the Radar to be at extreme risk. Operators radiating for 30 seconds on and 30 seconds off, remain in position for 30 minutes before 15 minutes of accumulated radiation is complete. Training and research conducted confirms Radar signature is detected immediately upon radiation. Ultimately, this allows an adversary 29 minutes and 59 seconds to target the Radar. In September of 2014, east of Mariupol, a Russian drone flew over a Ukrainian position and 15 minutes later a BM-21 multiple launch rocket system (MLRS) destroyed that position.[5] An argument can be made that an EW platform could find a target faster than a drone, ultimately reducing the sensor-to-shooter time. Continuing to use operational standards outlined in ATP 3-09.12 leave the Radars at risk for both detection and destruction.

The Field Artillery community can fight their Radars in an EW constrained environment using the proposed matrix (Figure 6). All radiation times are to be carried out consecutively, without breaks. This will increase the probability of tracking enemy IDF, as well as decrease the amount of time spent at one location. Each column from the matrix is explained in subsequent paragraphs.

The proposition includes the use of emission control (EMCON) which is the selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing the following:

a. detection by enemy sensors

3 Scales, R. H. (2016, August 15). Robert H. Scales: While the U.S. chased political correctness, Russia chased the edge on the battlefield. Retrieved August 02, 2020, from https://nationalpost.com/opinion/robert-h-scales-while-the-u-s-chased-political-correctness-russia-chased-the-edge-on-the-battlefield

4 Field Artillery Target Acquisition ATP 3-09.12, 24 July 2020 p.29

5 Karber, Dr. Phillip A. 2015. Lessons Learned from the Russo-Ukrainian War. Personal Observations, Washington D.C.: Johns Hopkins Applied Physics Laboratory p. 13

EMCON Status	Description
5	Describes a situation where there is no apparent hostile activity against friendly emitter operations. Operational performance of all electromagnetic spectrum (EMS) dependent systems is monitored, and password/encryption enabled systems are used as a layer of protection
4	Describes an increased risk of attack after detection. Increased monitoring of all EMS activities is mandated, and all Department of Defense end users must make sure their systems are secure, encrypted, power levels monitored, and transmissions limited. EMS usage may be restricted to certain emitters, and rehearsals for elevated EMCON is ideal.
3	Describes when a risk has been identified. Counter ECM (encryption/Freq hop/directional antennas) on important systems is a priority, and the EWOs alertness is increased. All unencrypted systems are disconnected.
2	Describes when an attack has taken place but the EMCON system is not at its highest alertness. Non-essential emitters may be taken offline, alternate methods of communication may be implemented, and modifications are made to standard lower EMCON configurations (id power levels and antenna types).
1	Describes when attacks are taking place based off the use of the EMS. The most restrictive methods of EP are enforced. Any compromised systems are isolated from the rest of the network.

(Figure 7)

5	N/A	Power amp authorized, Re-trans as needed to conduct operations	N/A	Neither screening crest nor tunneling required	Any

(Figure 8)

b. mutual interference among friendly systems

c. enemy interference with the ability to execute a military deception plan.[6]

JP 3-13.3 outlines how EMCON is important to operational security as well as essential to preventing the adversary from distinguishing deception activities from the main effort.[7] These EMCON levels should be assessed by the Field Artillery Battalion and deliberately elevated or lowered based on the criteria outlined in figure 7.[8]

Before discussing EMCON levels 1-5, clarification must be made regarding definitions and practices of Radar cueing. Situational cueing ties cueing to events or triggers that are determined during IPB and the planning process. For example, during the execution of offensive tasks, an event or trigger may be breaching or air-assault operation.[9] When the proposed survivability matrix discusses situational cueing, it is not referring to a cueing schedule where operators begin radiating at a designated time of the day. Rather the operators will begin radiating based on triggers. These triggers may include decisive points of the operation, during Airborne operations, or following a friendly Field Artillery volley in anticipation of enemy counterfire. At no time should the Radar operator begin radiating because it is a certain time, but rather only when a trigger has been met. Once that trigger has been met, cueing agents will contact operators, and inform them to begin radiating.

When discussing demand cueing, the survivability matrix is referring to the doctrinal definition of the activation of the weapon locating Radar once the enemy is known to have begun firing.[9] For purpose of discussion, I have provided two examples in which demand cueing will be effective. On July 11, 2014, in the town of Zelenopillya, Ukraine, a combined Russian MLRS strike destroyed two Ukrainian Mechanized Battalions and lasted no more than three minutes.[10] The significance behind this attack is not the destruction of the mechanized battalion, but rather the three minutes of firing. In a situation in which demand cueing would be implemented, three minutes is more than enough time for a cueing agent to inform a Radar to begin radiating. Additionally, a common Russian TTP is to perform anti-fire maneuver. During this TTP, artillery should begin moving within its area at a distance of up to 500 meters, followed by firing 7-10 rounds of each weapon.[11] Based on the rate of fire of a 2S19, the firing of 7-10 rounds will last 1-2 minutes, which would once again be

6 Joint Publication 3-13.3 Information Operations, 20 November 2014 p. 109
7 Joint Publication 3-13.3 Information Operations, 20 November 2014 p. 54
8 Flanagan, William. Electromagnetic Spectrum Footprint and Emissions Control
9 Field Artillery Target Acquisition ATP 3-09.12, 24 July 2020 p.49
10 Karber, Dr. Phillip A. 2015. Lessons Learned from the Russo-Ukrainian War. Personal Observations, Washington D.C.: Johns Hopkins Applied Physics Laboratory p. 18
11 Army collection Journal of the Ministry of Defense of the Russian Federation

4	Ensure comms are encrypted and black keys loaded	Power amp authorized, Re-trans as needed to conduct operations	Any cueing combination authorized, survivability moves conducted upon 15 minutes of radiation	Screening Crest Required	All Acquisitions, SPOT, SALUTE, PERSTAT, LOGSTAT, MEDEVAC, Equipment Slant

(Figure 9)

3	Evaluate EW threat to determine frequency range of ENY EW Assets. Minimize use of RADAR's operating in the frequency range of ENY EW Assets	Power amp authorized no closer than 10K from the FLOT, power amp not advised	Combination of both situational and demand cueing authorized, radiate for no longer than 8 minutes. Monitor previous locations and add time to cumulative radiation based on EW analysis	Screening crest and tunneling required	All Acquisitions, SPOT, SALUTE, PERSTAT, LOGSTAT, MEDEVAC, Equipment Slant

(Figure 10)

(Figure 11)

(Figure 12)

plenty of time for a cueing agent to inform a Radar to begin radiating.

The first EMCON level, level 5 (Figure 8), is best described by how Radars are currently operating in the COIN environment. There is no protocol to enforce as there is no threat of an EW attack. The Radars are free to operate as many hours a day as necessary to support their current objectives. This is the most permissive EMCON level.

EMCON level 4 (Figure 9) is active when suspected enemy EW assets are in the area of operations (AO). Any combination of situational or demand cueing is authorized, not to exceed 15 minutes of continuous radiation. The timeline is based on the event that was previously discussed, in Mariupol, where a unit was destroyed within 15 minutes of being detected.[12]

EMCON level 3 (Figure 10) is active when there is confirmation of an enemy EW threat in the AO. At this particular level, the FA Battalion S2 must determine the frequency range in which the enemy EW asset is capable of operating. If a Radar is operating outside of the determined frequency range, every effort should be made to maximize the use of that Radar. While operating at EMCON level 3, the use of a power amp is authorized, however, it is not advised. By switching from power amp to medium power it

12 Karber, Dr. Phillip A. 2015. Lessons Learned from the Russo-Ukrainian War. Personal Observations, Washington D.C.: Johns Hopkins Applied Physics Laboratory p. 13

2	Cease all non-essential transmissions, turn off JBCP's, switch Radios to high	Power amp not authorized, de-centralize RADAR's to units that can receive acquisitions with radios on high	Demand cueing prefered, situational cueing during decisive points. Radiate no longer than 8 minutes and conduct survivability move	Screening crest and tunneling required	All Acquisitions, SPOT, SALUTE, MEDEVAC

(Figure 13)

1	COMMS Silence	COMMS Silence	Demand cueing only, radiate no longer than 8 minutes and conduct survivability move	Screening crest and tunneling required	All Acquisitions, MEDEVAC

(Figure 14)

will reduce the signature that the Radar is producing while transmitting acquisitions. Figure 11 depicts a single SINCGARS on power amp while figure 12 depicts it on medium. Once again, a combination of both situational and demand cueing is authorized, however the amount of time has been reduced to eight minutes of consecutive radiation before displacing. Once displaced, the previous location is monitored for IDF or intelligence, surveillance, and reconnaissance assets. If there is no evidence of an EW threat, the eight minutes can be increased to a longer duration.

EMCON level 2 (Figure 13) is active when there is a confirmed attack based on the use of EMS. During this time the Radar operators must cease all nonessential radio transmissions. When EMCON level 2 is active, authorized radio transmissions include sending acquisitions, and radio transmissions necessary for mission accomplishment. The use of a radio's power amp is not authorized throughout EMCON level 2. The command support relationships may require adjustment, or the counterfire fight may transition to a decentralized fight to reduce emissions if the counterfire headquarters cannot be reached using the radio on high. Demand cueing is preferred, however situational cueing continues to be authorized during decisive points. Again, the Radar should radiate until it has reached eight minutes of continuous radiation and then displace.

EMCON level 1 (Figure 14) is active when attacks are continuously occurring through the use of EMS. This is the most restrictive EMCON level and will limit the Radar operator to complete communication silence. Demand cueing is the only authorized method of cueing during this level and no additional radio communications should occur apart from acquisitions or medical evacuation.

During times in which there is greater significance placed on improving EW systems, it is imperative that doctrine changes to increase the survivability of our Radars. With information collected via these training events, it has shown that the current Radar survivability matrix is not sufficient for an EW contested environment. Due to the Field Artillery and Target Acquisition community's inability to evolve with the ever-changing EW threat, new ways need to be identified in which the TAP, and its Radars can survive in this type of environment. Through the use of emissions control and the survivability matrix provided, I believe 2-32 FA's Radars would survive in this type of environment.

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The Roles of Battalion Logistical Mission Command Nodes

Reversing trends at JMRC and Combat Training Centers

CPT Nicholas Bowers and SFC Brandon Williams

The Brigade Combat Teams (BCTs) main effort is in attack positions ready to secure the near side objectives of a gap crossing. The bridging units are ready to deploy, but there is a problem. The smoke targets planned for the far side of the gap to obscure enemy scouts and forward observers failed to fire. There is chaos in the Field Artillery Battalion Operations Center, what happened?

The failure is often not in the execution of Field Artillery technical rehearsals or a Battery out of position, but in the often ill-trained and out-of-practice logistical support system. The effectiveness of the Field Artillery Battalion (FAB) correlates directly to the proper functioning and leadership of personnel assigned to the Combat Trains Command Post (CTCP) and the Field Trains Command Post (FTCP). These critical nodes make up the foundation of the Battalion's logistical system and it is essential they are proficiently trained to ensure maximum effectiveness. The FTCP and CTCP are separate and distinct in composition and role as well as space on the battlefield. Understanding the specific mission and composition of these two posts helps Leaders conceptualize how to man and equip these critical mission command nodes within their formation.

The FTCP is doctrinally located within the Brigade Support Area (BSA). It receives updated mission requirements, prepares planned resupply operations, and maintains readiness to support emergency or unplanned resupply requests by coordinating regularly with the CTCP and the BSA. The FTCP acts as the FAB's link to the BSA and indirectly to the Combat Sustainment Support Battalion and theater supply assets. The FTCP must be able to rapidly and seamlessly interface with the Brigade Support Battalion (BSB) and BCT logistics planners and Senior Leaders. For this reason, according to FM 3-96, *The Brigade Combat Team,* the FTCP is often located in the BSA. Locating it here helps increase the survivability of the mission command node and facilitates incorporating it into the larger BSA protection plan. The FTCP's functions include "coordinate logistics requirements with the BSBs support operations, configure logistical packages tailored to support requirements, and forecast and coordinate future sustainment requirements." (FM 3-96)

U.S. Army photo by SPC Kamryn Guthrie

To achieve its mission, the FTCP must have the proper equipment to communicate and coordinate with the Battalion, BCT, and BSB planners and executors. The BCT utilizes a combination of upper tactical internet, frequency modulation, and Joint Battle Command-Platform to communicate logistical information, but may also require high frequency or Tactical Satellite Radio Communications. Whatever Primary, Alternate, Contingency and Emergency (PACE) medium they choose must be established, practiced, rehearsed, and not deviated from. The FTCP must also be equipped with like systems. Only one upper tier server is available in a FAB's MTOE. As the Battalion senior Leaders are physically separated from the FTCP, the Battalion's Tactical Communications Node is rarely, if ever, located there. One way to ensure communications is to co-locate the FTCP with the BSA and conduct frequency modulation and face-to-face communications.

The FTCP's communications with the CTCP are equally important. The distance between the CTCP and FTCP fluctuates throughout the fight and standard frequency modulation radio communication is not consistent. Joint Battle Command Platform (JBC-P) is the most reliable and allows forwarding or saving of the text transmission for later reference. Radio voice transmissions through high frequency and frequency modulation radios are solid alternate and

U.S. Army photo by PFC Devron Bost/released

contingency plans for communications forward to the CTCP.

The FTCP is a mission command node and must operate as such; utilizing 24-hour operations and staffed with shifts of personnel to receive and transmit data. To ensure the mission success of the FTCP, the manning must appropriately fulfill all mission requirements. This includes a mixed group of personnel from the HHB and the Forward Support Company (FSC). An additional task of the FTCP is "to coordinate with the BCT for personnel services and replacement operations" (FM 3-96). This task mandates the assignment of S-1 personnel at the FTCP to track casualty movement to Role II and beyond.

Additionally to facilitate reception, assignment, and forward movement of replacement personnel the FTCP must have the infrastructure to support these operations and run all the required systems. The FSC has the capability internal to the company to support these operations either through the employment of the Company Command Post 1068 in an Armored Formation or the use of the expandable van or one of the Command Team Vehicles in a towed formation. A light formation can operate this command post with the use of internal assets from the maintenance control section or the distribution platoon headquarters and company command team combined to include power generation.

Critical to Field Artillery Operations at the FTCP is the correct configuration of ammunition. Class-V packages must be configured at the FTCP before movement to the CTCP or a logistics release point according to the unit TACSOP and standard operating procedures for distribution of ammunition. This requires someone knowledgeable in artillery ammunition to inspect loads before disembarking the BSA. A best practice is to utilize the Battalion Master Gunner as they are not encumbered with fighting a platoon and are likely the most knowledgeable Cannon Crewmember (13B) in the Battalion. The Master Gunner would ensure complete rounds are in the combat configured loads and the correct projectiles go to the appropriate Battery. The OIC of the FTCP is the FSC Executive Officer while the Company Commander has mission command oversight and their Company Command Post here. This allows the Commander to conduct battlefield circulation and liaise with the CTCP as required but facilitates them being the Battalion's Representative to the Brigade Synchronization Meetings in the Battalion Executive Officer's absence. They will have the knowledge and experience to effectively communicate the Battalion's logistical needs

and are well-versed in the Battalion's logistical statistics. The FSC Executive Officer stays at the FTCP facilitating its mission in the Commander's absence. The FTCP is the FAB's link to the logistical support and planners in the BSA and serves to properly prepare configured loads before sending vital sustainment to the next link in the logistics chain.

The CTCP is the logistical middle point of the fight coordinating between the Main Command Post (MCP) and the FTCP to facilitate the correct resources forward when needed by anticipating consumption and planning resupply triggers. It is a fine balance between enough assets to complete the mission and increasing survivability by projecting the smallest signature possible. The CTCP cannot become the Battalion's parking lot – only mission-essential vehicles must remain with it as its security is dependent on survivability and mobility. It must be mobile enough to support frequent moves under several conditions, the most important being security compromised (FM 3-96).

The CTCP comprises multiple elements and supports multiple missions. It is responsible for "controlling sustainment support to the current operation, providing sustainment representation to the MCP for planning and integration, monitoring supply routes and controlling the sustainment flow of materiel and personnel, and coordinating the evacuation of casualties, equipment, and detainees." (FM 3-96).

The accomplishment of most of these missions rests with the Battalion S-1 and S-4 overseen by the Battalion Executive Officer, which in older doctrine is referred to as the Administrative and Logistical Operations Center. This cell with required mission command systems remains vital to the function of the Battalion. Additionally at the CTCP, the doctrine calls for the Battalion Aid Station and the Unit Maintenance Control Point. These nodes can operate out of the CTCP or separately based on METT-TC. FABs do not possess enough assets to self-secure multiple nodes effectively. Safety lies in dispersion and concealment. Often this calls for multiple smaller nodes.

A small CTCP consisting of the ALOC, distribution platoon assets, and a small S-6 detachment with the Battalions' Tactical Communications Network allows for a small CTCP that easily conceals and disperses. An alternate option for Upper Tactical Internet is the placement of the Tactical Communications Network with the MCP and the utilization of the Soldier Network Extension Asset (organic to the Battalion S-6) or very small aperture terminal (organic to the FSC Maintenance Control Section) at the CTCP. These alternatives allow the Operations Staff at the MCP access to the Tactical Internet while enabling the CTCP to maintain connectivity as well. The other elements, Battalion Aid Station for example, may co-locate with the Battalion MCP enabling faster transfer from point of injury to the Role II. As another example, the UMCP emplaces as a separate node from a separate Battalion providing it the same benefits as the CTCP.

The Battalion Executive Officer is the senior Leader at the CTCP that is responsible overall for the sustainment and logistics for the Battalion. The XO moves between the CTCP, FTCP, and the logistic release points that the Battalion conducts ensuring the Battalion's logistics needs are met. The HHB Commander usually exercises mission command for the CTCP while the OIC is the S-4. The S-4 coordinates with the rest of the Battalion staff, FTCP, and FSC leadership ensuring the current fight is fully sustained while assisting with planning for future operations. They coordinate with the staff utilizing the Battalion signal PACE plan. Typically JBC-P is the best medium for planning as it is readily available at the MCP, FTCP, as well as the firing Batteries who also have access to it for submitting reports and requests resupply. Maintaining upper tier-one at the CTCP additionally allows the S-4 and S-1 to coordinate directly with the brigade sustainment Leaders to order future logistics packages as well as replacements.

The final task of the CTCP is to act as an alternate command post for the Battalion. The CTCP does not have fire direction capabilities, but does retain communications with the BCT - a capability the firing Batteries do not possess with their MTOE. In the event the MCP is not mission capable, the CTCP assumes control of the Battalion for movement and positioning guidance while one of them (Battery Operations Center) assumes tactical fire direction for the Battalion. For this reason, the CTCP must ensure proper battle tracking continuity, with the rest of the staff (at the MCP) is taking place at all times. The CTCP is a critical mission command node, the effectiveness of which can vary from unit to unit.

Rotational Units at the Joint Multinational Readiness Center and other Combined Training Centers have struggled with the delegation of roles and responsibilities, defensive postures, personnel management, and the prolonged functioning of the CTCP and FTCP. By understanding historical trends, future units can prepare for the challenges experienced by their predecessors. Defensive postures within logistical command nodes suffer due to a very simple issue: lack of crosstalk between Leaders.

Establishing a clear and defined chain of command that encompasses all command nodes within the CTCP footprint is paramount to setting the conditions for a shared defensive plan. First Sergeants and Commanders of jointly shared command nodes struggled to develop a defensive plan as a result of not having the chain of command understood by all parts of the combined formation. If the chain of command is in question, the command node is sure to fail. It is the command TM's responsibility to ensure security and sur-

vivability and in command nodes incorporating more than one element, someone must be in charge.

Often the CTCP is under the command of the HHB commander with the S-4 acting as the officer in charge (FM 3-96, 9-107). However, the FTCP is under the Command of the FSC Commander with the Headquarters Battery executive officer or FSC executive officer as the officer in charge. These command teams assume responsibility for and inspect defensive plans and positions as often as possible. The involvement of the Battalion executive Officer is critical in this area as his directed guidance to the staff will likely drive the development of the CTCP's chain of command and mission command functions.

The placement of key staff officers and NCOs has significant impacts on the performance of the FTCP. The medical platoon leader is often located with the aid station at the CTCP and removed from being part of the military decision-making process as the unit progresses through the phases of the battle. Alternatively, the S-4 often remains in the MCP, therefore, breaking a critical link in the communication from CTCP to FTCP. Both of these employments of staff officers proved ineffective and hindered the Battalion's ability to perform critical functions at both the MCP and the CTCP.

The prolonged functioning of the CTCP relies on the available mission command nodes at the unit's disposal. The communications platforms on the ground combined with the level of digital connectivity determines the efficiency of reports, and the ability to stay abreast of real-time changes on the battlefield. When units fail to conduct a critical analysis of mission command system placement and employment throughout the formation, logistical reporting and sustainment readiness can become a challenging obstacle to overcome.

Leaders must seek out creative ways to exercise their logistical mission command nodes including the deployment of the CTCP and FTCP for every exercise, utilization of constructive/replicated ammunition, and reduction of on-hand classes of supply. Multiple posts rotational after-action reviews reveal a common trend of rotational training units - their participation at JMRC is their first time operating a CTCP. Lacking quality repetitions during home-station training, units move straight into the execution phase without training the critical experience needed to avoid any of the common pitfalls experienced at Combat Training Centers or in combat.

Throughout home station training cycles, units face challenges with refining collective training tasks while balancing enduring tasks. FABs often default to leaving support elements and staff members in the cantonment area rather than move forward with the firing Batteries when deploying to a field collective training environment. In doing so, this prevents the Battalion from exercising all of its systems in a simulated combat training scenario. Incorporating staff involvement into training events is essential to test reporting procedures and validate practices that incorporate into the unit's TACSOP.

The maintenance and distribution platoons too must practice their craft in a field environment. Replacing an engine in a maintenance bay is significantly different from replacing one in a contested field environment at the UMCP and Soldiers need the repetitions to build confidence. Deploying the entirety of the FSC enables the company command team to understand the logistical challenges inherent to having personnel spread across the battlefield.

In doing so, this provides the opportunity of gaining repetitions of personnel management in a simulated combat environment. Accounting for work/rest cycles, manning shortages, and distribution of equipment and weapons systems, will enable Leaders to get a better understanding of how to provide the Battalion the support they need to continue the fight, and maintain their defensive postures.

Overall, to ensure the effectiveness of the FAB, Leaders must focus on preparation in the FTCP, planning in the CTCP, understanding trends, and increase the amount of training for the logistical nodes. These nodes have to receive equal attention in regards to manning, equipping, and training equivalent to that of the MCP. The CTCP and FTCP are vital for FAB operations from forecasting ammunition expenditures in the next phase to the replacement of combat casualties. Every logistical move is planned or executed at one of these nodes. When we need a mission to be successful, we inherently know it must be rehearsed. However, too often these critical aspects of the mission fall by the wayside as Leaders mainly focus on certified and qualified crews. It is the vital responsibility of the command team, Battalion Executive Officers, and staff officers and NCOs to ensure Soldiers and systems within their sustainment chains are exercised. Leaders and Soldiers must understand their part in the mission and fulfill it effectively and efficiently.

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Developing and implementing a RADAR Cueing Schedule

SFC Todd-Geoffrey P. White and SFC Theodis Scott Jr.

Alone on a hilltop, an AN/TPQ-53 Radio Detection and Ranging (RADAR) system is occupied, ready to radiate, and take on the mission assigned. That mission is to provide effective and timely counterfire acquisitions to the organic Brigade and Division. As they stand ready, observing the assigned azimuth of search, prepared to acquire enemy indirect fire weapon systems, something occurs of which they were not expecting. The RADAR has received a jamming signal indicating the detection of a probable enemy electronic warfare system. The section reports time, frequency, and azimuth to the Counterfire Cell at Brigade and continues their mission. Moments later, they receive another jamming signal on the same azimuth and frequency. Shortly thereafter, they hear the distinct buzzing of an aerial drone of unknown type. As the RADAR section reports the contact to the Counterfire Cell, the section begins acquiring enemy indirect fire acquisitions, followed by accurate enemy indirect fire on the RADAR site. This indirect fire results in the destruction of the Sustainment Operations Group and the wounding of one crewmember. In an effort to save the RADAR, the section executes an immediate displacement and survivability movement of the Mission Essential Group (MEG). This scenario, while fictional, is a feasible scenario that could play out during large-scale combat operations. To avoid the scenario, the question that we must answer is, how do we integrate the development and implementation of RADAR cueing schedules into training, to increase overall proficiency, effectiveness, and survivability? Many factors can lead to a situation such as this to come to fruition. One main factor, not developing a cueing schedule at the counterfire level, along with some other contributing factors may include: changing the cueing guidance without properly delineating to the RADAR sections, not planning for survivability movement once saturation time has been met, and failing to take into account the enemy electronic warfare threat in the area of operations. Furthermore, a lack of tracking radiate on and off cycling at the operator level, as well as, total saturation time can also contribute to the cueing schedules' ultimate success or failure.

Creation and implementation of a well-planned cueing schedule is one of the tasks that has degraded Army-wide, as trends at the Joint Multinational Readiness Center show. To begin to understand the problem, we must first understand the different types of cueing, advantages and disadvantages, and employment situations for each form of cueing. According to ATP 3-09.12, para 4-28, *Field Artillery Target Acquisition*, 24 July 2015, "Cueing is the process designed to prompt or notify the RADAR to begin radiating and acquire indirect fire. The cueing agent is a command and control element that has the authority to direct the RADARs search area and search time." There are two types of cueing that the RADAR systems execute - situational cueing and demand cueing.

"Situational cueing is the preferred technique for cueing Weapon Locating RADARs and is the most responsive. This method ties cueing to events or triggers that are determined during IPB and the planning process," ATP 3-09.12, para 4-32. There are many scenarios and missions related to situational cueing. For example, offensive operation triggers for the RADAR to begin cueing include but are not limited to, the beginning of an air assault mission, artillery raid, breach, or wet gap crossing. Thus, ensuring target acquisition coverage during those operations. During defensive operations, cueing triggers may be associated more with the enemy operational phases of fire as depicted on a decision support template.

"Demand cueing is the activation of weapon locating RADAR once the enemy is known to have begun firing. For demand cueing to be effective, cueing agents must be designated and a responsive communication system between the cueing agents and RADAR established," ATP 3-09.12, para 4-33. Prioritization and standardization are crucial before

Prioritization and standardization are crucial before utilizing demand cueing

utilizing demand cueing. Specifying cueing agents and triggers allow for effective RADAR coverage while limiting unnecessary radiating, resulting in less probability of detection by the enemy. Cueing agents may include, but are not limited to, forward observer teams, aerial intelligence surveillance and reconnaissance assets, electronic warfare assets, Brigade Fire Support Officers, and the Counterfire Cell. Agents, as well as triggers, vary based on the situation and which agent is best placed to direct cueing. For example, standard operating procedure for the brigade may be for the Counterfire Cell to retain all cueing authority; however, the enemy scheme of maneuver and friendly forces course of action may identify the forward observers in the forward most BN the best position to identify enemy indirect fire equipment. Therefore, delegating cueing responsibility as mission dictates to the forward most unit, may prove most relevant. Demand cueing relies heavily on every possible cueing agent understanding their role, having clear communications with the target acquisition assets, and integration of those assets into unit training to execute the cueing guidance.

Development of the brigade RADAR cueing schedule begins with the creation of the Target Acquisition Standard Operating Procedure. When including cueing schedules in the brigade TA SOP the Platoon Leader, Platoon Sergeant, Senior Field Artillery Targeting NCO, and Counterfire Officer make determinations on base-level guidance for each type of cueing. Development of a robust cueing guidance in the TA SOP provides the RADAR section a basis for operations that can then be refined and trained upon to ensure the sections have a clear understanding of cueing of their target acquisition systems. Baseline cueing guidance will also lay the groundwork for interoperable training events such as Mortar Evaluation Programs, Artillery Tables, and Counterfire Cell certification. This groundwork training will aid in the communication process, especially during demand cueing, as the RADAR sections often are not coordinated with possible cueing agents before large-scale combat operations. Once a Standard Operating Procedure is established, adjustment of the TA SOP occurs to align with Commander's guidance, Operational Environment variables, and mission analysis outputs, before development of the TA Tab of the BDE OPORD.

Every step of the Military Decision-Making Process is an opportunity to adapt and refine the brigade cueing schedule. From mission analysis to OPORD development, taking into account facts and assumptions that could affect the RADARs' capability to acquire targets and evade Electronic Warfare systems. The Intelligence Officer's assessments during Mission Analysis and Intelligence Preparation of the Battlefield are critical steps that the Counterfire Cell and Target Acquisition Platoon leadership should be most aware of, as these steps will provide the best facts and assumptions from which to plan. As an example, did we assume that the electronic warfare threat assessed at full strength in phase one, and therefore poses a high risk to our radio frequency-producing devices? What have we determined the RADAR cueing schedule to be throughout phase one? How will our cueing schedules continue to adapt as the mission progresses? Thorough analysis and development during the Military Decision-Making Process is crucial to answering the questions as the process continues, resulting in a refined plan for cueing during as many phases as possible, and refined as necessary.

Now that we have developed cueing guidance in our SOP, and have practiced the performance measures of our tasks, we can continue to develop our tactical planning for the employment of our RADAR systems at the BCT level in this often-overlooked aspect of Target Acquisition planning. Effective cueing will ultimately come down to the RADAR section's understanding of the importance of cueing and ownership of the RADARs cueing at their level. Therefore, a best practice is to integrate cueing into all training events, from RADAR Artillery Tables to Battalion and above Artillery Training events. A concerted effort to havinge the systems in play and conducting their role as normal is critical to gaining and maintaining proficiency in this area. All too often, utilization of the RADAR section is in an "administrative" role, wherein they are only at the

Development of the brigade RADAR cueing schedule begins with the creation of the Target Acquisition Standard Operating Procedure.

training event to provide secondary means of observation. They will generally emplace the system and not move for the entirety of the Live-fire Exercise. While this practice is not inherently wrong, it fails to provide the section the requisite training conditions to practice realistic technical and tactical performance measures. A holistic gated training strategy must include cueing of the RADAR during training events and certifications. Some ways to do this include aligning the RADAR table VI in line with the Field Artillery qualification tables for Howitzers or Rockets. Integrating the Counterfire Cell into the Brigade Fires Support Element during Artillery qualification tables, to provide real-world situations and orders for the sections. With additional planning and support, the Target Acquisition assets will be more involved and proficient in the systems and processes of an effective counterfire fight. No matter how the cueing plan is integrated, all levels must have the discipline to continue training in this area to ensure cueing does not become a skill that we allow to atrophy.

We can mitigate the problem sets of RADAR coverage and survivability against EW threats with proper development, implementation, and training of both the RADARs and Counterfire Cells. This often overlooked and undertrained aspect of system operations is complex but manageable with the proper systems and processes in place. However, once in place it will result in a trained and knowledgeable Weapon Locating RADAR System platoon and Counterfire Cell and mission accomplishment of the Target Acquisition assets. Enabling brigade, division artillery, and division commanders to achieve success in counterfire battles in any operational environment.

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We can mitigate the problem sets of RADAR coverage and survivability against EW threats with proper development, implementation, and training of both the RADARs and Counterfire Cells.

Training MLRS for LSCO

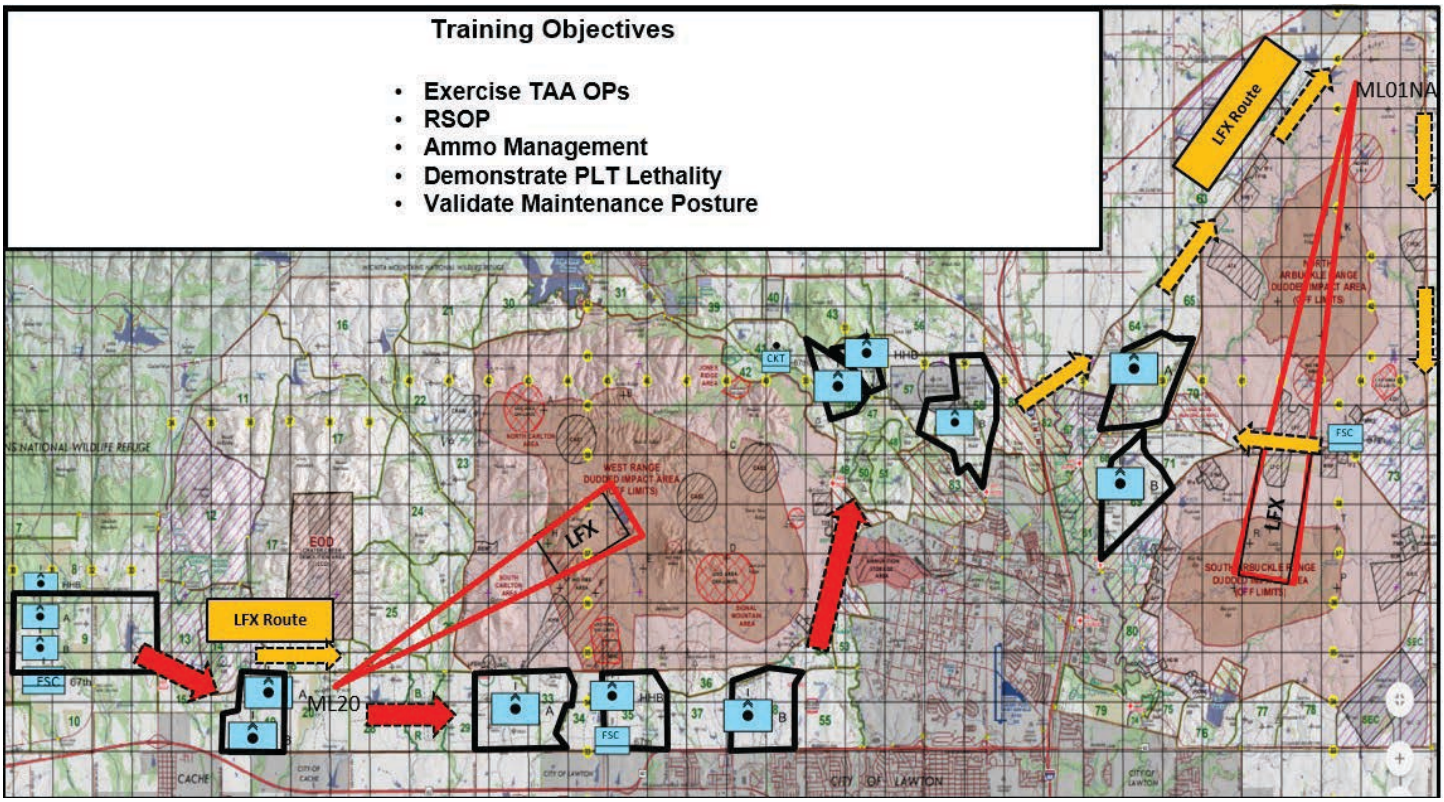
CPT Brandon J. Gillett and LTC Andrew J. Knight

The 2019 Fires Conference at Fort Sill, Oklahoma, made it abundantly clear that senior Army Leaders need the Field Artillery to prepare for Large-Scale Combat Operations (LSCO). LSCO is a significant change from the combat requirements in the CENTCOM Area of Responsibility which dominated the focus of most of the U.S. Army over the past 15 years. Fortunately, the Multiple Launch Rocket System (MLRS) community was able to retain many of the MLRS core competencies because of the requirements on the Korean peninsula, and because of the section and platoon-sized elements operating in Syria, Iraq, and Afghanistan. The same operations that maintained 13M Military Occupational Specialty (MOS) proficiency in the near past do not necessarily translate to LSCO readiness for a FA Battalion. While the MLRS community consistently trains to deliver fires at the section and Platoon level, increasing the rigor of FA Battalion training exercises will enable the rocket and missile units to build readiness for LSCO.

The active component M270A1 equipped MLRS Battalions focus almost entirely on the transition from armistice conditions to contingency operations on the Korean Peninsula. There are currently only two active duty Field Artillery Brigades with M270A1 Battalions, with a third under construction. All of the current M270A1 Battalions are either permanently stationed at Camp Casey (210th FA Brigade) or are attached to 210th FA Brigade from 75th FA Brigade at Fort Sill, Oklahoma, during successive rotational deployments. The readiness required to "Fight Tonight" from known locations does not necessarily translate to an LSCO scenario that occurs elsewhere on the globe, or even according to an expeditionary deployment timeline in support of a deliberate Theater operation. The personnel serving in these units never get exposed to supporting a maneuvering Corps or Division, and the platform specialty of the 13M MOS does not necessarily provide duty station variety.

The differences between the M270A1 MLRS and M142 High Mobility Artillery Rocket System (HIMARS) fire control panels cause system specialization in the 13M MOS. This creates a duty station loop for the 13M Soldier and NCO populations between Korea and Oklahoma. The training experiences of a unit with known requirements, or a unit training to assume responsibility for known requirements, creates a misunderstanding of how an M270A1 Battalion operates in LSCO anywhere else on the globe. There are a few

Figure 1. Operation BLUE MAX Concept. (Courtesy illustration)



very talented NCOs who can transition between the M270A1 and the M142 but, for the most part, a Launcher Chief is most successful when able to remain on the same system for an extended period that often includes two stints in Korea bridged by stabilization at Fort Sill. To expand the experience base to personnel without a clear understanding of LSCO requirements MLRS units need to get beyond set-piece Live Fire Exercises (LFX) based on semi-annual qualification requirements.

Operation BLUE MAX

The 2nd Battalion, 20th Field Artillery Regiment (MLRS) returned to Fort Sill from a nine-month rotation to Camp Casey, Korea, in November of 2018 and transitioned to Focused Ready Unit (FRU) responsibilities. As an FRU, 2-20 FA learned that they must maintain high levels of personnel and equipment readiness to be prepared to deploy in support of LSCO. As part of these FRU responsibilities, the Battalion needed to train differently than the 'Fight Tonight' mission required. Leaders up and down the chain of command needed to understand the unique challenges of arriving to a battlefield months after the first rounds were fired, or even occupying unfamiliar locations just before hostilities commencing. Operation BLUE MAX, a seven-day Field Training Exercise (FTX), was created as a means to train the Batteries and the Battalion Staff how to shoot, move, and communicate in an offensive manner where the sequence of events was almost entirely conditions-based.

Creating the proper training conditions for a Battalion FTX/LFX requires a viable scenario, abundant training land to include live firing points, an apportionment of live rockets from the annual ammunition allocation (STRAC), and an agile Exercise Control (EXCON) that can massage the scenario to maintain believability. The scenario for BLUE MAX forced the frequent movements that an MLRS unit is expected to make as it follows in support of maneuver forces on the offense. A very large proportion of the Fort Sill training space, 34 of 78 training areas, were utilized to provide freedom of movement according to the tactical situation. A heavy emphasis was placed on keeping the whole exercise as tactical as possible, such as scripting mandatory LFX roadblocks as traffic control points for the notional Division Headquarters, and by placing all administrative requirements in the hands of the EXCON. This resulted in one Lieutenant checking in to 20+ training areas at a time to allow the Batteries to move from one training area to another without administrative requirements interrupting the scenario.

Operation BLUE MAX incorporated two live-fire events into the scenario. A total of 48 rockets were available due to the management of the qualification cycles. Through the intentional spacing of qualifications over the course of the year, in April and September, 2-20 FA only required two Artillery Table (AT) VI qualifications in FY19. This qualification cycle is sustainable as long as crew turbulence does not force an additional qualification outside of a planned Battalion LFX. A few section qualifications can be built into the scenario but the number and level of qualifications, according to the Fires Gated Training Strategy, needs to be identified as a training objective so that the specific mission requirements do not disrupt the realism of the training event.

The training objectives selected for BLUE MAX were to conduct tactical assembly area operations, conduct Reconnaissance, Selection, and Occupation of a Position (RSOP) manage ammunition at the Battalion level, and demonstrate Platoon lethality. Surprisingly, very few Leaders in the Battalion had experience with these tasks and had never tried to incorporate all of them into a single training event. The education process for managing ammunition began months before the exercise and was the focus of the Leader Development Program in the weeks preceding the exercise. The other tasks were doctrinally studied but executed at speed with a steep learning curve and heavy coaching from the most senior Battalion Leaders.

Training objectives that are absent from this list, but are normally included in an exercise designed to prepare units for Korea, relate to CBRN decontamination and managing mass casualty events. While these are important skills, it was determined that they consume a large portion of training time and potentially detract from achieving the other training objectives. Instead, these events need to be treated as conditions under which the unit must continue to deliver rockets and missiles in support of maneuver forces. It is a mindset shift at the tactical level because the lessons of recent combat dictate that catastrophic events are a reason to pause operations. Units can no longer treat enemy actions as discreet events not connected to the larger combat operation and the scenario needs to drive that point home.

Operation BLUE MAX broke from traditional field preparation with a deliberate but notional deployment process that occurred the week before the Battalion began tactical operations (See Figure 2. Operation BLUE MAX Schedule of Events). This week of preparation before the actual exercise is where Reception, Staging, Onward Movement, and Integration (RSOI) of personnel and equipment was initiated in an attempt to replicate how the Battalion would deploy from Fort Sill to a global contingency operation.

The Battalion began Onward Movement by falling-in on equipment at a notional port and moving to a Tactical Assembly Area (TAA). RSOI continued with the publication of a fragmentary order to begin operations in support of a Division attack. Inside the TAA the Battalion built combat power through priorities of work and conducted TLPs down to the section level. The activities and rehearsals in the TAA set condi-

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	• Issue BN OPORD • Motorpool Ops	• SRP • Issue BTRY OPORDS • Motorpool Ops	• BN ROC Drill • Final PCC/PCIs	• DONSA	• DONSA	• Recall • Deploy to TAA • Issue BN Frago
• BN ROC Drill • Technical Fires RXL • LFX	• LFX • Scenario-based tactical operations	• Scenario-based tactical operations • Midpoint AAR/SOBE	• Issue LFX FRAGO • Scenario-based tactical operations • BN ROC Drill	• LFX • Scenario-based tactical operations	• Change of Mission • Day Zero Recovery	

Figure 2. Operation BLUE MAX Schedule of Events. (Courtesy information)

tions for rapid execution of future FRAGORDs during the remainder of the exercise.

Breaking away from the normal qualification practice of MLRS sections firing multiple missions from a static point, Operation BLUE MAX attempted to replicate the tactics necessary to survive in LSCO. The launchers loaded up live M28A1 Reduced Range Practice Rockets (RRPR) in the TAA, moved to the firing points to conduct RSOP, and proceeded to deliver rockets on target. The sections received their fire missions while in their hide sites, then remained concealed as long as possible before fire mission execution. This proved very uncomfortable to launcher chiefs who only knew static live fires throughout their careers.

The Support Platoons conducted tactical movements to secure and establish a doctrinal reload point in preparation for the firing Platoon movements. Upon the completion of the live fire, the Firing Platoons would reload their brain pods and move to their next assigned training area while the Support Platoon returned to the TAA with the live pods to give the next Platoon the same training experience. The very deliberate tracking of the live pods by a single element, the Battery Support Platoon, mitigated the risk associated with the transition between live and dry firing.

Directing movements in this manner also allowed the Batteries to exercise a hot and cold Platoon, as well as maintain one Platoon in position ready to fire while the other moved, all while immersed in the tactical scenario. The RSOP process needed to be executed multiple times over the course of the exercise to allow for Platoon AARs to occur, enabling improved performance with every repetition. Eventually, section chiefs made appropriate tactical decisions, freeing up Platoon Leadership to concentrate on fire direction, forecasting logistical requirements, and planning Soldier and equipment maintenance periods. The Platoon Leadership struggled at first to fully grasp the concepts and the level of autonomy afforded to the section chiefs, but throughout the FTX the RSOP procedures became standard across the formation.

Ammunition Management

Ammunition management was the most involved of all of the training objectives for the field exercise. This training objective directly involved the Battalion ammunition officer, support Platoon Leaders, the forward support company, and the Fire Direction Centers. To accomplish the task, while maintaining a level of tactical realism, 60 additional expended pods came from an adjacent Battalion to meet the total Battalion haul capacity. These expended pods were aligned with chit cards filled with administrative data so launcher chiefs and Support Platoons were held accountable and unable to continue firing after their ammunition was depleted. It also caused the Platoons to manage the number and type of rounds available on the launchers and at the reload points.

Despite the successes, there are ways to improve upon ammunition management and make the training even more realistic. Coordination with the Brigade Support Battalion would allow Support Platoons to drop expended pods in consolidated points across the installation to be left for the transportation company to pick up at a later date. This would facilitate a better segregation of ammunition and allow a pod to only be 'fired' once, as opposed to a process of reconstitution once an expended pod was retrieved by the Organic Distribution Platoon.

Demonstrate Platoon Lethality

Operation BLUE MAX was not an Artillery Table XII live fire with external evaluators to certify Platoons. However, it did demonstrate Platoon-level lethality in a tactical scenario by empowering junior Leaders to showcase capabilities outside of a scripted list of fire missions. Platoons conducted their deliberate RSOP, fully utilizing multiple firing points and hide sites across the training areas, to provide those Leaders the forum to learn and grow. During the LFX events the Platoons were only afforded one four-hour window of meteorological data to conduct RSOP and shoot their rockets or else they had to drop their remaining live pods for another Platoon to shoot. This rule added a level of competitiveness, rewarded a strong maintenance posture, and created a sense of urgency to complete the tasks with violence

MISSION ESSENTIAL TASK	Training Objectives	T.A.
Control Field Artillery Operations (06-BN-1021) 06-BN-1036 Prepare the Field Artillery Operations Estimate 06-BN-1038 Control a Field Artillery Unit Move ~~06-BN-1110 Conduct Field Artillery Liaison~~ 06-SEC-6030 Establish an Ammunition Holding Area MLRS/HIMARS 06-SEC-6032 Provide Battalion Ammunition Support 71-BN-5100 Conduct the Mission Command Operations Process for Battalions 71-BN-5122 Perform a Rehearsal for Battalion	• D-Day: **TAA OPS, Ammunition Management** - Deploy to TAA - Issue ammunition - Issue BN OPORD - Conduct BN ROC Drill • D+3: **TAA OPS** - Issue BN OPORD - Conduct BTRY ROC Drill	T
Conduct Battalion Fire Missions (06-BN-5001) 06-BN-1023 Coordinate a Field Artillery Raid 06-BN-1079 Conduct Battle Tracking ~~06-BN-2011 Request Battle Damage Assessment~~ 06-BN-5424 Process Fire Missions 06-BN-6055 Process a Precision Fire Mission 71-BN-5100 Conduct the Mission Command Operations Process for Battalions	• D+1/D+2: **Demonstrate PLT Lethality, Ammunition Management, RSOP** - Occupy TAs - LFX • D+3: **Demo PLT Lethality, RSOP** - Execute TLWS - Occupy TAs • D+5: **Demo PLT Lethality, RSOP** - Execute Artillery Raid LFX	T
Conduct Expeditionary Deployment Operations at the Battalion Level (55-BN-4800) 12-BN-0004 Prepare Personnel for Deployment (Battalion) 55-BN-4802 Conduct Home Station Mobilization Activities at the Battalion Level 55-BN-4804 Conduct Deployment Activities at the Battalion Level 55-BN-4850 Direct Deployment Alert and Recall at the Battalion Level ~~55-BN-4873 Plan Deployment at the Battalion Level~~ ~~55-EAC-4855 Coordinate Family Readiness Group Support(Battalion-Echelons Above Corps)~~ 71-BN-5100 Conduct the Mission Command Operations Process for Battalions	• D-5: Telephonic Alert • D-4: SRP • D-3: Motor Pool Operations - **Validate Maintenance Posture** **Training Objectives** • Exercise TAA OPs • RSOP • Ammo Management • Demonstrate PLT Lethality • Validate maintenance posture	T-

Figure 3. MLRS BN METs aligned with Operation BLUE MAX Training Objectives. (Courtesy illustration)

of action. Nobody, from Battery Commander to launcher driver, wanted to let someone else shoot the rockets originally allocated to them.

Whether firing live RRPR rounds or executing dry fire missions, the Platoon's actions remained driven by the same tactical scenario. Work and rest cycles had to be enforced to sustain personnel throughout the seven days while balancing dry fire missions and a live opposing force (OPFOR) element. The OPFOR was coordinated from an adjacent Battalion and given the resources to keep the Platoons active and engaged. Blank rounds, artillery simulators, and smoke grenades were all used to control the tempo of the fight and exercise systems throughout the organization. Real defense plans were required, SALUTE reports pushed up the chain of command, notional casualties treated, and CBRN capabilities tested. Although the Firing Platoons did not receive an AT XII qualification, the introduction of an expeditionary LSCO scenario with tactical requirements tested the experience level of Platoon Leaders and Battery Commanders and simultaneously challenged assumptions for a population of NCOs that spend a career in the Korea – Fort Sill – Korea duty station loop.

Conclusion

Operation BLUE MAX was a deliberate departure from traditional home station training exercises to prepare for the rigors of Large-Scale Combat Operations. The planners went into the exercise design process with the lessons learned from a nine-month rotation to Korea and a strong desire to have the MLRS battalion fight in a similar way to a cannon unit. The emphasis on shoot, move and communicate pushed the battalion to conduct operations in a way that was unfamiliar for many Leaders. It is important to note that the length of the exercise helped shape what the unit learned. By day four the organization was tired because Leaders drove themselves hard and were both frustrated by the steepness of the learning curve. By day six or seven the organization implemented some of the tough lessons learned during initial operations and ended on an upward performance trajectory.

Training events such as Operation BLUE MAX, with scenario-driven LFX incorporated into Battalion exercises, are not currently the norm within the M270A1 MLRS community. Variations of this exercise should be adopted to increase the lethality of rocket and missile formations. There are some challenges in resourcing a complicated training event internally. A Battalion struggles to source an EXCON while including the full Battalion staff in a continuous scenario. Also, to keep the Battalion staff in the training audience the exercise needs to have multiple firing batteries to train current operations, making it incredibly difficult to internally resource Artillery Table XII evaluators. Finally, a true Higher Control could increase the rigor of the exercise by increasing or decreasing the pace of fire missions pushed down to the Battalion Fire Direction Center. Even without these additions, a Battalion can conduct challenging and budget-friendly home-station training that forges an understanding of LSCO requirements for M270A1 MLRS units.

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Testing of the M1299 howitzer as part of the Extended Range Cannon Artillery program. (Courtesy photo)

Long-range Fires Gap

WO1 Conor McCarrell

Engagements against insurgency elements throughout Southwest Asia and Africa have occupied the United States Military and its allies for most of the young 21st Century. These irregular and hybrid threats have been the primary focus for nearly a whole generation of Service Members. The conventional doctrine developed for decades against uniformed forces served little relevance against an enemy not willing to fight in a typical fashion. In the nearly two decades of counter-insurgency, we have largely remained the same while the World has changed. The near-peer threat concept has gained significant relevance as we begin to shift our focus back toward conventional warfare. Due to strengthening economies and emerging technologies, countries such as Russia, China, and North Korea have gained militarized momentum and created several capability gaps within our Armed Forces. One such gap resides within the U.S. Army's Field Artillery, where aging equipment and munitions have shown a severe vulnerability in providing vital counter-fire and engaging in shaping operations to assist maneuver elements on the battlefield. Modernization is required for all Field Artillery echelons that will not only affect our lethal capabilities but also provide innovative methods of application and thinking when engaging against potential near-peer threats.

To compete with emerging militaries that will become near-peer threats imminently, or within the next decade, the United States Army will need to embrace innovations and dedicate more funding toward upgrading its Field Artillery Corps. While the U.S. Air Force and Navy enjoy significant current advantages over our competitors abroad, our Field Artillery assets lag in a variety of metrics, which presents a major concern toward delivering crucial support for maneuver efforts and counter-fire. Nearly all Field Artillery weapon systems within the current U.S. Army arsenal were developed between the 1960s to early 2000s, relying heavily on upgrades to maintain relevancy. The mainstay assets of long-range Field Artillery fires in the U.S. Army arsenal are currently the M142 HIMARS and M270A1 MLRS. The modern M31A1 GMLRS rocket, supplying both systems, has a range of 84km using precise GPS technology for guidance. The aging ATACMS missile extends the reach of these systems to 300km, which provides for theater ballistic missile capabilities. Outside of MLRS assets, long-range fires have become limited within the current arsenal. The 155mm Howitzers, M777A2, and M109A7, currently range 24km and 22km, respectively, with conventional HE munitions and between 30km and 40km for RAP munitions (Pike, 2020). These systems have demonstrated valuable effectiveness against lesser threats and counter-insurgency efforts, relying on

their capabilities to enforce their will on mismatched enemy forces to shape the battlefield for the maneuver effort. An engagement in Large-Scale Combat Operations against a near-peer threat may expose these systems due to inferior capabilities.

The Range Capability Gap

It's expected that Field Artillery range capabilities and precision will become primary attributes amongst the dominant world ground forces due to escalating technology innovations. Both Russia and China employ very capable artillery systems that are either in equivalence or exceed American systems. The Russian built 9A52-2 "Smerch," a common long-range threat in Warfighter exercises has a 90km range with their HE-FRAG 300mm rockets and 70km with other munition variants (Department of Defense, 2015). Built during the Soviet era, the "Smerch" was upgraded recently to the 9A52-4 "Tornado" to be a lightweight version of its predecessor, akin to the M142 HIMARs transition from the M270 MLRS. Additionally, the Tornado boasts GPS enabled munitions using the Russian GLONASS satellite navigation system, which significantly improves the Russians' precision fires capabilities. Russia claims that the Tornado's upgraded rockets will extend to 75 miles (120km), which can't be undermined by rival nations due to their notable history with rocket technology (Peck, 2018). The 9A52-4 may have a nearly 40km advantage over the M142/M270 MLRS systems, a massive gap that exposes a critical mismatch in deep-threat capabilities. Medium-ranged Russian MLRS, such as the 9P140 and the older BM-21, may force a direct American MLRS engagement, giving Russian ground forces a free hand and tactical advantage in delivering long-range fires. The U.S. Army will not have success in direct engagement with Russia's current long-range assets operating at their current limits.

Russian cannon weapon systems also have a range advantage over the American M777A2 and M109A7. The 152mm caliber 2S19 "Msta" has been the main self-propelled Howitzer for the Russian Ground Forces since the 1980s with a standard range up to 29km (Department of Defense, 2015). Its replacement, the 2S35, will have a reported 40km max range with conventional munitions and up to 70km for rocket-assisted munitions (Brown, 2017). The 152mm caliber 2A65 is Russia's main towed howitzer that has a similar range as the self-propelled 2S19, which still exceeds the American capabilities by several kilometers at max ranges. The disadvantages in range for the M777A2 and M109A7 against standard Russian cannon artillery systems expose a vulnerability in counter-fire operations. These assets will be planned to carry out operations in support of maneuver elements on the battlefield. Engaging in counter-fire against the enemy's fire support assets will be inevitable as they also support their maneuver operations. The Russian advantage in range will force American fire support assets to assume the tactical risk and move dangerously close into the fight. This situation is not ideal considering the loss of Field Artillery assets will strain maneuver elements as they directly engage enemy forces.

The possible mismatch with the U.S. Army's current field of long-range Field Artillery systems may be exposed even more against the Chinese. The Chinese People's Liberation Army employs a variety of long-range multiple launch rocket systems within their arsenal, including some technology transfer with Russia. Over the last couple of decades, the emergence of the Chinese economy has enabled rapid advancements in technology, which has also fueled their growing self-reliant military. The new PHL-16 MLRS reportedly has the capability of firing a pod of eight 370mm rockets at a range of 220km, with smaller calibers ranging between 70km and 130km (Suciu, 2020). This would give the Chinese People's Liberation Army a significant advantage over the M142/M270 in direct conflict, forcing the usage of different assets or methods of engagement. The PLZ-05, China's main modern self-propelled Howitzer, also exceeds the range of M777A7 and M109A7 by several kilometers. Similar to the disadvantages against Russian Field Artillery equipment, the Chinese capabilities can exploit the Americans' limitations and support their maneuver elements more effectively with their extended range of influence.

Range Capability Gap Solutions

The common theme when comparing U.S. Army Field Artillery assets against near-peer threats is the range capabilities are severely lacking. The gap may be only a few kilometers in each case, but this knowledge will be known and exploited to ensure American forces are not guaranteed superiority on the battlefield. One solution to this issue is to match or exceed range capabilities with innovations in rocket and munition technology. New advancements have been made in recent years and planned projects continue. Multiple prototypes are being tested through the Extended Range Cannon Artillery program that is designed to extend the ranges much farther than current capabilities offered by the M777A2 and M109A7 Paladin.

The M1299 is an upgraded version of the Paladin, which uses a new weapon integrated on the same chassis designed in the 1960s. The extended barrel and upgraded Excalibur munitions may extend the range of the U.S. Army's main self-propelled asset from 40km with RAP to between 70km and 100km, rivaling some near-peer MLRS ranges (Gould, 2018). The M777 is also receiving upgrades to its weapon system, attempting to improve the barrel's geometry as well as the munitions fired from it. Increasing barrel pressure to provide additional propulsion damaged the conventional Cold War-era munitions generally fired from the M777. The XM113 munition is

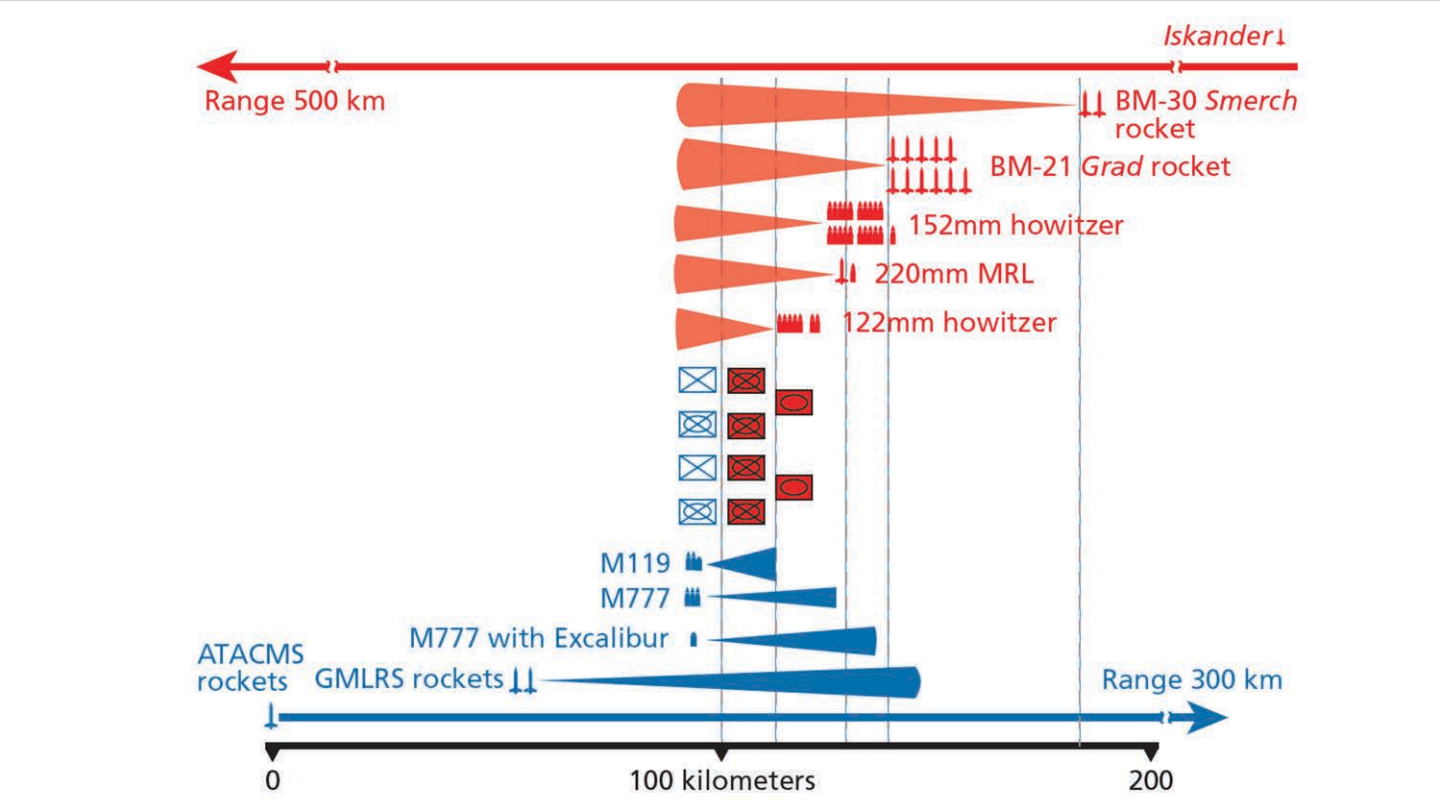

Figure 7.2 from Rand Corporation's "Army Fires Capabilities for 2025 and Beyond", showing the balance of fires between U.S. (blue) and Russian (red) artillery munitions in a theoretical Baltic Sea scenario. Center of the figure shows a notional line of contact between forces, with corresponding disposition of fire support capabilities based on battlefield positioning and mass of systems, highlighting a distinct advantage for the Russians. (Courtesy illustration)

being developed to replace the M549 HERA and when used in conjunction with the upgraded M777, it's expected to extend the range more than 40km. Extending the ranges on these howitzer systems will greatly improve the shaping and counter-fire operations at lower echelons assisting maneuver forces. The added range will subdue the threat's leverage that they otherwise would have had against American forces, thus stressing their capabilities across the battlefield to compete.

At echelons above brigade, the M142 and M270 MLRS systems will likely see a replacement for the 1980s era ATACMS. The new Precision Strike Missile (PrSM) provides the U.S. Army with all the benefits of the long-range tactical missile from mobile artillery, but with an extended range up to 500km (Gouré, 2019). After the recent pull out of the Intermediate-Range Nuclear Forces Treaty with Russia, the PrSM's capabilities may extend even further. Regardless, the extended range that the new munition brings to the M142 and M270 strengthens the Army's influence well beyond previous capabilities and would be a potent deterrent against a near-peer. Each PrSM fired would be an expensive investment, requiring the Commander's commitment to trust the staff in identifying key target systems that would cause cascading degradation to the enemy from this weapon.

Tactics and Operation to Bridge the Gap

The task to upgrade nearly every Field Artillery asset in the U.S. Army arsenal is an expensive and potentially long endeavor that pins the service in a tough position, especially considering many near-peer threats are well ahead in terms of Artillery accessibility. The U.S. Army, in its current form, is outranged and outnumbered, which places a significant strain on its ability to support maneuver elements through shaping and counter-fire operations. Waiting for upgrades to key Artillery systems may be too late if an engagement against a near-peer ignites sooner than expected.

The U.S. Army shouldn't expect to engage a near-peer threat alone. Joint assets are available and likely necessary to defeat an enemy with similar capabilities. The U.S. Air Force and Naval air assets have been unimpeded by counter-insurgency forces in the recent decades, eliminating key ground targets with quickness and ease. Even in a contested environment, the USAF/USN will remain a strong asset for the Army with its deep-strike capabilities. This is essentially the status quo, in terms of the relationship with the Army, but further coordination is required since the USAF/USN will likely not have air

superiority due to very capable near-peer air forces, as well as potent ADA systems. Additional Joint assistance from partner nations must be considered as they may have very capable weapons systems that can provide fire support to maneuver elements. Coordination with allied countries will require even more patience and management due to language/communication barriers, doctrinal differences, and overall capabilities.

If the U.S. Army can't rely on Joint assets for fire support assistance, Commanders must assume tactical risk to influence operations with fire support assets. This is a requirement when nearly every U.S. Field Artillery asset is outranged on the battlefield. Continuous movement may be required to shape the operation for the maneuver forces. At any given point in time, these elements will be in the range of enemy indirect fire assets, which puts them in constant danger. Commanders must understand this, but maintain constant pressure to ensure the mission continues. Fire support assets may need to be relatively close to the maneuver front line to maintain sufficient coverage for shaping operations as well as reducing the indirect fire threat. This will put Artillery units in relative danger, but the risk may be necessary for maneuver operations.

Overcoming the range disadvantage for U.S. Army Field Artillery will require proactive planning and execution. The near-peer threat will have a significant numerical advantage when comparing indirect fire assets, which will make reducing that threat nearly impossible when engaging single elements. Therefore, targeting key nodes of systems will be a force multiplier. Indirect fires assets require command and control and detection through ISR platforms or target acquisition radars to deliver timely and accurate fires. Destroying or neutralizing command posts, radars, and ISR launch points will reduce the enemy's indirect fire capabilities. Missions against these soft elements can be executed by U.S. Field Artillery, even with current capabilities, but require special coordination. The concept of artillery raids gives Commanders the ability to leverage indirect fire assets near or behind the Enemy Forward Line of Own Troops and engage Deep Area Targets. Special PAAs need to be planned ahead of time and cleared before flying in artillery assets for extremely quick fire missions. These raids rely on the element of surprise, requiring coordination at all levels to execute and once that surprise is blown as missions are fired, even quicker exfiltration is required to remove all equipment and personnel from the area. If executed correctly, the range disadvantage is eliminated, creating an extra dilemma for the enemy to overcome. Constantly applying disruptive pressure on the enemy, using artillery once deemed inferior, will give Commanders the crucial control they would need to reduce the overwhelming enemy artillery threat.

Conclusion

No longer is the U.S. Army considered significantly superior against emerging near-peer threats. The strongest of these threats, Russia and China, have improved their indirect fires capabilities considerably over the last couple of decades while the United States has focused on counter-insurgency threats. These nations also boast a significant amount of artillery overall, utilizing these assets at higher echelons within the ranks to devastate opponents. The U.S. Army needs to modernize its Field Artillery assets through more capable munitions and weapon systems to bridge the range gap. Even this may not be enough against a peer, which then may require further advancement of clever tactics and planning to establish an element of surprise and gain leverage over a potentially colossal threat.

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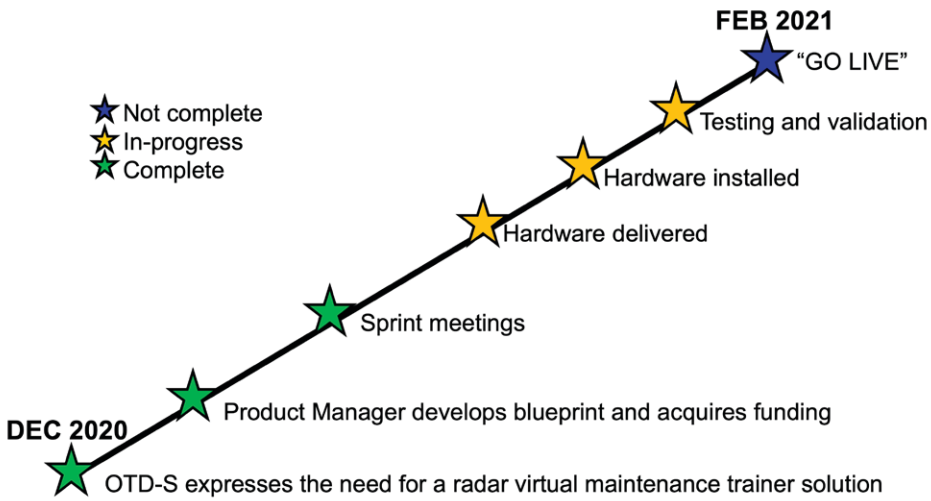
OTD-S Leverages Industry to Virtualize Radar Maintenance Training

CW4 Fatima A. Nettles and CW3 Michael D. Gulsby



Defense Research and Engineering Network (DREN III) Enabled Radar Virtual Software (RVS). (Courtesy illustration)

The Army-wide shortage of AN/TPQ-53 Radars, specifically, in the TRADOC environment, motivated the Ordnance Training Detachment-Sill (OTD-S) to establish a supplemental hands-on training aid capability. OTD-S saw potential in a virtual system used by MOS 13R, Fire-finder Radar operators and began to develop a solution where instructors could insert maintenance training scenarios in the Training Aids, Devices, Simulators, and Simulation product to achieve the desired training results.

The Fort Sill team acquired the Defense Research and Engineering Network (DREN III), AN/TPQ-53 Radar Virtual Software (RVS) capability to enable virtual radar maintenance training for MOS 94M, Radar Repairers and 948D, Electronic Missiles Systems Maintenance Technicians. The DREN III allows an independent network capability separate from the installation Network Enterprise Center permitting ease of operation and uninterrupted access of the AN/TPQ-53 RVS. The RVS provides maintainers a ground-breaking "Man-Machine" interface for extensive training and evaluation on Radar theory, in-depth fault isolation, complex troubleshooting, and the removal and installation of Line Replacement Units prior to students conducting practical hands-on training. Subject matter experts from the Sill team along with the Program Executive Office Command, Control, Communications-Tactical (PEO C3T) and Product Manager, Multi-Mission Surveillance Systems (M2S2) used a phased approach to integrate the AN/TPQ-53 interactive multimedia instruction (IMI) and technical manuals to develop a cohesive capability to simulate realistic radar maintenance training.

Implementation Phases

The first phase involved the Product Manager developing a blueprint and acquiring funds. Phase one was executed in a series of sprint meetings, where OTD-S and PEO C3T developed the initial prototype and capability to easily adjust the software as IMIs and technical manuals update. During phase two, PEO C3T operationalized the data input while OTD-S validated that the system achieves the desired outcome from a software perspective. The third and current phase of implementation encompasses hardware installation. The system requires servers, switches, cabling, and computer imaging for full operation. The Fires Center of Excellence provided information technology support, a Product Manager, M2S2 funded and delivered state-of-the art servers and switches, and OTD-S used their electronic skillset to splice category six cable to enable connectivity. The last two phases of Execution and Assessment are in progress with plans to go live with the AN/TPQ-53 RVS in February 2021.

Conclusion

OTD-S continues to leverage industry in support of the Army's Modernization Plan to deliver tactically and technically proficient Warrant Officers and Soldiers, equipped with the knowledge to fight and win in a multi-domain battle. The AN/TPQ-53 RVS enabled by the DREN III, balanced with practical training on the actual equipment allows the Army to reach the optimal training outcome. Additionally, the use of the RVS and other virtual systems in Forces Command operational units could serve as great tools for low density and remedial training.

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(1LT Jonathan Camp/U.S. Army)

Winning LSCO Begins Here

Rigor to Basic Combat Training at Fort Sill

LTC Eric Kunak and CPT Branden Buffalo

The U.S. Army's competitive edge begins at Basic Combat Training (BCT). Over the last few years, BCT units like the ones at Fort Sill have emphasized increasing rigor in the construction of our future fighting men and women – all to ensure our success in Large-Scale Combat Operations (LSCO). To be certain, perseverance in LSCO requires Soldiers to survive in combat and demonstrate proficiency in their Basic Skill Level One Tasks and Battle Drills.

With the increased demand from Operational Forces for physically and mentally fit Soldiers, BCT units have taken a hard look at their program of instruction over the last few years. Significant changes in both physical fitness, field exercises, and weapons training have been identified and implemented to meet the needs of the force.

"Recent changes in the program of instruction for Basic Training introduced Trainees with an opportunity to improve their physical fitness, mental stamina, and their critical thinking abilities. Undoubtedly these changes have given our Basic Training graduates more tools to assist them as the U.S. potentially faces our adversaries during LSCO," CSM John Bamba, Vampire 04 at the Joint Multinational Readiness Center explains. "Without a doubt, POI changes have improved the overall Soldier graduation Basic Training. Future studies will highlight the quality of Soldiers being trained as a result of the POI change."

Fundamentals

Up until Oct. 1, 2018, BCT Trainees were judged on their fitness through the Basic Physical Fitness Test (BPFT). The three-event APFT was utilized as a model, however, the graduating score was decreased to the 50 percent threshold for the trainee's respective age group. The initial effort to push trainee fitness saw the BPFT erased in FY19, thus aligning the trainee expectations with the traditional APFT scores of 60 percent.

To achieve this standard over eight weeks of rapid-paced training – while maintaining the requirements of 7-22's Conditioning Phase – our Battalion had to re-look at how we utilized our time for PRT. It began with command guidance to employ Battery Master Fitness Trainers, Senior Drill Sergeants, and First Sergeants as subject matter experts in a working group. From their input, we increased the number of cardiovascular activities (such as 30/60, 60/120, and Ability Group Runs) and increased the period of physical fitness from 60 minutes daily to 90 minutes daily. In addition, we

(1LT Jonathan Camp/U.S. Army)

(CPT Jean Tomte/U.S. Army)

maximized opportunities to foot march by limiting government transportation.

With an earlier start to the day, Trainees were able to focus on foundational PRT warm-ups and safely executed more frequent moves greater than 4 KM to training events. In addition, commanders implemented progressive load over time, reaching 20 percent of the trainee's body weight by culmination. Drill Sergeant Contact Time was utilized to maximize touchpoints on fitness. Drill Sergeants focused on short but meaningful evening sessions of PRT (approximately 30mins) to target areas of weakness before a trainee's prescribed personal time.

After implementing these modifications, our Battalion discovered that Trainees were readily capable of rising to the APFT standard before their capstone field exercise in Weeks 7 and 8. Despite the increased expectations, the percentages of passing between the APFT and BPFT saw parity around the 85-90 percent range by the time of graduation. An average of an additional five percent demonstrated the ability to pass the APFT after an additional two weeks of instruction after graduation.

The next major paradigm shift in Army physical fitness culture understandably came with the introduction of the Army Combat Fitness Test (ACFT). Starting in mid-2019, BCT units on Fort Sill began executing the ACFT as part of the efforts to test and familiarize themselves with the upcoming test of record. Our Battalion's strategy remained fairly consistent, albeit with minor modifications to address the change of tested events.

Drill Sergeant Contact Time became primarily centered on the mastering of the leg tuck exercise – this called for more emphasis on the "4 for the Core" regimen and increased climbing drills. As result, we readily discovered that Trainees were capable of meeting the 5 of 6 event requirement by Week 7 of BCT at the "gold" level. By graduation at Week 10, the significant majority of Trainees did not require any waivers to proceed to Advanced Individual Training.

Field Environment

Fitness is only one piece of the puzzle. In tandem with the rollout of the FY19 period of instruction, BCT introduced the modifications to the field training progression by adding a day to each exercise. These FTXs effectively became phase gates, culminating with the capstone event "The Forge" – a 96-hour event requiring the use of continual movement and numerous physical and mental challenges.

Our Battalion utilized the opportunity to operationalize the FTXs by implementing a common operations order that gradually scaled throughout BCT. This slowly introduced Trainees to common terminology and allowed Drill Sergeants to exercise fundamental leadership skills by briefing a rehearsal of

(LTC Eric Kunak/U.S. Army)

concept before the Forge. In these briefs, Drill Sergeants delivered an overview of the exercise, described actions on the objective, and then supervised the trainee leadership as they individually briefed their platoons.

This increased responsibility and accountability could be felt in action, with trainee leadership taking the lead in conducting both PCIs and PCCs (albeit, with Drill Sergeant supervision) before each exercise.

Put into practice, Trainees are given no less than three opportunities to rehearse their fundamental skill level 1 tasks during each exercise. Command guidance drove a deliberate process – each event (such as building a fighting position) was demonstrated by a Drill Sergeant, practiced by the Trainees, and then received an end of scenario lane informal AAR to address deficiencies. After retraining, the "hands-on" portion of each phase test draws on the proper execution of these tasks.

Our experience found that by the Forge, Trainees were engaged and demonstrated the foundational knowledge expected of a graduate. This includes, but is not limited to, the fundamentals of immediate first aid, camouflage of themselves and their equipment, employment of protective gear, movement as a team and proficiently conducting tactical road marches.

Gone are the days of iron sites being considered "back up." With the roll-out of the newest edition of instruction, Trainees are now expected to qualify with both iron sites and with an optic. This results in additional time behind a rifle and in the Engage Skills Trainer.

We found that weapons immersion paid off in the long run. Introducing Trainees to their primary weapon system as early as possible allowed for Drill Sergeants to run concurrent training during Red Phase, focusing on the fundamentals – trigger squeeze, breathing, and site picture. This was achieved by emphasizing Dime and Washer Drills, along with ready use of bore sites and shadow boxes.

Once the battery reached the range during group and zero in Week 4, the Battalion made good use of outside enablers in the form of the Resiliency Team from the Graham Resiliency Center. These professionals were employed to teach struggling Trainees breathing techniques to tighten up their shot groups.

The RM experience culminates with two events: the Buddy Team Live Fire and the Battle March and Shoot. Buddy Team Live Fire remains consistent with previous POI and includes a dry, blank, and live iteration – all requiring the trainee to demonstrate safe handling of their weapon while moving, reloading, and transitioning from targets with another trainee. The latter takes place during the Forge and consists of platoons rucking into a stress shoot environment, building trainee confidence with their rifles while demonstrating the effect of physical exertion on the ability to engage targets.

Platoon Leaders

The inclusion of Platoon Leaders into BCT has proven to be a significant assistance to both the Drill Sergeants and the mission. As General Funk lists among his fundamentals, "Good units do routine things routinely." Over the span of a year assignment, a platoon leader will experience an average of four training cycles. Accounting for rotating duty week responsibilities, this translates to approximately 10 weeks of training that the Lieutenant is responsible for planning and resourcing. Broken down to the details: each Lieutenant will execute approximately 15 Small Arm Ranges, one Hand Grenade Range, two Stress Shoots, one CBRN Range, four Obstacle Courses, three Field Training Exercises, and two Land Navigation Courses. On top of this, they will coordinate at least one High-Visibility Graduation and be involved in the transformation of up to 1,000 civilians into Soldiers.

In the majority of these examples, the Lieutenant is responsible for the training week will simultaneously be engaging with our Brigade and post-level enablers. This includes, but is not limited to, the Brigade Ammunition Section, Range Operations/Control, Brigade Medical Section, and Brigade Range Cadre.

What this translates into is more time for the Drill Sergeants to focus on the Trainees, and ample opportunity for Junior Company Grade Officers to experience foundational knowledge being instructed. When a Lieutenant completes their time as a BCT Platoon Leader, they move on to their next assignment with the competency and confidence to know what "right looks like." These Lieutenants are ready and capable of performing autonomously in positions of trust and have demonstrated it through repetition. These select Platoon Leaders have the opportunity to work with young Staff Sergeants. The experience from the Company Grade Officers brings FORSCOM diversity that aids in preparing them for futures as Platoon Sergeants. Simultaneously, the Lieutenants have the benefit of receiving mentorship from some of the best Sergeant First Classes the force has to offer. Not only does BCT produce Soldiers, we produce outstanding Company/Battery Leaders ready to be value-added to any unit in any capacity. Winning our country's land battles begins here – with highly trained new Soldiers and highly qualified young NCOs and Officers.

LTC Eric J. Kunak is a native of Los Angeles, California, and is a 1998 graduate of the California State University of Northridge where he received a Bachelor's Degree in U.S. History while attending the University of California Los Angeles for Reserve Officer Training Corps. In 1998, he was commissioned a Second Lieutenant in the Field Artillery. His command and staff assignments have been in Fort Carson, South Korea, Fort Campbell, Fort Knox, Joint Base Pearl Harbor, Afghanistan, and Iraq. LTC Kunak's most recent duty assignment was the Battalion Commander of 1st Battalion, 79th Field Artillery at Fort Sill, Oklahoma. He currently is the Chief of Operational Training Division at the Directorate of Training and Doctrine, Fort Sill, Oklahoma. LTC Kunak is a graduate of the Field Artillery Officer Basic and Advanced Courses, Command & Staff Service School, General Staff College, Joint Firepower Course, Air Force Air Operations Course Initial Qualification- Combat Plans Division, and the Army Theater Security Cooperation Planner's course. His civilian education includes a Masters in Leadership and Management from Webster University.

CPT Branden Buffalo currently commands the Headquarters and Headquarters Company, Fort Sill Garrison. In addition, he commands the U.S. Army Personnel Control Facility and is responsible for the Army's AWOL and confined Soldier program. His previous leadership positions include: Battalion Assistant S2— 2-29 Field Artillery, Fort Bliss, Texas. Fire Direction Officer—Charlie Battery, 4-1 Field Artillery, Fort Bliss, Texas. Fire Support Officer—Headquarters Battery, 4-1 Field Artillery, Fort Bliss, Texas. Executive Officer—Headquarters Battery, 4-1 Field Artillery, Fort Bliss, Texas. Battalion S3 — 1-79 Field Artillery, Fort Sill, Oklahoma. Commander – Delta Battery, 1-79 Field Artillery, Fort Sill, Oklahoma. CPT Branden Buffalo enlisted in the U.S. Army in 2013 and was commissioned a Field Artillery Officer through Officer Candidate School in 2014. His undergraduate degree is a Bachelor of Science in Administration of Justice from Northern Arizona University. His graduate degree is in Global Security from Arizona State University. His military education includes the Field Artillery Officer Basic Course, Joint Fires Observer Course, Precision Fires Course, USARAF Foreign Weapons Course, the Field Artillery Captain's Career Course, and the Precision Weaponeering Course.

Reading the Music of Mars

The importance of Doctrinal Foundations in the Organizational and Personal Domains

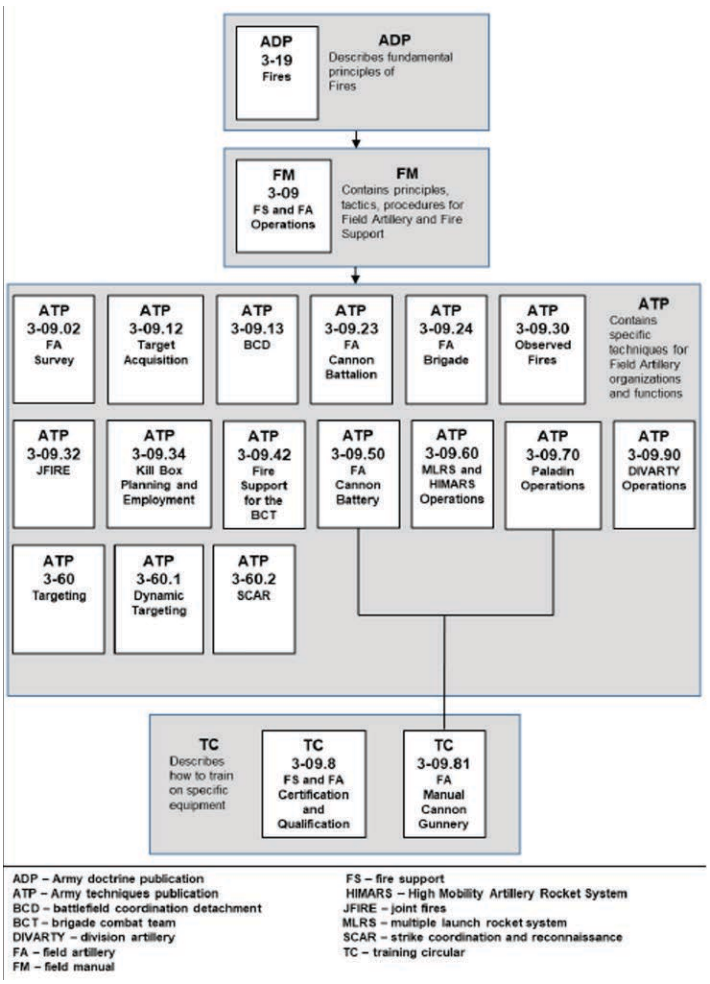
MAJ Mark A. Lichak

In June of 1990, the United States Army's Combined Arms Training Activity Center for Army Lessons Learned (later CALL) published *The Musicians of Mars: A Story of Synchronization for the Company/Team Commander.* The purpose of this publication was to de scribe how different combat arms are needed to harmonize their actions on the battlefield to meet the Commander's intent instead of allowing the different arms to act alone. The basis of the short pamphlet came from the Army's success during Operation Desert Shield and Desert Storm but also sprung forth from a quote from then Major General George S. Patton, Jr. when he commanded the 2nd Armored Division in July of 1941.

"There is still a tendency in each separate unit … to be a one-handed puncher. By that I mean that the rifleman wants to shoot, the tanker to charge, the artilleryman to fire … that is not the way to win battles. If the band played a piece first with the piccolo, then with the brass horn, then with the clarinet, and then with the trumpet, there would be a hell of a lot of noise but no music. To get harmony in music, each instrument must support the others. To get harmony in battle, each weapon must support the other. Team play wins. You musicians of Mars … must come into the concert at the proper place at the proper time."[1]

A decade and a half would pass before the Army would feel the need to follow up on its original *Musicians of Mars* (1990) pamphlet with three additional sequels in 2016 (*Musicians of Mars II*), 2019 (*Musicians of Mars III: The Cobra Strikes*) and the latest in May 2020 (*Musicians of Mars IV: The Mustangs' War*). While each of these installments varies in format, all of them address a fundamental need to understand warfighting involving the combined arms team, mainly at the small-unit level, and especially in terms of Large-Scale Combat Operations (LSCO) in the later versions. While mentioned in these collections of vignettes and tactical examples, the importance of reading, understanding, and using doctrine is only implied. It is as if the practitioners and characters within these publications absorbed doctrine in between the volumes or between the pages. The fact that you cannot be a "Musician of Mars" if you do not read the music is left out - and doctrine is our music.

Field Artillery students receive an introduction to this doctrine during their time in the institutional learning domain (BCT, AIT, BOLC, etc.), but the publications shown above need to be continuously revisited once the Soldier/Officer reaches the Operational domain. The hierarchy of Field Artillery doctrine is a guide to ones technical and tactical development. Start with ADP 3-19 and FM 3-09 and then move into the doctrinal publications specific to your current assignment. (FM 3-09/Courtesy illustration)



1 The Musicians of Mars: A story of synchronization for the company/team commander. (1990, June). Retrieved from https://usacac.army.mil/sites/default/files/publications/90-6MoM.pdf

As the Army continues to shift its focus and efforts on returning to LSCO against near-peer competitors, the Field Artillery is doing its part to follow suit here at Fort Sill. The institutional courses at the United States Army Field Artillery School consistently and aggressively teach the use and importance of doctrine. But is it being taught and emphasized enough in the operating forces or have units come to rely too heavily on Tactics, Techniques, and Procedures (TTPs), Standard Operating Procedures (SOPs), and "this is the way we have always done it," mentality? In the age of Multi-Domain Operations, is it ever enough to study doctrine only in the institutional realm, or do we need Soldiers and leaders to acquire a desire to read, understand, and discuss doctrine with those they lead and serve? Doctrine serves as the foundation of tactical and technical knowledge in the Army and serves as a guide to how units structure their training and planning efforts should the nation go to war. A greater emphasis on its use and study in the operating and individual domains is necessary to maintain and advance the qualitative advantage that our Army still possesses over our near-peer competitors. Field Artillery leaders at all levels need to review their leadership development plans to ensure that their efforts include sufficient time and energy spent on the teaching, studying, and employment of current and developing doctrine.

Within the Army, there are three learning domains. Institutional, Organizational, and Personal. The Institutional Domain includes Basic Combat Training, Basic Courses for Officers and Warrant Officers, Basic, Advanced, and Senior Leader Courses for NCOs, and the Command and General Staff Officer's Course to name a few. Within the different schoolhouses, its doctrine serves as the professional foundation for occupational knowledge, skillsets, and behaviors.

The Organizational Domain includes units in major army commands such as FORSCOM and TRADOC as well as units assigned to the Army's Service Component Commands and Direct Reporting Units, while the last domain, the Personal Domain, encompasses those actions and activities that a leader or Soldier does to prepare themselves for their duty positions and their overall self-development. Over the time of their professional development, Soldiers and leaders should come to regard themselves as both Subject Matter Experts within their specific field (military occupational specialty/MOS) and a generalist (i.e. all leaders need to know the orders process, and how to write awards and evaluations).

While a Soldier or officer receives a foundation in doctrine early in their careers, that baseline only builds intermittently as they move into and out of the institutional domains along strict lines of progression based on rank, time-in service, and other key developmental milestones. With this in mind, it is not uncommon for three to four years to pass between an officer's graduation from the Basic Officer Leader Course and their attendance to the Captains Career Course (CCC). The same goes for the time between CCC and an officer's attendance to the Command and General Staff Officer's Course. If units and individuals do not continuously study doctrine outside of the Institutional Domain then it is possible that officers, NCOs, and Soldiers could miss substantial doctrinal changes (i.e. the current shift from Unified Land Operations to Multi-Domain Operations). Thus the continued study of current and emerging doctrine is essential for Commanders to emphasize.

Aside from the outright reading, understanding, and studying of Field Manuals and Army Tactical Publications, doctrine is doubly important as it serves as a guide for the planning and execution of Army operations. In a way, it provides the 'notes' that the "Musicians of Mars" are going to get their combined arms orchestra to play. While the Commander provides purpose, direction, shared understanding as well as their intent, key tasks, and end state, it is largely the job of the operations officer and the Fire Support Coordinator/Fire Support Officer to ensure the timely execution and synchronization of those assets, which make up the orchestra itself. Just as the orchestra comprises different sections made up of various types of instruments, so too is the corps, division, and brigade combat team divided into smaller units, systems, and individuals which all have specific parts to play in making the harmony. Therefore doctrine deserves continuous attention from all serious military professionals and why it should make up the 'crawl' step of every training progression and basis of each operation and campaign.

If we adhered to doctrine more closely, perhaps we would not see the amount of repeated trends at the Combat Training Centers. Observer/Controllers recorded trends including deficiencies in targeting, fire support, placement of artillery on the battlefield, and logistics, ever since the implementation of the first Decisive Action Training Exercise in October 2012 at the Joint Multinational Training Center in Grafenwoehr, Germany.[2] One of the reasons that the list of trends and their content have not substantially changed over the last eight years is because of the lack of use and practice of doctrine by formations and Soldiers while in the organizational domain.

The sheer amount of doctrine can be overwhelming if taken in its entirety. However, it does not apply to every situation and every person all the time. The task of studying doctrine should be narrowed and actively focused on through the use of Leader Professional Development (LPD) and counseling sessions. This allows an organizational leader to guide an individual's development and focus attention on the specific doctrine which matters to their precise role within the organization and include both doc-

2 Bridgwater, SFC Kelly Jo, "Decisive Action Training Environment: Future Training Grounded in Today's Intelligence." (2012, November). Retrieved from https://www.army.mil/article/91690/decisive_action_training_environment_future_training_grounded_in_todays_intelligence.

trine specific to their MOS or more general topics like training, writing, and leadership. Some will make the argument that doctrine is cumbersome, there is too much of it, and it is always changing. There is only so much time for LPDs and why study doctrine if we already have TTPs, voluminous tactical SOPs (TACSOPs), and "playbooks."

The time and place for TTPs and playbooks are in the field and only if those products had a proper grounding in doctrine and were taught, discussed, and practiced before execution. Where units encounter some topic not spelled out in doctrine then TACSOPs and SOPs fill in the specifics based on unit type, missions, and the current operating environment. There are times when doctrine becomes stale or the tactical situation facing the Army demands an update. How can emerging doctrine make its way to the operating forces? It is the leader's responsibility to identify newly published doctrine and make the organization aware of its implementation. Delivering this in a classroom-like setting driven by a leader with authority is one recommendation. It is then the individual's responsibility to further read and understand the new doctrine. This is admittedly harder in the operating forces than in the schoolhouses.

One way for Commanders and units to achieve buy-in for the study of doctrine is to let their Soldiers and leaders know that they can be involved in the development and review of new doctrine. It is a fact that doctrine needs to change over time to keep up with changes in the operating environment. Each of the Army's doctrinal publications list the proponent, preparing agency, and a way to make recommendations on future changes to that publication through a DA Form 2028.

The onus for teaching doctrine to Soldiers in the Operational Domain falls on the Commander. It should be included as part of the command's professional development series and adequately planned, scheduled, resourced, and reviewed before beginning any training progression or the development of a training plan. Furthermore, to consider someone a professional Soldier, they also need to take individual responsibility and build time into their schedules to read and study the doctrine that matters most to their Army-related specialty.

Michael Jordan (arguably the greatest basketball player of all time) had to learn the game's rules and regulations - its doctrine - before he could know which rules he could bend, which rules he could break (and still get away with) and what to do if the play broke down. Jazz musicians are much the same, learning to play their instrument(s) while also learning to read the music before they can improvise and create new music. At an LPD on new and emerging doctrine in February 2020, COL Jeffrey Buck, then Commander of the 428th Field Artillery Brigade, stated that "the more one grounds themselves in doctrine and truly understands its purpose, the more one can knowingly deviate from it."

Additional Doctrine and Regulations

Tactical

- FM -1-02.1 Operational Terms
- FM 1-02.2 Military Symbols
- ADP & FM 2-0 Intelligence
- ADP & FM 3-0 Operations
- FM 3-90-1 Offense and Defense Volume 1
- FM 3-90-2 Reconnaissance, Security, and Tactical Enabling Tasks Volume 2
- ADP & FM 4-0 Sustainment Operations

Training and Leadership

- ADP 1 The Army
- ADP 5-0 The Operations Process
- FM 6-0 Commander and Staff Organization and Operations
- ADP 6-22 Army Leadership and the Profession
- AR 350-1 Army Training and Leader Development
- FM 6-22 Leader Development
- ADP 7-0 Training
- FM 7-0 Train to Win in a Complex World

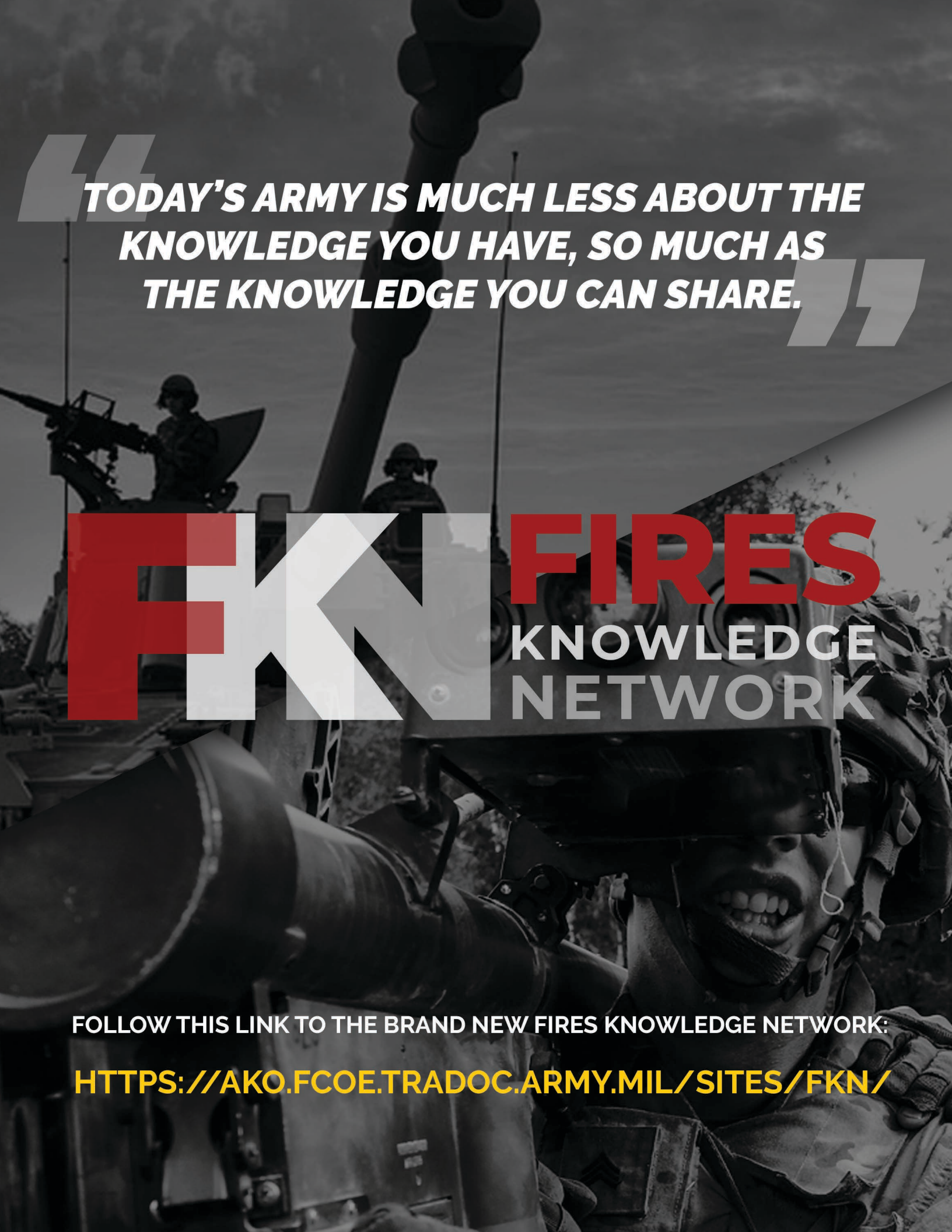
Administrative

- AR 600-8-22 Military Awards
- AR 623-3 Evaluation Reporting System

All Army leaders, but especially Field Artillery leaders, need to be well-versed in the other Warfighting Functions, specifically Intelligence, Movement and Maneuver (Operations), and Sustainment. Soldiers and leaders also need a deeper understanding of leadership development, training, and should have a basic understanding of how to write awards and evaluations.

While doctrine is imperative to how the Army operates, it is also a known and oft-repeated cliché that Soldiers and leaders are to be "doctrinally sound, not doctrinally bound." This subverts and diminishes the actual importance of studying doctrine and its overall usefulness to the force as a whole. Currently lacking a quantitative advantage over our near-peer adversaries, we can strive to maintain the one advantage that the United States Army has long had over our enemies - quality. Knowing, studying, and contributing to the refinement and development of doctrine is the underlying foundation to maintaining the quality of our Soldiers and those who lead them.

MAJ Mark Lichak is currently the Fire Support Branch Chief for the Field Artillery Basic Officer Leader Course (FABOLC) and a former Fire Support Instructor for FABOLC Class 2-20. A Field Artillery officer, he has served in Infantry, Stryker, and Armored Brigade Combat Teams as well as a Field Artillery Brigade, DIVARTY, and Corps-level combined joint task force. He has operational experience in OIF, OEF, OIR, and OAR. He commanded a firing battery with 2-320th FA and the Headquarters and Headquarters Company for 1st Brigade, 101st Airborne Division (Air Assault). He completed his KD time with 1st Brigade, 1st Cavalry Division.


"TODAY'S ARMY IS MUCH LESS ABOUT THE KNOWLEDGE YOU HAVE, SO MUCH AS THE KNOWLEDGE YOU CAN SHARE."
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Field Artillery in photos

Left: Soldiers assigned to A Battery, 1st Battalion, 77th Field Artillery Regiment fire the battalion's first rocket from a Multiple Launch Rocket System during Table VI live-fire certification on Feb. 24 in the Grafenwoehr Training Area, Germany. (MAJ Joe Bush/41st FAB)

Top: SPC Lauren Marte, information technology specialist, 1st Battalion, 144th Field Artillery Regiment, Burbank, California, conducts training with guardsmen who will be checking in Californians driving in for their COVID-19 vaccine shots at the Oakland Coliseum's mass vaccination supersite, Feb. 13, Oakland, Calif. The California Guard along with other federal and state agencies is in full support of the Governor's push to get the COVID-19 vaccine to as many Californians as soon as possible. (Tech. Sgt. Deepak Prasad/U.S. Air National Guard)

Bottom: A Soldier, assigned to the C Battery, Field Artillery Squadron, 2nd Cavalry Regiment, waves hand as howitzer fires during a direct fires mission in Grafenwoehr Training Area, Germany, Feb. 4. After nearly three years, the battery conducted the mission to meet their qualification objectives. (SGT LaShic Patterson/U.S. Army)

The 2021 submission deadlines for the Field Artillery Professional Bulletin:

Summer edition, May 1

Fall edition, Aug. 1

Winter edition, Oct. 1

Submit your articles to:

sharon.g.mcbride4.civ@mail.mil
john.m.folland.civ@mail.mil

Artillerymen from A Battery, 1st Battalion, 120th Field Artillery, Wisconsin National Guard, load a round into their M119 howitzer during a firing mission exercise during Winter Strike 21 at Camp Grayling Maneuver Center, Michigan, Jan. 27. Winter Strike 21 is a cold weather readiness event held as part of the Northern Strike exercise series that offers the Michigan National Guard's unparalleled facilities as a venue for U.S. and coalition forces to receive advanced All-Domain joint fires training in all weather conditions. (Master Sgt. Dan Heaton/U.S. Air National Guard)

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