

FA Journal

General Raymond T. Odierno
US Army, Retired
1954-2021



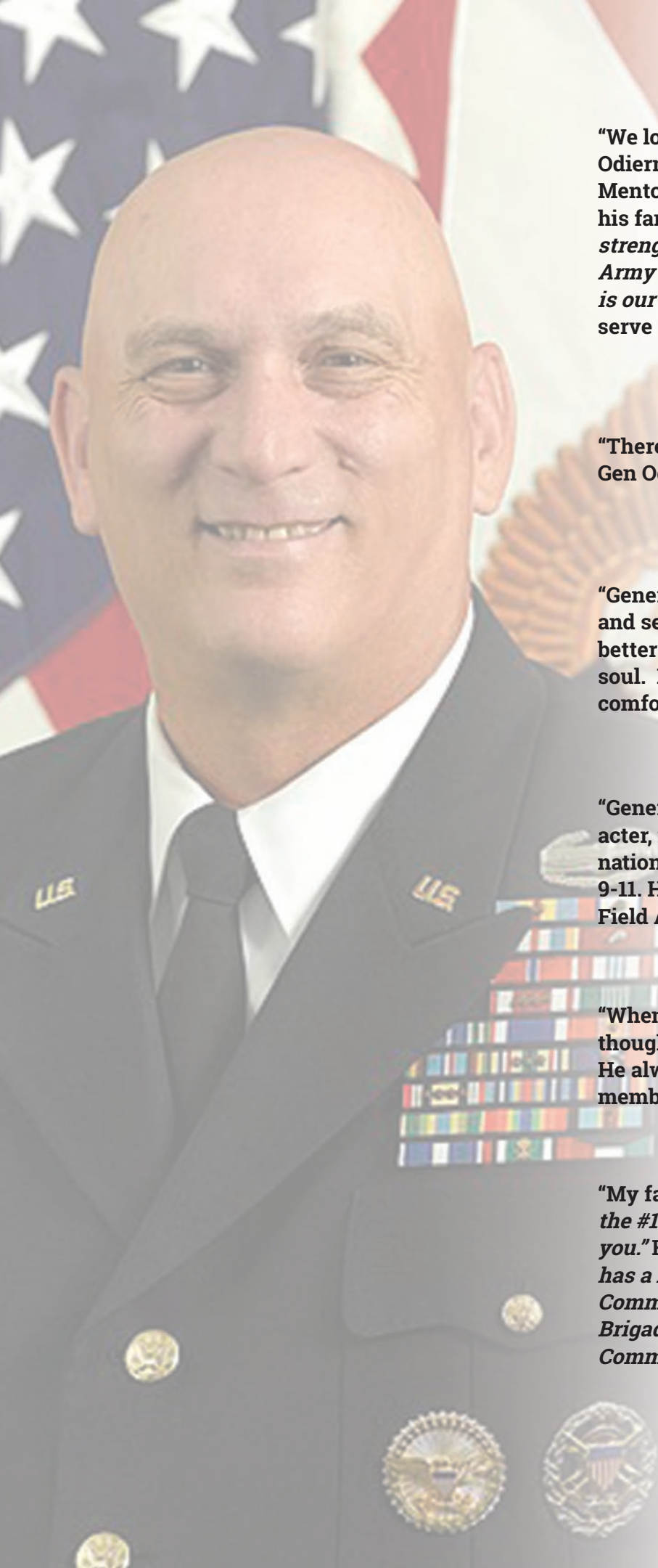
A professional journal for
US Field Artillerymen
Issue 4, 2021



Presented by:

USFAA

United States Field Artillery Association



"We lost a great Artilleryman way too early. Gen Odierno was a proud Redleg, a Leader, a Warrior, a Mentor, and a Family man. May St Barbara watch over his family always. As 38th CSA, his words that *"The strength of our nation is our Army. The strength of our Army is our Soldiers. And the strength of our Soldiers is our Families. That's what makes us Army Strong"* serve a azimuth for us all to follow."

**-LTG David Halverson
US Army, Retired
USFAA Chairman of the Board**

"There are only a few great people in the world and Gen Odierno was one of them."

**-MG Mark McDonald
US Army, Retired
USFAA President**

"General Ray Odierno was a tough, competent, caring, and selfless leader. He was larger than life. We are all better for having served with him. May God bless his soul. Prayers for Linda and their Family for peace and comfort."

**- LTG Richard P. Formica
US Army, Retired**

"General (Ret.) Raymond Odierno personified character, integrity and positive leadership during our nation's crucible season which followed the attacks of 9-11. He will forever be remembered as an icon of the Field Artillery community and our Army.""

**-MG Keneth Kamper
CG, Fires Center of Excellence**

"When I think about General Odierno, my foremost thought is about how he genuinely cared for people. He always took time to talk with Soldiers and family members. Once he met you, he never forgot you."

**-MG Steve Maranian
CG, 56th Artillery Command**

"My favorite quote from GEN Odierno, was: *"What is the #1 lesson of leadership? Do what your Boss tells you."* He also said frequently: *"Leader Development has a lot to do with generational gaps. Battalion Commanders should focus on their Lieutenants. Brigade Commanders on their Captains. Division Commanders on their Battalion Commanders."*

**-MG Miles Brown
CG, Combat Capabilities Development Command (DEVCOM)
Aberdeen Proving Ground, Army Futures Command**

A photograph of General Raymond T. Odierno in a US Army combat uniform, standing in front of a building with Arabic signage. He is bald and has a serious expression, with his right hand resting on his chest. The background is slightly blurred, showing a street scene in a Middle Eastern setting.

Remembering GENERAL RAYMOND T. ODIERNO

UNITED STATES ARMY, RETIRED

38TH CHIEF OF STAFF OF THE UNITED STATES ARMY

1954 - 2021

"The Field Artillery lost a great leader on 8 October 2021 with the passing of General Raymond T. Odierno. He was thoughtful, deliberate, deeply cared about Soldiers, and about making every formation he commanded ready to fight and win. During his tenure as the 38th Army Chief of Staff, General Odierno applied his concern for readiness to the re-creation of the Division Artillery – paving the way as he visualized the eventual transition from fighting in a COIN environment to being ready to shape and dominate the battlefield in Large Scale Combat Operations.

The Field Artillery is prepared today to meet the challenges of the future, and to ensure our Soldiers never have to fight a fair fight due in large part to General Odierno's efforts. Our sincere condolences to his family. Our Army was fortunate to have shared a significant portion of his life with you, and his example continues to live in Redlegs today. For this we celebrate his life, vision for the Field Artillery, and strive to perpetuate the legacy he left behind.

King of Battle!"

**-BG Andrew Preston and CSM Michael McMurdy
US Army Field Artillery School and Field Artillery Branch**



YOUR SUPPORT MATTERS!

The United States Field Artillery Association was founded in 1910 by Major John E. Mahon, Captain William S. Snow and Captain W.S. McNair to promote the efficiency of the Field Artillery by maintaining traditions.

Over 100 years later, the Association stands strong as the only professional organization that serves the Field Artillery branch of the military exclusively.

Help continue the Field Artillery legacy by keeping your membership current, connecting your membership with your local chapter, and encouraging other Redlegs to join and stay active.

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*General Raymond Odierno at his retirement.
(US Army Photos)*

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DISCLAIMER:

The FA Journal is published quarterly by USFAA. Most of the content is originally sourced from the US Army Field Artillery School and Marine Detachment, Fort Sill, OK. The views expressed are those of the authors, not the Department of Defense or its elements. FA Journal's content doesn't necessarily reflect the USFAA, USMC or US Army's positions and doesn't supersede information in other official Army or Marine publications. Use of news items constitutes neither affirmation of accuracy nor product endorsements.



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FA Journal Submission Guide

The Field Artillery Journal serves as the professional forum of the branch across all ranks, Marine, Army, and Civilian. We exist to inform on new developments in the Branch and winning ideas from the field. The FAJ is seeking articles and short features on past, present or future programs, equipment, tactics, techniques, procedures or other issues affecting our Branch. Approximately 40 percent of our readers are company-grade Field Artillery Soldiers and Marines. The other 60 percent is comprised of more senior-ranking Redlegs, servicemen from other branches and services, our Allies, corporate executives and politicians. We are a total-branch publication.

What to Submit:

Article submissions do not have to agree with current doctrine, official policy or approved techniques or procedures. Ask yourself how the topic is going to help the artillery community. Only unclassified information can be published in the FAJ. Articles must promote safe techniques and procedures. Be accurate, logical and complete in your writing. Submissions must be clearly written with an evident thesis, no more than 2500 words. Strive to educate, not impress. A message is most clear when written in simple language, an abundance of adjectives, adverbs and words that the reader will have to look-up detracts from the message. If possible please include graphics, charts or photographs to supplement your article.

Preferred Topics:

- Counter-fire at the DIV/Corps Level
- Targeting
- Training at homestation for LSCO
- Fires Support Issues within the EUCOM/PACOM AOR

All submissions must be emailed to Director@fieldartillery.org with the subject line FAJ Article Submission. Please email submissions in an attached word doc format. DO NOT place images or graphics into the word document. Send them as attachments in jpeg, png, pdf, or eps files. Include footnotes where appropriate, though we may not publish them with the article. Also include a short biography, highlighting the experience that makes you credible as an author on that subject. Include your name, email address and phone number so that we may contact you with follow-up questions.

The USFAA Staff reserves the right to edit an article and put it in the magazine's style and format. If you have questions on themes, subject matter or publication deadlines, please call 580.355.4677.

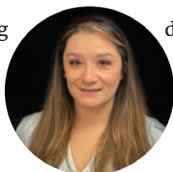
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PURPOSE:

The FA Journal continues the tradition begun with the first Field Artillery Journal published in 1911. To publish a journal for disseminating professional knowledge and furnishing information as to the Artillery's progress, development and best use in campaigning to cultivate, with other arms, a common understanding of the power and limitations of each to foster a feeling of hearty cooperation by all and to promote understanding between the regular and militia forces by forging a closer bond, all of which objects are worthy and contribute to the good of the country.

MEMBERSHIP:

Subscription to the FA Journal comes with membership in the Association. Individual or corporate memberships may be obtained through the USFAA website at www.fieldartillery.org or by calling 580.355.4677. Dues start at \$25.00 per year for an individual membership for US and APO addresses (International rates may vary).

ADDRESS CHANGES:

Members can change their address, email and chapter affiliation online in the member portal at www.fieldartillery.org or by calling our office at 580.355.4677.

REPRINTS:

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President

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FA School PAO: Sharon McBride
Editor: Jamie Southerland
Art Director: David Johnson
Assistant Editor: Monica Wood



BG Andrew Preston
USAFAS Commandant
Fort Sill, OK

These are exciting times within our branch and the Field Artillery school! Since I took on the responsibilities of the Chief of the Field Artillery and the 55th Commandant of the United States Army Field Artillery School, I have had the opportunity to visit with a number of students and instructors in various classes on Fort Sill and with Field Artillerymen and women across the Army. I am very encouraged by the state of our branch.

Our Field Artillery is made up of bright and enthusiastic people who have volunteered to serve their Nation; and we are lucky to have such outstanding Officers, Warrant Officers, NCOs, and Soldiers.

All Soldiers deserve great leadership, and my commitment to you is to provide multiple opportunities for leader development throughout your careers.

As our Force grows, it must also modernize, and we continue to increase lethality to ensure our Soldiers never have to fight a fair fight. At the Field Artillery School we are evaluating what we teach, specifically how we prepare our Redlegs to fight and win during Large-Scale Combat Operations in all domains. Starting with our Lieutenants, we provide tough and realistic training to Basic Officer Leader Course Students through execution of realistic Fire Support lanes, including a

“walk and shoot” LFX, and a Culminating Training Exercise.

And for Captains, we continue to refine and improve their culminating training event known as Operation Purge in the Field Artillery Captain Career Course.

For Warrant Officers, the recruitment, development, employment, and retention of our Field Artillery Warrant Officers is critical to the success of our Targeting enterprise. We continue to select the most qualified Non-Commissioned Officers to become 131A Field Artillery Targeting Technicians.

As we invest in our People we must also modernize to maintain overmatch of our adversaries and enable MDO transformation; giving our highly skilled Redlegs the tools they need to fight and win during Large-Scale Combat Operations in all domains.

We must close all range and lethality gaps through our modernization efforts. By 2023, the U.S. Army will begin delivering a portfolio of strategic, mid-range and short-range Fires capabilities that will change the battlefield calculus against our competitors, through significant upgrades to our cannon, rocket, and missile force.

We are also modernizing our force at echelon, including significant investments at Theater, Corps and Division to transform as part of a Multi-Domain Operations (MDO) capable force.

At strategic levels, we are fielding a Theater Fires Command and Theater Fires Element in Europe and the Pacific in FY22. We are standing up Multi-Domain Task Forces to support Combatant Commanders across the globe.

In addition, in synchronization with the CSA’s priorities, we will field a Long-Range Hypersonics Weapons Capability, enabling Combatant and Joint Force Commanders the ability to leverage Surface-to-Surface fires for strategic effect.

At tactical level, we will increase lethality and our ability to synchronize Fires through the creation of eight Army National Guard Division

Artilleries by 2028, with the first standing up this year.

At the operational level, we are developing a ground-launched, mid-range Fires capability as part of our modernization strategy known as Mid-Range Capability or MRC. MRC addresses a need identified by the FY20 Strategic Fires Study in coordination with key theaters and combatant commands. As approved by the Secretary of the Army, the Army Rapid Capabilities and Critical Technologies Office (RCCTO) is developing and we will field the initial prototype MRC operational battery in FY23.

There remains a clear need for a Field Artillery Command and Control capability at the Corps level. Currently we have no JFLCC capacity to Command and Control multiple Field Artillery Brigades. A Corps-level Operational Fires Command is needed to synchronize Joint Fires with Formal Target production capability and Command and Control multiple Field Artillery Brigades.

As we work to increase lethality and range at the tactical level, we will transition our active component 2 x 8 Rocket Battalions to 3 x 9 and our Army National Guard Echelons above Brigade 155 BNs from 3 x 4 to 3 x 6.

By FY25 we see the DIVARTYs role increasing as we begin to field Extended Range Cannons. The Extended Range Cannon Artillery will double the current M109 reach with ranges of over 65 km. Precision Strike Missiles replace the Cold War-era ATACMS, increasing the range of the Army’s MLRS and HIMARS missile launchers from 300 km to around 500 km, with a future upgrade aiming for much greater distance.

What an exciting time to be a Field Artillery professional! In order to meet the challenges of the future, we must continue to prioritize leader development, modernization, and continue to enhance lethality to ensure our Soldiers never have to fight a fair fight. The state of the Field Artillery is strong.

KING OF BATTLE!

PROUD TO SUPPORT THE FIELD ARTILLERY JOURNAL'S PRINT EDITION



Marines fire an M777A2 howitzer during training at Pohakuloa Training Area, Hawaii, Sept. 20, 2020.

Photo By: Marine Corps Sgt. Luke Kuennen

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CSM Michael McMurdy
USAFAS Command Sergeant Major
Fort Sill, OK

Redlegs,

It has been a year of progress and change across the Branch, our 55th Chief and Commandant of the Field Artillery has the team laser-focused on maintaining momentum while implementing change to meet future requirements! Watching our current and future leaders navigating and professionally addressing the challenges of today and tomorrow continues to be impressive and reassuring. Based on BG Preston's priorities, here is what you should expect to see from the team and myself across leader development, Functional and Primary Military Education (PME), Self-Development, and opportunities for our Enlisted Artillery Women and Men:

DA PAM 600-25 Update: ALL Enlisted MOS's and Grades are updated on MilSuite at <https://www.milsuite.mil/book/groups/smart-book-da-pam-600-25> dated 10 Aug 21. Please take time to review these critical changes/updates to our Redleg Career Maps!

Project Athena: We have completed our portion of the TRADOC Pilot Program in our 13 Series Senior Leaders Courses and are on glide path to incorporate Project Athena across all PME courses beginning in October 2021. We are messaging to the force to become familiar with the program, and you do not have to wait to utilize this Self Development resource just in PME. See for yourself at <https://capl.army.mil/athena/#/>.

FA Master Gunner Redesign: Directorate of Training and Doctrine handed off the proposed five-week Program of Instruction to the FAMG Division for validation and edits. Upon completion, we will send it to Operational Unit leaders for comments and adjudication. Courseware, simulations, and connectivity are all on track to run the pilot program in FY23 -- assuming the Course Growth Request is approved and supported by Senior Leaders this fall for full implementation in FY24.

FA Pre-Command Course Redesign: In preparation for the FY22 CAC mandated one-week Branch PCC, we ran our last FY21 course (26-30 July) as a pilot to allow for adjustments. Notable changes include- Incorporate Tests/Assessments- Assess students' ability to fight (technical and tactical competence), develops FA Specific IDP to correct knowledge gaps, and link assessments with leader developmental resources. CSM selects will continue to be invited to attend!

Edition 4 of our Saint Barbara Enlisted SITREP is scheduled for release at the end of August. Previous editions can be viewed at <https://sill-www.army.mil/USAFAS/stbarbenlisted/>.

We are humbled to serve you and our Field Artillery community. We look forward to another year of progress, leader development, and driving change.

Guns up and King of Battle!

RedLeg7
CSM Michael McMurdy



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18 MAY

Two Morning
Educational Sessions

Luncheon

Two Afternoon
Educational Sessions

Hall of Fame
Induction Dinner

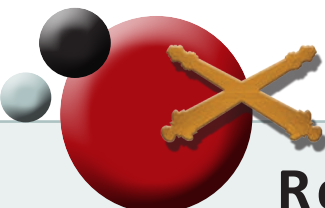
19 MAY

Two Morning
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One Afternoon
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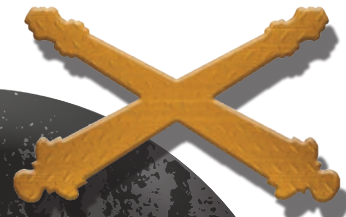
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NEW CHALLENGE KICKS OFF NOVEMBER 17th!

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more information at www.fieldartillery.org/events

The 1st Annual King of Battle Virtual Fitness Challenge took us on the Henry Knox Trail with the first Field Artillery. Our 2nd Annual Challenge will take us along the Western Front in France during WW1 and highlight several Horse-Drawn Artillery units. All proceeds will benefit the Historic Half Section on Fort Sill.

The event will go live November 17, 2021. The My Virtual Mission fitness app links with your cell phone, smart watch or fitness tracker so that all steps are counted towards the total. Finish before November 16, 2022 and receive the custom race medal pictured above!



USFAA'S GLOBAL MEMBERSHIP DRIVE

We challenged all chapters during the month of September to join our global membership drive. Every Chapter that reached a 25% growth received an additional \$250 grant on top of their annual chapter check. The top three chapters with the highest percentage of growth during the month received an additional grant.

FIRST PLACE

MISSISSIPPI REDLEGS CHAPTER MISSISSIPPI ARMY NATIONAL GUARD 2nd BN 114th FA

All past, present, and future Artillerymen in the State of Mississippi are represented through the Mississippi Redleg Chapter, of the Field Artillery Association. Chartered in 1984, this Chapter represents the continued legacy of Artillerymen in Mississippi through the work of the 2-114th FA RGMT, headquartered in Starkville, MS. The Battalion is Direct Support (DS) to the 155th Armored Brigade Combat Team (ABCT) headquartered in Tupelo, MS, and consists of three M109A6 firing Batteries located in Columbus, Kosciusko, and Canton, MS. The Battalion's Forward Support Company, F CO, 106th BSB, is located in Louisville, MS.

SECOND PLACE

SPARTAN STEEL 2nd BN 377th PFAR

The Spartan Steel chapter represents 2-377th PFAR. Constituted in 1921, they served alongside the 101st Airborne during WWII. They currently reside in Fort Richardson, Alaska. The battalion's mission is: "On order, 2-377th PFAR provides fire-power overmatch throughout the 4-25 IBCT(ABN) area of operations in order to dominate all adversaries through the rapid & simultaneous application of fires and sensor platforms."

THIRD PLACE

SKY SOLDIERS CHAPTER 4-319 ABN FAR, Germany

Since 1998 the Sky Soldier Chapter has been comprised of "King of the Herd" Paratroopers assigned to the 4th Battalion, 319th Airborne Field Artillery Regiment and in direct support the 173rd IBCT (Airborne). Based out of Grafenwohr, Germany and Vicenza, Italy, our Airborne RedLegs are forward positioned overseas to provide lethal fires from any drop zone throughout Europe and Africa.

HONORABLE MENTIONS

THIS WE'LL DEFEND - 434th FA BDE

OLD BREED - 11TH MARINES

YANKEE REDLEGS - 42ND ID DIVARTY

AT THE READY - 14TH MARINES / USMC RESERVES

Why Join?

The Field Artillery Association was founded in 1910 and consists of over 6000 active members and 55 chapters world-wide. For over 100 years, USFAA has stood strong as the only professional organization that serves the Field Artillery branch of the military. The USFAA mission is to support, preserve and perpetuate the esprit, traditions, and standards of the Field Artillery.

•By becoming a member of the Field Artillery Association you not only support your profession but you also support your local chapter, as the chapter you affiliate with gets 10 - 15% of your membership fees annually.

•You receive a copy of the Field Artillery Journal (the only professional magazine dedicated to the Field Artillery), mailed to your residence quarterly.

•You receive access to our historical issues online (back to 1911).

•You, your dependents and immediate family

members are eligible for our scholarships. In 2021 we awarded over \$15,000 in scholarships to our members.

•You are eligible for the Honorable Order of Saint Barbara and your spouse is eligible for the Artillery Order of Molly Pitcher. Your membership ensures that these Association awards endure.

•Members receive a 15% discount on all USFAA merchandise in store and online.

•You receive a complementary membership with AUSA. As long as you remain a member of the USFAA, you will retain membership with AUSA. You are entitled to all of their member benefits and the legislative support from their lobbying arm.

•We also have a robust board of retired senior leaders who are available to advise and support our chapters professionally.

The team at the USFAA is eager to support you! If you have ideas on how we can provide better support please feel free to contact us.



United States Field Artillery Association

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LtCol (R) Michael Grice

Writing Award

2021

The LtCol (R) Michael Grice Writing Award was established by LtCol (R) Michael Grice and the United States Field Artillery Association to promote involvement in the creation of content for FA Journal publication. It was meant to encourage creative thinking and sharing of ideas among both officers and enlisted, Soldiers, Marines, National Guardsmen and Reservists throughout the branch. Eligibility was open to any new article that appeared in the last four FA Journal issues. The voting panel consisted of Field Artillery Leadership from both the Army, National Guard and USMC. They reviewed these issues and each selected a first, second and third place based on the topic of this year's contest, "Challenge the status quo – What can we as artillerymen do better?". The votes were then compiled to reveal the second-annual winners.

FIRST PLACE

WO1 CONOR MCCARREL
169th BDE CO ARNG

Long Range Fires Gap

Issue 3, 2021

WO1 Conor McCarrell enlisted in the Colorado ARNG in 2009 as a Fire Support Specialist (13F). In 2012, WO1 McCarrell became a Forward Observer for 1-157th INF COARNG and then deployed with the 169th Field Artillery Brigade in 2017 as a Targeting NCO. During the deployment, he was assigned to the Special Operations Joint Task Force (SOJTF) J2 Targeting Cell, assisting in the discovery and development of ISIS targets in support of Operation Inherent Resolve. After the deployment in 2018, WO1 McCarrell went through the COARNG Warrant Officer Candidate School program and graduated from the WOBC in June 2020 as a 131A. He is currently the Brigade Counterfire Officer for COARNG's 169th FA BDE. He also recently graduated from Colorado State University with Bachelors of Science in Mechanical Engineering and Engineering Science.

SECOND PLACE

MAJOR SCOTT CLARK
Olmsted Scholar - Krakow, Poland
**The Case for NATO Joint Fires
Center of Excellence**

Issue 3, 2021

MAJ Scott Clark is a US Army Field Artilleryman and Olmsted Scholar studying Bezpieczeństwo Narodowe (National Security) at Jagiellonian University in Kraków, Poland. MAJ Clark's assignments include staff & faculty at USMA, battery command in South Korea, and Company / Battalion Fire Support Officer in Italy, with deployments in Operation Enduring Freedom X & XIII.

THIRD PLACE

MAJOR GEORGE CASS
3rd CAV Regiment
Trigger Math

Issue 2, 2021

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Targeting and Synchronizing Fires

By LTC Travis Robison, MAJ Joshua Hollingsworth, and CW3 Edwin VillanuevaVargas

Field Grade Officers graduating from Intermediate Level Education (ILE), and some Field Artillery Battalion and Brigade Combat Team (BCT) Commanders, often have limited knowledge or experience managing the complexities of targeting and synchronizing Fires during brigade operations. This shortcoming tends to manifest in desynchronized and ineffective Fire support at the Combat Training Centers (CTC) and, if not corrected, potentially during large-scale combat operations. The purpose of this article is to provide Brigade-level primary staff officers, particularly those serving as intelligence, operations, and Fire support officers, an overview of the requirements to effectively target and synchronize Brigade Fires. This paper attempts to bridge the gap between doctrinal expectations and realistic execution in a complex, dynamic, and time-constrained environment. We use our recent experience supporting the 2nd Infantry Brigade Combat Team, 25th Infantry Division, during a comprehensive training cycle culminating in a rotation at the Joint Readiness Training Center (JRTC) where we achieve noteworthy results that inform the following discussion.

Setting the Stage

One thousand hours, time for the Targeting Working Group (TWG) to begin. Seated at the table were the Fire Support Coordinator (FSCoord), Brigade Executive Officer (XO) or Operations Officer (S3), Brigade Fire Support Officer (FSO), Brigade Targeting (TARGO) and Counterfire Officers, Brigade Intelligence Officer (S2), Brigade Engineer, Battalion liaisons officers, and a diverse set of enablers representing the Air Force, Special Forces, along with several other Army collection and non-lethal assets. Representatives from Brigade S1, S4, and S6 would attend as needed, and the brigade's Chief of Reconnaissance often dialed in to participate by phone. The

rules of the road were rank didn't matter and that everyone came prepared with information and ideas. Efficient briefing ensured that the large group received relevant information for synchronizing brigade operations.

The briefing began with the Assessment Officer addressing the FSCoord. "Sir, in Air Tasking Order (ATO) BB we supported the Commander's intent by focusing on enemy maneuver, reconnaissance, surveillance, target acquisition, and Fire support assets on the high-payoff target list. We destroyed seven tanks, one air defense RADAR, and two long-range artillery systems. This reduced the enemy's strength to 68%. We remain on track to achieve the Commander's intent for targeting." Following the Assessment Officer, the Air Force Staff Weather Officer briefed, "Sir, weather conditions remain favorable for us over the next three ATOs." The TARGO followed. "Sir, ATO BC remains unchanged and is currently flying. In ATO BD we recommend moving Fire support from number four on the High-Payoff Target List (HPTL) to number one based on our assessment that the enemy is increasing its Fire support capability which may disrupt or delay maneuver during our upcoming attack. In ATO BE, the enemy will be preparing to conduct a hasty defense, so we recommend moving engineers from number three to number two on the HPTL and focusing on their mine-laying capability to facilitate our freedom of maneuver. Pending any questions, we are ready to discuss ATO BF." The FSCoord looked at the Brigade XO, FSO, and S3 to see if they had any input. Without any, the FSCoord replied "We're ready, let's work through ATO BF. Keep in mind the Brigade Commander's intent to preserve as much combat power as possible during the assault in order to F for the counter-attack expected during ATO BG."

The TARGO approached the analog map board with the affixed enemy, maneuver, engineer, intelligence, and Fire support overlays. He began with, "Roger Sir. In ATO BF the Fire Support Coordination Line will move to Phase Line (PL) Chargers as we complete our assault and the Coordinated Fire Line will move from PL Packers to PL Chiefs. The Division HPTL remains unchanged as they continue to focus on maneuver, Fire support, reconnaissance, and command and control in support of our assault. Pending any questions, I will be followed by an assistant operations officer (AS3)." The AS3 approached the operation map board, then moved unit icons as he briefed, "Sir, in this ATO Task Force (TF) Rattlesnakes will continue to screen north and south of Objectives (OBJ) CRIMSON and TIDE, respectively. TF Wolfhounds will complete their air assault no later than 2000 and will be prepared to execute actions on OBJ CRIMSON no later than 2200. TF Gimlets will complete their air assault no later than 1930, conduct link-up with their ground assault convoy no later than 2000, and begin movement towards OBJ TIDE no later than 2020. TF Wolfhounds and TF Gimlets will complete their assaults no later than 0200 in ATO BG. Sir, pending your questions, I will be followed by Brigade S2." The FSCoord, BCT XO, FSO, and BCT S3 briefly discuss the air assault timeline and the conditions that must be set for success, including suppression of enemy air defense during two air assaults with multiple turns. They also discuss the potential effects of the brigade's artillery displacement on its ability to support the ground assault convoy. Once satisfied, the FSCoord replies with, "Thank you, no questions."

Following the AS3, the Brigade S2 approached the map board and moved enemy icons while briefing, "Sir, during ATO BF the 163rd Mechanized Infantry Brigade will be in defensive positions along

with PL Chiefs at objectives CRIMSON and TIDE. We assess that by this ATO the 163rd will be at 35% strength. This means that the 163rd will have approximately two T-72 tanks and three or four BTR-80 Infantry Fighting Vehicles in prepared defensive positions on each objective. The 163rd will be supported with indirect Fires from the 175th Brigade Artillery Group (BAG) and the 17th Division Artillery Group (DAG). The BAG and the DAG are expected to be at 50% strength and capable of providing long-range Fires from BM-21 rocket launchers and close-range Fires from D-20 and D-30 Howitzers. The 163rd will use organic mortar systems to disrupt our freedom of maneuver around both objectives. Sir, pending your questions I will be followed by our Special Forces partners." The Brigade XO asked, "S2, from how many BM-21s can we expect to receive Fires during our assault on OBJ CRIMSON?" The S2 replied, "Based on their current strength, and if they decide to mass Fires on OBJ CRIMSON, I assess that we will receive anywhere from two to eight rounds per minute for 10 minutes from multiple BM-21s." The FSO responded with, "I agree, they can fire two rounds per minute per launcher system; however, based on their current strength, if they decide to mass, I think we should only expect six to eight rounds per minute." The FSCOORD then replied with, "Roger, FSO, we need to elevate this one to the Division since Fire support is number two on their HPTL. Tell them we'll need at least ten systems destroyed to set the conditions for our assault. Thank you, no further questions." The Special Forces liaison then briefed, "Sir, we are direct support to the brigade during ATO BF. We will be located west of PL Chiefs conducting forward reconnaissance of OBJs SABAN and BRYANT to identify the enemy reserve and BAG locations. Sir, pending your questions I will be followed by the TARGO." The FSCOORD then replied with, "No questions, but the Commander is particularly concerned about the enemy reserve, so please prioritize locating that. Thanks for your

support." The TARGO then stood up and briefed, "Sir, based on the friendly, enemy, and Special Forces schemes of maneuver during ATO BF, we propose the following HPTL: Maneuver, focusing on the T-72s, Fire Support focusing on the D-20 and D-30s, Command, Control, Communications, Computers and Intelligence focusing on jamming the 163rd's ability to communicate, and Reconnaissance and Target Acquisition focusing on their ability to detect our indirect Fire systems." The FSCOORD replied with, "Roger that, let's go through each one." The core of the targeting process occurred following this portion of the working group.

Targeting. We used the Army's Decide, Detect, Deliver, and Assess (D3A) methodology. Establishing the HPTL during the process described above completed the decide portion - "what do we need to kill?" Next, we went through each high-payoff target with the S2 and Collection Manager discussing where, when, and at what strength we should expect to see systems. During this time-phase analysis, the Collection Manager highlighted which Named Areas of Interest allocated collection systems would focus on based on the S2's assessment of the enemy scheme of maneuver. Additionally, the Collection Manager discussed which collection systems would layer over each area and their cross-cueing criteria. Once satisfied with the detection plan, the team transitioned to discuss delivering effects against the targets. The FSO, Air Liaison Officer, S3, Brigade Aviation Officer, XO, and FSCOORD discussed the various lethal and non-lethal capabilities available to the brigade as well as division-level assets that required synchronization to deliver effects against each of the high-payoff targets at the specified time. This process answered the critical questions of where will the target be on the battlefield, when will it likely be there, are collection assets in the correct location to see the target, what will it look like so we know that we're attacking the right target, and are assets in place to deliver desired effects? The

meeting transitioned to guidance for the following ATO after discussing each HPTL category in detail. This allowed the staff to shift focus to the following day and begin synchronizing targeting resources. The meeting then adjourned, to be followed later in the day by the Target Decision Board (TDB).

The daily TDB followed the same format as the working group except that the FSCOORD led the brief to the Brigade Commander. The Commander received an assessment of the previous ATO, focusing on whether the brigade achieved its targeting objectives. This was important to stay focused on fighting the enemy instead of the plan as often happens when managing targeting by the ATO cycle. The Commander also received an update on the current ATO and recommendations to update or change the next two ATO targeting priorities based on the assessment of the effects. The last portion was his approval or directed changes to the recommended HPTL for the ATO 96 hours out as discussed during the TWG. Following the Commander's approval, he provided guidance for the following ATO and the meeting adjourned. At this point, the Battle Captain received the targeting board for the next ATO to post on the command post floor. This effectively completed the Future Operations to Current Operations (CUOPs) battle hand-over.

The TDB must occur daily as it provides the staff with guidance and priorities directly from the Commander three days in advance of execution. Our TDBs occurred in the brigade's Main Command Post, its' Tactical Command Post, under poncho or on a HUMMWV hood while conducting a move, and desk-side with the Commander when key players or time weren't available. The bottom line is that the TWG and TDB must occur daily regardless of circumstances because they enable synchronized targeting focused on killing the enemy. The Warrior Brigade's targeting process was synchronized, successful, and highly efficient. This begs the question, how do you get your brigade to perform similarly or even better? The

ATO Targeting Cycle

SUN	MON	TUE	WED	THU	FRI	SAT
09 AUG	10 AUG	11 AUG	12 AUG	13 AUG	14 AUG	15 AUG
16 AUG	17 AUG	18 AUG	19 AUG	20 AUG	21 AUG	22 AUG
MDMP					DONSA	
23 AUG	24 AUG	25 AUG	26 AUG	27 AUG	28 AUG	29 AUG
MDMP		TWG	ATO: TA, TB, TC		TDB	DEPLOYMENT
30 AUG	31 AUG	01 SEP	02 SEP	03 SEP	04 SEP	05 SEP
ATO: TA		ATO: TB	ATO: TC	ATO: TD	ATO: TE	ATO: TF
Approve: TD Guidance: TE		Approve: TE Guidance: TF	Approve: TF Guidance: TG	Approve: TG Guidance: TH	Approve: TH Guidance: TI	Approve: TI Guidance: TJ
DEPLOYMENT	06 SEP	07 SEP	08 SEP	09 SEP	10 SEP	11 SEP
ATO: TG	ATO: TH	ATO: TI	ATO: TJ	ATO: TK	ATO: TL	ATO: TM
Approve: TJ Guidance: TK	Approve: TK Guidance: TL	Approve: TL Guidance: TM	Approve: TM Guidance: TN	Approve: TN Guidance: TO	Approve: TO Guidance: TP	Approve: TP Guidance: TQ

answer lies within a gated training strategy using the crawl, walk, run methodology.

Training the Team

The Warrior Brigade started with an untrained staff who was willing to learn, a highly knowledgeable FSCoord, and a Brigade Commander who fully supported the targeting process. What followed was a five-month training plan based on an objective, standards based approach aligned with the brigade's upcoming JRTC rotation. During the crawl phase, we emphasized training each targeting task. During the walk phase, we focused on training each task to an objective standard. During the run phase, we conducted iterative, multi-echelon collective training to achieve and sustain proficiency at the full targeting process. Each of these phases began with leader professional development sessions focused on developing foundational, rehearsal, and execution knowledge across the staff.

During the Foundational (crawl) phase, we conducted training in a classroom environment. Members of the Brigade Fires Cell and any staff member who might be part of the process learned the fundamentals of targeting and the D3A methodology. This included required inputs and outputs from each Warfighting Function (WfF) and the responsibilities of each section within the targeting process. In the Rehearsal (walk) phase, training centered on the TWG, including

conducting mock working groups with the FSCoord who used these sessions to coach, teach, and mentor participants. This phase culminated with familiarization with the TDB and involved discussing issues, concerns, guidelines, responsibilities, and recommendations for operations. The training focused on efficient preparation, consolidation, and deliberation during the TDB. During the Execution (run) phase we conducted the TWG and TDB during the Military Decision Making Process for the brigade's culminating training event. This exercise provided the staff opportunities to conduct the TWG and TDB daily and under simulated wartime conditions. The staff experienced firsthand that they must come prepared for the TWG by conducting the necessary WfF analysis ahead of the meeting and to be ready to discuss solutions for complex targeting problems. This event and our subsequent Leadership Training Program course at Fort Polk resulted in the staff becoming highly proficient at the targeting process. The final step was ensuring that the work transitioned from planning to execution – the Future Operations to CUOP hand-over. Our biggest question was how?

Organizing for Success

The Warrior Brigade discovered that the answer was two-fold. The first centered on the overall layout of the brigade's main command post. Our main command post was

originally organized to house (i.e., fit) all of the elements of the staff and attached enabling partners. It was organized, but it was unenergetic and generally unproductive because the layout reduced cross-talk and situational awareness across enablers and key warfighting functions. This became the first thing to change. We restructured, focusing on the efficiency of interactions within the command post. The Brigade Commander authorized the creation of a "Kill Table," similar to the Joint Air to Ground Integration Centers found within Division main command posts. Applying the JAGIC concept facilitated our synchronization of Joint Fires and the de-confliction of the airspace across the brigade's area of operation. The Kill Table became the focal point for all operations. The Brigade FSO ran the table which had all of the brigade enablers facing each other. This immediately and measurably increased our command post capabilities and effectiveness, in large part because it helped create shared understanding across the warfighting functions. Moreover, the Brigade FSO was tied into the targeting process and understood the Commander's intent, so he could orchestrate shaping and destructive effects to achieve the Command's intent.

Our second answer focused on information sharing. As previously mentioned, we changed the targeting board each day after the TDB to ensure CUOPs fought the correct ATO. The ATO board hung directly in the center of the CUOPs floor and we briefed it during battle hand-over, seven-minute drills, and as assets checked onto the station. We taught the Battle Captains how to read the board and where to look when assets checked onto the station or when targets of opportunities presented themselves. It highlighted the time (decide), the place (detect), and the assets the Commander authorized (deliver) for use against each of the HPTL categories. It provided guidance and ensured the work during the targeting process remained consistent during execution. In short, it focused and synchronized CUOPs even during

Battle Rhythm

Main CP Battle Rhythm V4.1 CAO: 13 1000 AUG 20				
Time	Event	Location	PACE	Attendees
0000	Orders Published	Plans Tent	CPOF / ShareDrive	
0100				
0200				
0300				
0400	S2 Sync	BISE	CPOF/ SVOIP/ FM	BN S2s, IC Managers, FAIO, CA, SOF LNOs
0500				
0600	Battle Handover Brief	CUOPS Tent	In-person/ SVOIP	All
0700	BUB	Plans Tent	In-person/ SVOIP	BCT CMD Team, BN CMD Teams, BCT and BN Staff Primaries
0800	AWG/ BN Inputs/ Running Estimates	Plans Tent	In-person/ SVOIP	CHOPS, BTL CPT, S2, S4, CF/FAIO, LNOs, ADAM/BAE, Non-Lethal, CM
0900				
1000	TWG	Plans Tent	In-person/ SVOIP	XO, S3, FSO, S2, S4, S6, TARGO, FAIO, CFO, SJA, BAO, ADAM/BAE, CM, ALO/TACP, CEMA, ENG, PAO, CA, PSYOPS, SOF LNO, CUOPS, LNOs, MNVR Planner(s)
1100	LOGSYNC	S4 Tent	CPOF/ SVOIP/ FM	S4, BN S4, FSC CDRs (XO), SPO, BAE
1200	IC Sync	BISE	CPOF/ SVOIP/ FM	BN S2s, IC Managers, CEMA, FAIO, CA, BAO, SOF LNOs, SIGINT, HUMINT
1300	RDSP	Plans Tent	In-person/ SVOIP	All
1400	Plans Update to W6	Plans Tent	In-person/ SVOIP	S3, MNVR Planner(s)
1500	TDB	BISE	CPOF/ SVOIP/ FM	XO, S3, FSO, S2, S4, S6, TARGO, FAIO, CFO, SJA, BAO, ADAM/BAE, CM, ALO/TACP, CEMA, ENG, PAO, CA, PSYOPS, SOF LNO, CUOPS, LNOs, MNVR Planner(s)
1600	S2 Sync	Plans Tent	In-person/ SVOIP	BN S2s, IC Managers, FAIO, CA, SOF LNOs
1700	CSV/ Requests	CUOPS Tent	CPOF/ SVOIP/ FM	BN CMD Teams, Staff Primaries
1800	Fires Sync, Battle Handover Brief	CUOPS Tent	CPOF/ SVOIP/ FM	BCT FSO, BN FSOs
1900	DIV CUB	CUOPS Tent	CPOF/ SVOIP/ FM	BCT CMD Team, S3, XO
2000				
2100	OPSYNC	Plans Tent	CPOF/ SVOIP/ FM	S3, BN S3s, MNVR Planner(s)
2200				
2300				

those periods when the Brigade FSO and XO left the floor to work on other brigade priorities. The board ensured that the approved HPTL created shared understanding and focused action at decisive points.

Final Takeaways

Our targeting process efficiently established an HPTL synchronized with detection and delivery assets. However, our earlier targeting efforts were often ineffective despite being developed within the context of the enemy and friendly schemes of maneuver. We focused on identifying what was killing us but failed to fully understand or identify when a target would present itself on the battlefield to be killed. This resulted in our using collection assets in the wrong place or requesting delivery assets at the wrong time. Moreover, the JRTC team was unable to visualize how targeting fit within the scheme of maneuver. This resulted in the misapplication of delivery assets against lower priority targets.

Through coaching, we learned the importance of establishing targeting priorities within an ATO, based on a detailed time-phased analysis of enemy and friendly schemes of maneuver. We retained the HPTL, but synchronized detection and delivery assets to focus on periods when the assets on the list would likely appear in the zone and how they would present themselves. Establishing these targeting priorities focused assets when and

where we expected to see high-pay-off targets and mitigated our tendency to spread assets across the battlespace. It also facilitated the CUOPS team's understanding of when and where we needed to kill targets to facilitate our desired scheme of maneuver. We immediately noted significant improvement in targeting effectiveness against targets on the HPTL, and ultimately, as noted by the Fox Observers, Coaches, or Trainers achieving the best targeting process JRTC has seen in years.

These noteworthy results informed the previous discussion in hopes that Field Grade Officers graduating from ILE, as well as new Field Artillery Battalion and BCT Commanders, can bridge the gap between doctrinal expectations and realistic targeting in a complex, dynamic, and time-constrained environment. Desynchronized and ineffective Fire support at the CTC or, worse, during large-scale combat operations will hinder success.

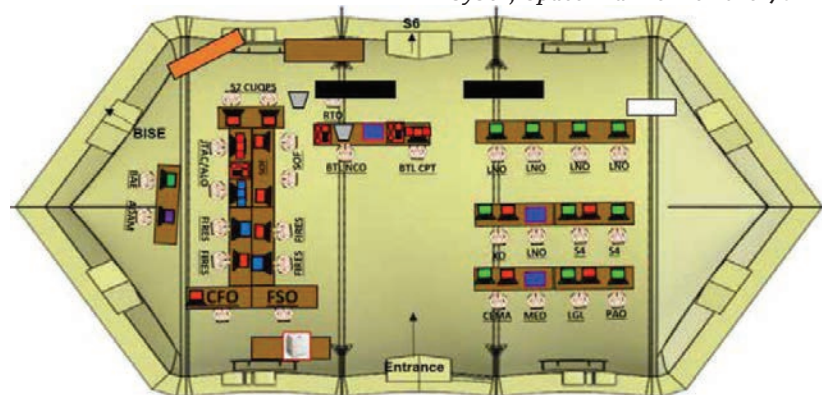
Worse yet, they will force our Soldiers to pay for in blood what we should be using steel to buy. We owe it to them to master and apply an effective targeting process.

About the Authors:

LTC Travis Robison was commissioned in 1999 as a Field Artillery second lieutenant upon graduation from the University of Colorado as an Army ROTC Distinguished Military Graduate. His education includes a Bachelor's of Arts in Political Science from the University of Colorado, a Master's of Public Administration from the University of Montana, a Master's of Operational Art and Science from the Air Command and Staff College, a Master's of Arts and Doctor of Philosophy in Political Science from the University of Pennsylvania. Before assuming command of 2-11th Field Artillery, 25th Division Artillery, LTC Robison served as an Advanced Strategic Planning and Policy Program fellow. He is moving on to become the Special Assistant to the TRADOC Commander.

MAJ Joshua Hollingsworth graduated and was commissioned in December of 2008 from the University of Alabama. He holds a Bachelor's of Arts in Criminal Justice from the University of Alabama and a Master's Degree in Defense and Strategic Studies from the Naval War College. His previous assignments include Battery Commander within the 1-320th Field Artillery Regiment 101st Airborne Division Artillery, Senior Field Artillery Assignment Officer at Human Resources Command; Brigade Fire Support Officer and Battalion Executive Officer in 2-11th Field Artillery supporting 2nd Brigade Combat Team within the 25th Infantry Division and he is currently serving as the Brigade Operations Officer for the 25th Infantry Division DIVARTY.

CW3 Edwin VillanuevaVargas is the 2nd Brigade Combat Team's Targeting Officer. He has served in the Active Army for over 20 years and has been deployed on numerous occasions in support of OEF, OIF, and OIR. He earned a Bachelor's of Science in Sports and Health Sciences from the American Military University. Prior to this assignment, during his career, CW3 VillanuevaVargas has served as the counter-fire officer and target acquisition platoon leader for 4th Brigade Combat Team, 82nd Airborne Division; Targeting Officer for 3rd Brigade Combat Team, 82nd Airborne Division; and as the Fires, Cyber, Space Planner for the 782nd Military



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APPLYING MULTI DOMAIN EFFECTS TO OPERATION INHERENT RESOLVE

By MAJ Benjamin Murphy (UK) and COL G. Damon Wells

Multi-Domain Operations (MDO) are the U.S. Department of Defense's most recent solution to the complex, multifaceted problem of state actors subverting Westphalian conventions. At its heart, MDO evolved from the natural and inevitable fusion of accelerated improvements in technology, the complexity of modern competition, and the need for rapid battlefield decisions at echelon. The concept of simultaneously employing ways and means across multiple domains to achieve a specific end is not new. This employment technique historically provided Commanders options for executing simultaneous and sequential operations by integrating capabilities across domains. When applied appropriately, these operations present multiple dilemmas to an adversary, achieve friendly physical and psychological advantages, and maximize influence and control over the operational environment. This is as true for the Combined Joint Task Force (CJTF) in Phase IV of Operation Inherent Resolve (OIR) as it is for the doctrinal MDO problem set of Anti-Access and Area Denial (A2/AD) systems.

Although MDO shares common traits with concepts like Airland Battle there are important differences. Airland Battle doctrine focused on the three-dimensional and technological impacts of modern warfare that prescribed rapid, integrated air and ground maneuvers and viewed a battlefield extended in both the dimensions of geography and time. This informed NATO's deep battle warfighting concept to combat against a potential Soviet attack in Europe. In comparison, MDO focuses on the competition continuum and the requirement for parity of effort throughout. It incorporates the fundamental

changes in the character of warfare and acknowledges that constant competition between nations with sporadic escalation to conflict is the new normal. While not a direct translation of MDO doctrine into the application, Operation Inherent Resolve's current activities fit the model in practice. At the lower echelons, organizational structure, resource availability, and competition spectrum specifics may not truly match the MDO model. However, it can be scaled to function in varying environments through the understanding and deliberate application of the U.S. Army's principles. CJTF-OIR created the Multi-Domain Effects Directorate (MDED) as a functional bridge to enable a typical CJTF structured headquarters to leverage the advantages created through a multi-domain approach.

Conceptually, U.S. forces seek to execute MDO in several stages. Initially, the main effort is the penetration of enemy A2/AD systems to enable strategic and operational Maneuver. The next step is the disintegration of the aforementioned A2/AD system to enable operational and tactical Maneuver for U.S. forces and partners. Exploiting the resulting freedom of Maneuver achieves operational and strategic objectives which defeat enemy forces across the domains. The final stage is re-entering normal competition and consolidating gains before forces return to competition on favorable terms to the United States and allies.

CJTF-OIR's initial analysis of restructuring into an MDO approach was a function of environmental complexity and change from Phase III to Phase IV. CJTF's primary mission is the defeat of Daesh across designated regions of Iraq and Syria. The design of the campaign

enables whole-of-government action to increase regional stability and is currently in its fourth and final phase. During the first three phases of the campaign, which ran from 2014 through mid-2020, the Coalition trained and equipped partner forces in Iraq and Syria, advised and accompanied those forces during operations, provided intelligence, and conducted airstrikes to enable the territorial defeat of Daesh. As a result, Daesh lost its territorial hold in Iraq in December 2017 and Syria in March 2019 but has continued to operate as a low-level insurgency in both countries. In the summer of 2020, OIR transitioned to Phase IV of the campaign. In this phase, the Coalition largely shifted from hands-on training, developing, and assisting partner forces in both Iraq and Syria to advising and enabling them, mainly remotely, from consolidated bases during operations against Daesh. Training of partner forces continues in Syria, while in Iraq Coalition efforts focus on reforming and professionalizing Iraqi security institutions and combating corruption to ensure the enduring defeat of Daesh. In both Iraq and Syria, OIR's most significant security threats come not just from Daesh but other forces working against Coalition interests in each country. In Iraq, several Iranian-Aligned Militia Groups (IAMG), including some incorporated into the Popular Mobilization Forces, remain hostile toward the U.S. troop presence. IAMG violence against Coalition interests in Iraq increased ahead of the first anniversary of the U.S. strike on the Iranian Revolutionary Guards Corps' Quds Force Commander, General Qassem Soleimani, and again with the advent of Ramadan. In Syria, Coalition forces continue to operate in a complex

"Out of intense complexities, intense simplicities emerge."

- Sir Winston Churchill

Churchill WLS. The World Crisis, Volume III: 1916-1918, London: 1927

security environment in close proximity to Russian, Iranian aligned, the Syrian regime, and pro-regime forces. These actors moved into the areas of northeastern Syria U.S. troops vacated when Turkey launched an incursion into northern Syria in October 2019. The Defense Intelligence Agency reported that malign actors, including Daesh and forces associated with Iran and the Syrian regime, pose the most significant threat to the Coalition and its mission. Moreover, the U.S. must embrace the complexities of a Joint Coalition headquarters, and relationships with the Government of Iraq, the Iraqi Security Forces (ISF), and Counter-Terrorism Service forces, as well as Coalition Aligned Syrian Forces (CASF). Plotted graphically, the complexity of actors in the CJTF area of operations represent points on nearly every section of the cooperation/conflict continuum.

Daesh remains the primary adversary and they demonstrate a willingness to try to retake territory in Iraq, displaying the makings of a growing and dangerous insurgency. While technically defeated, they maintain the capability to conduct limited actions against the local populace and Coalition forces in Iraq and Syria, thus efforts to prevent their resurgence cannot be underemphasized. As part of the natural progression of conflict, the kinetic tools and methods previously employed in Phase III (Defeat-Daesh) operations are no longer appropriate and relevant to Phase IV (Normalize). Non-kinetic means and non-lethal effects now have primacy while the Coalition achieves the gradual and deliberate transition of operations to the host nation forces.

During Phase III operations, the CJTF-OIR staff structure included a Fires Cell (CJ34) and an Information Operations (IO) Cell (CJ39). Fires had limited assets with a sole focus on kinetic strikes and consisted of HIMARS, M777A2, and air assets. In contrast, IO focused on longer-term planning and consisted of multiple Information Related Capabilities including; Cyber and Electro-Magnetic Activities, Psychological Operations, Special Technical

Operations, Special Activities, and Space (specifically Space Force). This is not atypical for a standard military (especially U.S.) HQ staff. Indeed, there was some overlap in the functions of Fires and IO, as might be found in a typical U.S. JTF or Division-level headquarters. However, integration and interaction were not the default. This organizational construct created particular disadvantages. First, there were limited interactions between the Fires and IO cells. With a focus on purely kinetic strikes, the Fires Cell had minimal deliberate interactions with the non kinetic IO cell. Additionally, increasing levels of classification for IO capabilities up to U.S. Top Secret / Alternative or Compensatory Control Measures / No Foreign Nationals mean those particular functions became stovepipes. Often there was such separation from the remainder of the HQ that they planned and conducted their tasks in isolation from other sections and sometimes independently of other capabilities within CJ39. On occasion, this even resulted in divergence from the campaign's priorities and objectives which had the potential to degrade the efficiency of the capabilities themselves and the HQ as a whole. Predictably, the lack of the function of a truly integrated effect created a substantial gap in the ineffectiveness during Phase IV planning and execution.

To adapt to the changing operational environment, CJTF-OIR undertook a structural review in January 2021, creating the MDED. The intent was to scale down from the pure MDO model (Multi-Domain Task Force10) to meet the requirements of the CJTF-OIR Phase IV environment. Additionally, this new staff section would establish itself and function as a microcosm of the wider staff. The MDED organization draws from appropriately qualified and experienced pan-service Five Eyes personnel within CJTF-OIR. Accordingly, the design of the organization was not from the ground up, with a requirements model and an understanding of the exact nature of operational effectiveness.

In simple terms, the creation of the CJTF-OIR MDED consolidated the CJ34 and CJ39 sections; a fusion of kinetic and non-kinetic Fires to provide integrated delivery of lethal and non-lethal effects by design. This model has proven efficacious and conditional recommendations are only slight modifications, each depends on the exact requirements of the operational environment. The conditions to successfully operate in Phase IV primarily emphasize non-lethal effects and environmental influence while reducing the employment of lethal Fires. CJTF-OIR's Line of Effort 2 is 'Enhance Partner Force Capabilities' so MDED's primary planning focus was to ensure that the ISF, Counter Terrorism Service, Syrian Democratic Forces, and other CASF conducted kinetic operations while Coalition efforts focused on the ability to shape the environment so that the kinetic effects were optimized. Consequently, MDED's primary charter is the convergence of partner operations and Coalition non-lethal effects. The MDED, while not strictly adhering to MDO as outlined by U.S. Army TP 525-3-1, adopted Multi-Domain thinking and an MDO approach to the CJTF-OIR mission. Through the creation of the MDED, CJTF-OIR created a scaled-down MDO hub within the larger headquarters.

The ultimate benefit of changing CJTF-OIR's HQ structure to an MDED concept versus the standard Joint Effects concept may be subtle, but it is real. An important point of clarity is that MDO is not just combined arms with some space and cyber capabilities mixed in but a fundamentally new way of thinking about warfare across both the competition and conflict phases of war; to either make conflict unpalatable or victory decisive. Integration of all effects substantially increases effectiveness and the MDED achieves this by serving as CJTF-OIR's integration cell for multi-domain operations and effects. This requires an intimate understanding of the environment, campaign objectives, intermediate military objectives, and operational effects while ensuring that all assets and organizations

Actors in the CJTF-OIR Operational Area span the competition continuum from cooperation to armed conflict.

align optimally to achieve these effects with the requisite synergy and convergence.

Conceptually, instead of a pan-staff MDO approach, the MDED naturally became CJTF-OIR's nexus by serving as its primary integrator, with a reach extending into the various other staff sections and importantly, into subordinate and external units, and other governmental agencies. This integrative capacity is the root of MDO in practice. Consequently, the MDED's influence is broad and it has become a significant contributor to CJTF-OIR's operational effectiveness; it is exponentially more effective than the sum of CJ34 and CJ39.

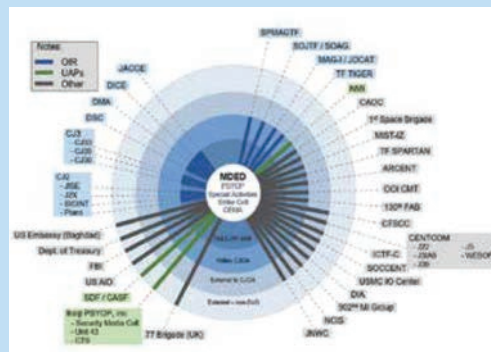
By ensuring the inculcation of a multi-domain approach, MDED planners in each functional area are better equipped to employ their effects in conjunction with other capabilities to enhance operational effectiveness. This is a learning process, so it was not immediately apparent, but the leaders quickly understood the benefit and actively supported the process. Additionally, with more emphasis on the MDO team, versus individual assets, the senior capability representatives were able to step up and away from their stovepipes and more efficiently lend their experience to shaping multiple plans across the HQ. Finally, with more senior capability representatives engaged in the process, there was enough functional overlap that the team created an increased capacity for planning and cross-domain influence throughout the current and future operations

staff sections as well as to Commanders. In practice, only a moderate amount of time and effort determines which domain was relevant or how many domains to leverage for the sake of multi-domain adherence. Instead, the MDED solved problems using all the available assets, organic or externally requested, including the doctrinal air/land/sea/cyber/space, and also interagency, special operations forces, human, informational, and any other 'domain' available. Thus, regardless of how one defines a domain, MDED leveraged it. There was less concern about which domains to employ and more focus on maximizing the use of resources to achieve the desired effect on targets.

Physical structural changes enabled and accelerated this cohesion. The creation of bigger, open workspaces, ensured previously disparate teams were now in close proximity. While obvious to the point of cliché, and frequently downplayed as a merely superficial technique, it created an immediate dividend for the CJTF-OIR MDED team. Previously, the split of CJ34 and CJ39 across three distinct office spaces and two Sensitive Compartmented Information Facilities (SCIFs) exacerbated the functional stovepiping. By creating a large, open planning room, a large conference room, and one executive area, it nested team members together and they became more collaborative which enabled

the creation of novel solutions against tactical and operational issues. To mitigate against segregated SCIF areas there were several weekly touchpoints introduced to ensure the SCIF workers had regular interactions with the remainder of the team. These centered around two weekly MDED meetings conducted each Saturday; the first was a morning huddle, in which every team member, agnostic of rank, briefed their current projects for no longer than five minutes. The second meeting was an afternoon leadership seminar, which provided an informal touchpoint and encouraged lateral thinking and problem solving within the group. These seminars were unique and beneficial as the topics were independent of current problem sets. Finally, daily touchpoints each morning quickly covered priorities, changes in the environment, progress on tasks, or other topics.

The primary manifestation of these changes was the noticeably enhanced team cohesion and increased unity of effort across the MDED. A more integrated team enabled mutual understanding and de-confliction of capabilities while simultaneously promoting diversity of thought. This led to increased effectiveness of planning and problem solving by introducing novel solutions to traditionally stove-piped problems, which achieved the desired effects. A microcosm of this increased efficiency was the MDED plans team's approach to CJTF-OIR planning groups. Planners in the MDED are both lethal and non-lethal Subject Matter Experts (SMEs) so they continually look for opportunities to leverage assets and effects across domains to create a



A hub and spoke diagram outlining MDED's stakeholder relationships.

convergence of effects, as well as spatial or temporal advantages and opportunities to defeat competitors' short term niche environmental supremacy. The CJ39 personnel's full integration into the larger staff created the most dramatic effect, facilitating a noticeable depth of environmental awareness and response time.

MDED planners operate in both the current and future operations sphere, so have awareness of operational impacts as they happen, insight into how current conditions affect future operations, and the ability to anticipate changes in the operational and information environment. This was a marked change for former CJ39 personnel, who moved from relatively isolated planning teams to quickly become adaptable and responsive to environmental changes. By evolving to a multi-domain approach, their wide spectrum of non-lethal assets provided immediate applicability and relevance to the HQ. Having broader awareness has created change for former CJ39 personnel, who moved from relatively isolated planning teams to quickly become adaptable and responsive planning teams to

quickly become adaptable and responsive to environmental changes. By evolving to a multi-domain approach, their wide spectrum of non-lethal assets provided immediate applicability and relevance to the HQ. Having broader awareness has created a better ability to plan and operate under the umbrella of campaign priorities, this ensures the organization is deliberately driving toward the correct effects and desired a better ability to plan and operate a better ability to plan and operate under the umbrella of campaign priorities, this ensures the organization is deliberately driving toward the correct effects and desired endstates or conditions. As a result, the MDED achieves a better understanding of desired effects across the HQ and highlights opportunities to leverage multiple assets for convergence, which creates a temporal or spatial advantage. Placing the relevant capability SME into the planning event at the right time enables efficient planning. More efficient use of SME time provides an ability to focus on relevant problem sets, improve synchronization and then effectively employ the available assets.

A secondary benefit was the inculcation of an execution-focused mentality into the information-related capabilities. By being better linked to the Strike Cell and the Tactical Forward HQ these previously long lead capabilities' SMEs were exposed to the benefits of maintaining awareness of the current tactical dilemmas. They could now have pre-authorized response options and Concept of Operations to use in real-time situations which empowered Commanders with the ability to leverage a wide range of lethal and non-lethal effects. This gave them the ability to create multiple dilemmas' for our adversaries. In turn, this generated flexibility in decision making at the operational level and mitigated CJTF-OIR's inability to ensure supremacy across a wide combined Joint operational area by guaranteed provision of localized superiority at the Commander's time and place of choosing.

Instead of agonizing about the difference between Joint and multi-domain, consider multi-domain as the natural extension of Joint. Joint is a step up from past operations, which were fairly service/domain-centric.





MDED relationships

The Joint concept focused on the integration of services and took the military's ability to synchronize and coordinate to the 'next level.' Multi-Domain Operations are the natural extension of Joint, it is the new 'next level.' Where previously conducting Joint operations was a pivotal milestone, it should now be the baseline. When you shift your baseline, you must conceptualize what your next step up must be. Multi-domain improves Joint operations. We have enough practice and experience with Joint operations to refine, improve, and introduce further complexity. Also, consider that when creating the Joint concept the threat was markedly different to the current and future threat environments. Joint simply isn't good enough anymore. MDO enables us to simplify the conduct of operations with partner force and ground forces, coalition, cyber, space, and technical effects, to ensure success at a specific point in the tactical battlefield. MDO is not just a concept applicable to great er competition in the Pacific. The CJTF-OIR MDED experience proves that it can and should be modified to fit the environment then applied wherever and whenever U.S. forces operate.

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CJTF-OIR's MDED includes personnel from all five services (USA, USN, USMC, USAF, and USSF) as well as the UK (Army and RAF), Canada (Army), and Australia (Army).



Field Artillery in the Arctic



Thoughts, experiences, and TTPs from 2-8 Field Artillery Regiment

Located less than 200 miles south of the Arctic Circle, Fort Wainwright presents challenges to those living and working here. With extreme winter temperatures, snowfall accumulation, and months of constant darkness or daylight, the conditions existing at Fort Wainwright are not commonly experienced at other duty stations in CONUS. It is essential to the success of the Field Artillery that we shed light on these identified challenges and some potential solutions.

This article highlights the challenges 2-8 FAR (Fort Wainwright, Alaska) has experienced in Field Artillery operations. For too long, the Field Artillery has neglected cold weather and high-altitude operations. With the focus on developing an Arctic Strategy, we implore the larger Field Artillery community to respect the challenges discussed within this document to pave the way for future initiatives in manning, equipping, and training in cold weather and high-altitude regions. Our goal is that this article serves as an entry point for a professional discussion on what is required to fight and win in the Arctic – including further refinement of our TTPs for future generations of Arctic Warriors.

Winter Impacts on Operational Timelines

With winter temperatures remaining below freezing and months of constant darkness, the Arctic climate is one of the most dominant issues that wreak havoc on training, maintenance, and equipment in the Arctic. Last year in late September, we received our first significant

snowfall in Interior Alaska. That accumulation remained until April. To this point, the artillery battalion lacks the organic snow removal equipment required to maintain operations in both garrison and tactical operations. Based on snow removal contracts, the garrison can only commit to clearing our motor pool and parking lots approximately once a month (beginning in December). Further, the battalion is not equipped for clearing snow from main avenues of approach, firing points, observation points, or radar positions. Because of this, we rely heavily on support elements from the Brigade Engineer Battalion (BEB) and assets from Fort Wainwright Garrison – Department of Public Works and Range Control. Lack of an organic snow removal capability significantly encumbers our formation in garrison and

limits the cross-terrain mobility of the battalion in training and operations.

Cold Weather Impacts on Communications, Sustainment Equipment, and Howitzers

The majority of the equipment employed by the battalion has not been extensively tested in Arctic conditions before issue. Due to the brigade's historical deployments to CENTCOM regions, MTOE equipment was purpose-built to function in temperate or arid conditions. However, our current equipment is frequently effected by the winter climate of the Alaskan Interior. These effects have the potential to impede our ability to support the SBCT with all-climate, year-round, accurate fires.

Winter temperatures tend to fall outside our firing communication



2-8 FAR conducts Artillery Certifications and Qualifications in the Yukon Training Area, Alaska. During this Live-Fire Exercise, the battalion experienced a spectrum of temperatures – from -30F to 45F. (April 2021)

platforms' prime operational temperature ranges, firing batteries, and radar equipment. These impacts require extra determination to keep our equipment functional. For example, we must ensure key Mission Command nodes and vehicles are fortified against the climate to avoid wild temperature fluctuations, which cripple the sensitive components inside.

In our experience, communications radios require a defrosting process that may take up to an hour – restricting use and capability until the components warm. After turning the radio on, additional time must be allotted for initialization before transmitting or changing frequencies. Internal damage can be inadvertently caused to our electrical equipment due to condensation and rapid cooling caused by the cold external temperatures conflicting with the warmer internal temperatures of the equipment. External components, such as wires and antennas, are not designed to be exposed to severe conditions and will become brittle and break easily in subzero temperatures. We have experienced some success by periodically running vehicles and insulating our radio systems when not in use – often by placing unused garments and insulating materials around these sensitive components.

Sustainment equipment such as water buffalos and portable burner units (Jet Boils) do not escape the effects of subzero temperatures. Water Buffalos are often prone to internal icing (even with the heaters attached and running). The water distribution nozzles are susceptible to freezing in cold weather as they are exposed to the elements. Meanwhile, the portable burner units used by our Field Feeding Teams are not designed to operate in temperatures below -15F due to the risk of equipment failure. This requirement often requires extra heat generation systems to be applied and the Assault Kitchen tents to be warmed to above -15F before starting the burners to ensure our equipment operates effectively.



Forward Observer Teams watching illum. Yukon Training Area, Alaska. (October-November 2020)



Forward Observer Teams support infantry battalion Mortar Qualifications (MORTEPS). Yukon Training Area, Alaska. (October-November 2020)



Forward Observer Teams negotiate extreme climate variances to direct artillery fires to a precise location. Yukon Training Area, Alaska. (April 2021)

Cold Weather Impacts on Maintenance Operations for the Howitzers

Maintenance operations in the winter months of Interior Alaska require an extreme amount of time as our M777A2 battalion is vulnerable to cold weather conditions. Colder temperatures result in the fluctuation of nitrogen levels which decrease, and potentially increase with the temperature. Thus, the nitrogen must be adjusted to account for external temperatures to avoid difficulties with the employment of howitzers in subzero temperatures. Intrinsically, if temperatures drop below -10 degrees F, fluids and gases in the system retract and shrink, creating leaks in seals.

Furthermore, the trunnion pumps frequently experience malfunctions in colder weather, preventing the howitzer from the transition from employed to towable status. Additionally, these temperatures cause vehicle and howitzer batteries to discharge at an increased rate. Commonly, an M777A2 with standard batteries will completely discharge in less than two hours when subjected to temperatures below

-20F if not prepared adequately. Our experience has determined that the howitzers must remain attached to a power generation system to maintain firing capability.

The M777A2 howitzer is extremely sensitive to fluctuating temperatures. If transitioned between warm storage and a frigid environment, condensation will form in the brake fluid reservoirs which freeze essential fluids and prevent the use of the brakes. Currently, the recommended winterization of howitzers at the battery level requires the following equipment across the battalion: 12 x Nitrogen tanks, 7 x Quarts of petroleum-based hydraulic fluid (OHT), 6 x Gallons of brake fluid, and two U6 certified personnel to oversee and complete these intensive and vital tasks. Failing to winterize the howitzers properly places excess strain on the elevation belts, resulting in damage to or snapping of these components. Daily pressure monitoring is required throughout the winter months to prevent damage from the environmental conditions.

Cold Weather Impacts on the Five Requirements for Accurate and Predicted Fire

The Artillery's goal is always to achieve first-round fire for effect. Even fully winterized howitzers will see effects caused by the deep cold at Fort Wainwright. To account for these conditions, we must understand the impact of Arctic conditions on the five requirements for accurate fire.

Regarding firing unit location, employing howitzers from the months of October through April, temperatures can historically drop as low as -70 degrees Fahrenheit. At these subzero temperatures, the ground freezes - complicating emplacement. When combined with the frigid environment, snow and ice accumulations make it nearly impossible to dig in howitzer spades. Without properly dug-in spades, the howitzer is likely to dislocate when fired (a term used to describe the howitzer coming out of position due to not having the stable firing conditions necessary to remain in a consistent location). Any movement of the howitzer has a significant impact on the accuracy of the round. To account for a potential dislodgment of the howitzer requires the Section Chief to maintain and update the howitzer's position through each fire mission.

For target location, when snow and ice accumulations in the target area are unknown, extracting an accurate altitude can be difficult. Without a precise target altitude, we risk missing the intended target.

The cold temperatures also result in cold-tube and cold-propellant situations, further reducing muzzle velocity and affecting the firing range. The cannon tube will warm up as it is exercised, but variations in muzzle velocity must be accounted for. If the howitzers stop firing for a short time, the muzzle velocity will once again replicate the conditions of a cold tube. Additionally, improper storage of propellants will cause ice crystals to form within the powder, further degrading the propellant efficiency and affecting the range. In the Arctic, plan for higher charges to account for the effect of cold tubes and cold propellants.

Finally, the drastic transition periods between day and night conditions require MET to be analyzed more frequently to achieve precise fires.

Conclusion

With the identification of prevalent challenges faced in Arctic Field Artillery operations and sustainment, we aim to find resolutions throughout our FY22 training. Currently, one of the greatest assets at our immediate disposal is the knowledge possessed by current and previous Soldiers in the Arctic Field Artillery community – and our international community of Arctic Artillery experts. Through the collection of AARs and collaborative efforts such as this article, we will use that knowledge to our benefit established TTPs, and create new ones. We hope that this article sparks discussion amongst the Field Artillery community and paves

the way for further collaboration to support the Arctic Strategy's future.

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1LT John Devanney, Maintenance Control Officer
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Howitzer crews conduct Cold Weather maintenance and weatherizing. Fort Wainwright, Alaska. (February 2021)





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XM1299 Extended Range Cannon Artillery at the National Training Center 20-10

By CPT Samuel Sutton and MAJ Jeffery Wollenman



In September of 2020, the 1st Infantry Division (1ID) rotated through the National Training Center (NTC) 20-10. It was the first time a Division rotated through as well as a proof of concept was tested regarding the Reinforced Cavalry Squadron (RCS) model. The 1st Division Artillery (DIVARTY) deployed to support 1ID as the Force Field Artillery Headquarters. In addition to their organic Paladin Battalions, 1ID controlled a guest Battalion of M270 Multiple Launch Rocket Systems (MLRS), simulated M777A2 Howitzers, and simulated Extended Range Cannon Artillery (ERCA). Given the physical restrictions on maneuverable space, only one Paladin and one MLRS battalion were present at the NTC, whereas the other Artillery Battalions were simulated from response cells at Fort Irwin Cantonment Area and Fort Riley, Kansas. While this rotation validated Divisional operations in a contested environment, the RCS, and the employment of DIVARTY, the rotation illuminated the effectiveness of a new weapons platform: the ERCA. It demonstrated the profound impact of the ERCA to the Division fight and the promise of renewed supremacy in land-based warfare.

Background On Erca

The XM1299 ERCA is the next artillery platform for the United States Army. Designed by BAE Systems, the ERCA is the next step in modernizing the nation's Field Artillery capabilities against peer adversaries. Still in the prototype stage, the ERCA boasts a longer tube, improved breech, and an autoloader, mounted on the existing M109A7 chassis. The ERCA has demonstrated its ability to fire a round over 65 km to within one meter of a target.² This outclasses the M209A7 and M777A2 Howitzers by more than twice their range. The autoloader is templated to fire 10 rounds a minute sustained, once again eclipsing

any cannon artillery in the arsenal. With its improved range and rate-of-fire, the ERCA shows exceptional potential on paper. However, it is a revolutionary platform of which no current unit or Soldier has experience.

Train-Up to NTC, Employment in DG II & III

During its training trajectory for the NTC 20-10, 1ID conducted three Command Post Exercises (CPXs) called Danger Gauntlet (DG) IV. DG IV was the culminating training event executed at NTC 20-10. The majority of the DIVARTY staff which attended NTC 20-10 executed DGs II and III, which incorporated ERCA into the DIVARTY's task organization. DGs II and III also had similar troop lists as DG IV, including the ERCA, MLRS, Paladin, and M777A2 units. Each of these units was represented by a work cell and executed without realistic constraints and friction such as maintenance or communication. The Paladin and M777A2 Battalions spent much of their time as direct support to the RCS or their organic Brigades, and therefore received positioning guidance and answered Calls for Fire primarily from their parent organization in support of the Division close fight. The ERCA and MLRS Battalions were General Support (GS) to 1ID, therefore they received their positioning guidance from DIVARTY and supported the deep fight: shaping in between the Coordinated Firing Line and the Fire Support Coordination Line.

The 1ID DIVARTY Commander's guidance for planning and fighting his artillery was to "Fight Fires Forward," or employ the GS artillery as far forward as possible to maximize range and then destroy the enemy with large volleys. This translated to the GS Field Artillery Battalions moving rapidly forward just behind the Brigade Combat Teams (BCTs) main elements or

the initial screen line during the counter reconnaissance fight while the BCTs were uncoiling from their Target Audience Analysis. Positioning these Battalions forward ostensibly makes more of the enemy available to shoot. Saturating the enemy artillery and air defense in indirect Fire is a must to ensure the enemies' total annihilation. This clear and simple guidance drove the planning cycles for each of the Danger Gauntlet CPXs and framed the schemes of Fires and Field Artillery Support Plans (FASP) the DIVARTY developed. The DIVARTY staff planned 3x3 km Position Areas for Artillery (PAA) over ground the DIVARTY S2 analyzed as sufficient for cannon cant tolerance. These PAAs covered nearly all the unrestricted terrain in the area of operations, as the staff planned to move frequently. Due to the unfamiliarity with both the ERCA and MLRS platforms and the lack of available doctrine on ERCA, the DIVARTY staff planned both the MLRS and ERCA to use these PAAs interchangeably. Since the guidance was to saturate the enemy in Fires, both Battalions were consolidated in one PAA each and expected to fire significant volumes of Fire. Due to the limitations of the simulation employed in the CPX, ammunition resupply was not well-rehearsed and the resupplies were unbridled by terrain or enemy. This created an unrealistic expectation of ammunition expenditures unconstrained by a controlled supply rate and near-instantaneous Class V resupply. Once the DIVARTY staff received the Fragmentary Order (FRAGORD) stating a realistic Controlled Supply Rate, an updated Maneuver plan, and an enemy long-range artillery threat, they realized their old procedures for fighting deep-shaping battalions was insufficient.

Concept of ERCA Employment in Planning

The DIVARTY staff deployed directly into Forward Operating Base Santa Fe at Fort Irwin with a scheme ready to execute. Upon synchronizing with the MLRS operations team in person for the first time due to COVID-19 and receiving a FRAGORD from 1ID, the staff quickly executed Rapid Decision-Making Process to refine their current concept of Fires. The MLRS' bottom-up refinement on how to best utilize their formation in terms of munitions capabilities and operations area requirements necessitated another look at their employment. Additionally, the tempo of the Division's fight was elevated, requiring more aggressive posturing of GS units forward, which fits the tenet underlined by ATP 3-09.603 Multiple Launch Rocket System (MLRS) Operations and HIMARS Operations. Therefore, the DIVARTY staff reworked the FASP and published a new scheme of Fires.

The new concept for the GS Battalions included redefined roles for each platform. Due to the limitations on ammo received for the rockets, the DIVARTY staff reserved them for planned missions on soft or stationary targets such as air defense or command posts. The traditional combat load for MLRS supporting Corps includes a great number of Army Tactical Missile Systems. Since our Guest Battalion was acting as a Division asset and not a Corps shaping unit, they received the Guided Multiple Launch Rocket System only. The ERCA would serve as the workhorse-prosecuting both counterfire and dynamic targets that required rapid execution. Due to the simulated theatre and situation, VII Corps was the main effort of the United States Army in Europe and therefore received the coveted Bonus MK II Round. While enemy armored forces enjoyed relative safety from indirect Fires in the past, the Bonus MK II Round penetrates armor with a roughly one-for-one round per tank ratio. Simultaneous with these changes, the staff reallocated land for PAAs so that each PAA would be a 4x4 km area. Each of our guest

MLRS' two batteries would receive their Operation Area (OP AREA) and the ERCA would receive one PAA. Though the ATP 3-09.60 maintains a 4x4 km operational area for each platoon, we were unable to provide such a large amount of land. The scheme retained the aggressive "Fires Forward" mentality, however, since the MLRS battalion was truly on-ground and not simulated, they were relegated to on-post land only.

Begin ERCA Employment Actual DG IV

Once the force-on-force portion of NTC 20-10 began, the DIVARTY staff confronted several challenges with the ERCA. First was the initial volume of Fires requested from 1ID was significantly greater than anticipated. Instead of firing around fifty missions a day as in DG II and III, the ERCA was firing over a hundred missions a day split between counterfire, deliberate, dynamic, and Suppression of Enemy Air Defense (SEAD) Fires. Because of this, the DIVARTY and ERCA response cell split the battalion into three PAAs to maximize the space in which each battery could conduct survivability moves. Unfortunately, splitting the ERCA battalion into three separate PAAs greatly diminished responsiveness for battalion massing since the Division Joint Air-Ground Integration Cell had to clear three distinct locations. Therefore, ERCA transitioned from firing Battalion volleys to primarily firing Battery volleys. The DIVARTY reserved massing the ERCA Battalion for enemy Battalion- and Brigade-sized formations which were stationary and justified longer Target Selection Standards. As force-on-force progressed, the great preponderance of Fire missions was sent to the ERCA to service due to its flexibility and responsiveness. The 1ID's Battalions fought a tough close-fight with enemy indirect Fire systems with significant counterfire. The Division's GS Battalions, however, fired with little to no fear of repercussions.

The second challenge effect of the volume of Fires on how each ERCA battery conducted survivabil-

ity moves, managed ammunition and maintained equipment. ERCA's initial survivability criterion was to conduct a survivability move within their PAA after every Fire mission. Due to the volume of Fires, this became untenable with multiple Fire missions queued for each firing battery. Therefore, DIVARTY refined the survivability criteria to conduct survivability moves within their PAA after three to four Fire missions or during any lull in the firing. The Battalion Fire Direction Center (FDC) then managed those moves and reported when they needed to conduct survivability moves. Ammo resupply with the volume of Fires required a daily resupply with forecasting out to 96 hours. We exercised "just in time inventory" at the beginning of the rotation as we adjusted our consumption tables to account for the higher volume of Fires. This was critical to ensuring continuous Fires and was personally managed by the DIVARTY Executive Officer in a daily staff synch. Additionally, maintenance became an issue with the volume of firing for the ERCA. The tube life for the XM 907 is currently templated at 700 rounds with the supercharge propellant firing at max range. Additionally, if the tube temperature reached 350 degrees, then the tube required a mandatory 24 hour period to cool down. The ERCA response cell simulated these constraints by rotating firing batteries and managing their Battalion Fire orders. Despite this management, there were times ERCA sections were down for maintenance for 24 hours to account for tube wear and temperature.

A third challenge was the change in command-support relationships with the ERCA. During one of the lulls in the fighting, our Paladin battalion requested the ERCA provide GS Fires to the RCS to allow the Paladins to reconsolidate, conduct Battalion resupply, and refit operations and then reposition to better support the RCS next zone reconnaissance the following morning. The ERCA BN was able to provide these GS Fires without having to reposition its forces and with no degradation to its deep shaping

Fires. The extraordinary range capabilities of the XM1299 allow for the Battalion to fire into the far northern corridor in the area of operations and shape the deep fight in the central and southern Maneuver corridors of the area of operations simultaneously.

A fourth challenge was the assistance to the Combat Aviation Brigade's (CAB) deep attacks in the form of SEAD. The CAB conducted a period of darkness deep attack nearly every night and consequently submitted a robust request for SEAD every day. The ERCA battalion consistently provided suppression of enemy air defense for these missions. ERCA's munition flexibility allowed for specific rounds per target type as well as last-minute "audible" changes to targets. Having the capability to range up to 70 km to suppress or destroy air defense enabled the CAB to not only expand its attack distance but expand its target SEAD targets to allow for a more comprehensive suppression. Though the DIVARTY staff does not recommend it due to ammunition and planning requirements, the ERCA regularly suppressed or destroyed over a dozen targets for SEAD near simultaneously.

The last challenge of the ERCA was in its fight against the enemy's armor. Of course, the Bonus MK II Round was the key to this challenge, which arguably provided the greatest advantage of the ERCA. While the Bonus MK II Round was reputed to be a revolution, 1ID had yet to utilize this round; simulation or otherwise. This combination of extended range up to 50 km and anti-tank munitions changed the course of the battle. As 1ID moved west and occupied the initial objectives, the enemy received a mechanized brigade of reinforcements and launched a devastating counterattack. The counterattack caused the Division to halt and the GS Battalions to retrograde to more secure PAAs and OP AREAS. This was in anticipation of the roughly 200 (T-90) MS Main Battle Tanks consolidating to attack through the southern mobility corridor. The 1ID quickly identified the force and its supporting air defense assets.

Then, the 1ID cleared all air in the south and sent DIVARTY a single Fire mission targeting this enemy Brigade Tactical Group. The DIVARTY Fire Control Officer directed the ERCA to fire twelve battalion volleys of the Bonus MK II Round. The ensuing Fire mission destroyed 135 T-90s in minutes thus effectively ending the enemy's counterattack and ensuring the initiative remained with 1ID. The ERCA would subsequently destroy the remainder of the T-90s in piecemeal Fire missions using that munition.

Of note was the pairing of the AN/TPQ-Q53 RADAR and the ERCA, which could fire out to the RADAR's maximum sensing range. The enemy medium and light indirect Fires were focused on the close fight with the BCTs and RCS and chose to prioritize those formations over the GS Battalions. Therefore, the DIVARTY's Counterfire became a game of "whack-a-mole," trying to destroy the dispersed medium artillery as quickly as possible to support the BCTs in the close fight. The medium artillery was lower on priority on the High Payoff Target List, but VII Corps shaping effects had been effective at destroying the enemy long-range artillery. Therefore, the ERCA Battalion received minimal counter Battery at its formations and could fire with near impunity in the counter firefight.

Summary and Future Considerations

The ERCA response cell consisted of an FDC, with one AFATDS box operator sending to the simulation operators. This system was not entirely realistic, however, it created enough links in the mission chain to somewhat simulate realistic FDC processing times. Since the platform will come equipped with an autoloader, the unrealistic mission times could be near accurate. Therefore, the value of the experiences and knowledge learned from the ERCA during the rotation shouldn't be discounted completely due to simulations.

The XM1299 ERCA dominated the battlefield during NTC Rotation 20-10. Positioned just behind Maneuver forces to fire forward, the ERCA

had ample range in which to Fire missions, providing extraordinary responsiveness when Division acquired targets. The very nature of cannon artillery enables munition flexibility, as the round only needs to be on hand and not pre-loaded. This platform destroyed tanks, artillery, electronic warfare assets, and air defense with lethal efficiency. Furthermore, the ERCA can easily assist in the close fight for GS relationships when needed; the platform will not need to relocate to range. The fundamentals of the cannon propellant allow for flexibility on short or longer ranges.

The ERCA is capable of firing roughly 70 km, but that would ostensibly require a full load of supercharges. The wear from such a propellant load will rapidly degrade a tube if combined with the ability to shoot far and with an autoloader. ERCA units will need to be able to rapidly replace tubes due to excessive wear. They may need to even have the Forward Support Companies (FSC) carry them to switch out as quickly as possible, which would need to be a priority training objective for those FSC Commanders.

The extended tube and range of the ERCA does raise a few concerns. Is the XM1299 ERCA capable of direct Fire on encroaching enemies? Though it is preferable to avoid the situation, direct Fire has saved countless Artillerymen. If it is still possible, then Battery Commanders should ensure sufficient space between sections to enable direct Fire when applicable.

Communications are the other main concern. The ERCA can fire at such long ranges that traditional FM communications are potentially insufficient. The ERCA command posts were regularly located in mountainous areas 30 km or more from our nearest command post during NTC Rotation 20-10. ERCA Battery and Battalion FDCs should come equipped with both high-frequency radio and Warfighter Information Network-Tactical (WIN-T). The ERCAs must also have sufficient Joint Battle Command Platform coverage throughout the formation. While high-frequency has a slight lag time for transmission,

WIN-T requires adequate satellite coverage. Both options, however, are preferable to setting up an OE-254/GRC Antenna Group at each occupation.

The XM1299 ERCA is the future King of Battle. The platform's flexibility, adaptability, range, and lethality ensure its dominance in the indirect Fires domain. Developing clear and effective targeting in conjunction with flexible air and ground clearance procedures for ERCA will result in devastating effects on the battlefield. Doctrine should be unique and carefully crafted through numerous large-scale exercises for the ERCA. Simultaneously, the Army must maintain the MK2 Bonus round or an equivalent to enable dominance against armored threats. In near-peer or peer adversaries, air superiority is not guaranteed. Allowing the ERCA space and time to work will repay all investment with interest, and victory.

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ATP 3-09.60, 4-12

JWA_Inc2_LRP_CFT_Capability Baseball Card

Current Weapons of the U.S. Army Field Artillery



Left Column:

M119A3 105 mm light towed howitzer

M777A2 (Triple-7) 155 mm medium towed howitzer

M109A7 (Paladin) 155 mm self-propelled howitzer



Right Column:

M142 (HIMARS) High Mobility Rocket Artillery System

M270A1 (MLRS) Multiple Launch Rocket System

Photo credits: U.S. Army



Extended Range Cannon Artillery, or ERCA, will be an improvement to the latest version of the Paladin self-propelled howitzer that provides indirect fires for the brigade combat team and division-level fight. Building on mobility upgrades, ERCA will increase the lethality of self-propelled howitzers. ERCA provides a "10x" capability through a combination of an increased range, increased rate of fire, increased lethality, increased reliability and a greater survivability. Photo by Edward Lopez, 2018



How the Commandant's Planning Guidance will impact the future of Marine Artillery



By Capt. Rory Mikita

Last year Marines from 5th Battalion 11th Marines departed for their inaugural Western Pacific (WESTPAC) deployment 21-1 with the 15th Marine Expeditionary Unit (MEU). This would be the first time that a High Mobility Artillery Rocket System (HIMARS) Detachment would be attached to the 15th MEU and embarked on Navy vessels for more than eight months. This deployment increased the operational ability of the 15th MEU by providing surface to surface long range precision fires to multiple combatant commanders as it traveled through the INDOPACOM, AFRICOM and CENTCOM areas of responsibility. The deployment also aided in the Commandant of the Marine Corp's vision of Naval Integration (Berger, 2019) and provided experimentation that helped identify future requirements of Marine Artillery that need to be addressed to achieve this vision.

HIMARS is not a new system within the Marine Corps and has been in use since 2008, deploying to support Operation Iraqi Freedom and Operation Enduring Freedom in Afghanistan on numerous occasions. However HIMARS units were previously unable to support the deployed mission of the Marine Corps as part of a Marine Expeditionary Unit deployment. This was due to the large size of the rocket pods not fitting within Navy L-Class ship ammunition magazines. However this issue was recently resolved and led to the first WESTPAC deployment in November of 2021. In May of 2021 the 24th MEU became the first East Coast MEU to deploy with a HIMARS detachment. A dif-

ferent strategy was used with the 24th MEU, the HIMARS unit was not embarked on to the ships but instead was tethered to the KC-130's and forward deployed to support operations (Cochran, 2021). The recent demands for HIMARS units within the Marine Corps is certainly a result of the Commandants Planning Guidance 2019 and Force Design 2030, as commanders are now eager to use this capability and beginning to understand how this weapon system will become a focal point in the emergent Marine Littoral Regiment.

During the WESTPAC 21-1 deployment the HIMARS Detachment participated in several exercises that tested the current capabilities of rocket artillery both in a MAGTF and in large scale joint operations. The HIMARS detachment showed versatility in employment through operating from ship to shore via Landing Craft Air Cushion and conducting missions via air and the MEU's KC-130. Current rocket artillery procedures are relatively familiar within the Marine Air Ground Task Force (MAGTF) as many officers have experience working with HIMARS during the conflicts in Iraq and Afghanistan and made for mostly smooth operations, even on the first deployment of its kind. These exercises culminated at the end of the deployment when the 15th MEU would participate in Exercise Northern Edge 2021 and Marine rocket artillery would effectively integrate into a Joint War at Sea scenario and Joint Air War scenario. These scenarios showed that current rocket artillery long range munitions and future munitions

with greater ranges are deeply tied into joint warfare. Target acquisition sensors used to identify deep targets were heavily dependent on joint capabilities and the coordination and deconfliction used to execute these strikes also depended on the joint force. Overall this deployment validated the MEU's ability to provide long range precision fires to anywhere in the world at a moment's notice.

During these exercises future capabilities were also tested on several occasions. Testing for the Marine Littoral Regiment (MLR) on the construction and the Task Organization & Equipment (TO&E) of a NEMESIS Platoon and or a Fires Expeditionary Advanced Base (EAB) was conducted in order to identify personnel and equipment shortfalls. This testing showed that in order to meet the requirement of a small agile force persisting inside of an adversaries weapons engagement zone, Marine Artillery must begin to do more with less, a reduction in personnel and equipment would need to be made. Marines who were versatile were the key to achieving this, Marines who had multiple licenses in vehicles but also maintained the ability to perform a primary role such as Communications and Fire Direction played an important part in achieving a smaller lighter footprint. Also in completing this new mission set Marine artillery units needed to be augmented by several other units in the MAGTF such as Infantry, Low Altitude Air Defense, Direct Air Support Center and Intelligence Marines. Combining these units caused minor friction as many had never trained together,

however when the MLR stands up I see this problem being resolved quickly.

The most important capability that was tested during this time were the rehearsals involving maritime strike kill-chains in which the HIMARS Det prosecuted targets at sea. This could possibly be the primary mission of many Marine artillery units very soon and the Marines and Navy are still in the infancy of conducting this procedure. These rehearsal were done on numerous occasions and helped the Marine Corps and Navy gain a better understanding of how to conduct these strikes. Much work is still needed in this area as many Sailors and Marines are unfamiliar and things such as a shared vocabulary would have greatly benefited both parties.

So what does The Commandants Planning Guidance and this deployment mean for the future of Marine artillery? As the Marine Corps starts to build itself into “One force that will be optimized for naval expedi-

tionary warfare in contested spaces, purpose built to facilitate sea denial and assured access in support of the fleets”(Berger, 2019) Marine artillery needs to understand how its role will inevitably shift and begin to take the necessary steps to better understand how we can facilitate this requirement.

The mission of sea control and sea denial is a very new concept for Marine artillery and one that is still not fully understood by the vast majority of its officer corps many of whom in a relatively short time may be tasked with completing this mission. While certain Tactics, Techniques and Procedures (TTP's) from traditional artillery will carry over, many new TTP's will need to be created. First, who we are supporting, in this mission we are no longer supporting the infantry maneuver commander, we are presumably supporting Fleet Commanders, Strike Group Commanders or designated Composite Warfare Commander. We must begin to establish the same liaison relationships that

a battalion or regimental Fire Support Officer (FSO) would have with their supporting commander. These FSO's must have complete understanding of how the Navy conducts maritime strikes and a shared vocabulary to effectively integrate. Over decades conventional artillery has been standardized into concise verbiage and practices that make for timely and accurate fires. We must look to achieve the same level of standardization through new and innovative doctrine with the Navy in order to accomplish this new mission. Marine FSO's will also need to be knowledgeable of the maritime targets they will be facing in order to achieve desired effects. These targets and their attributes are far different then the traditional ground targets and information such as speed and missile defense capability, are major factors in weaponeering for these targets. FSO's must have an understanding of the advanced long range sensors and communications equipment used in identifying these targets



U.S. Marine Corps shifting to more High Mobility Artillery Rocket Systems to enhance interoperability by training in complex, multi-domain operations scenarios that address the full range of Indo-Pacific security concerns. (U.S. Marine Corps photo)

U.S. Marine Corps High Mobility Artillery Rocket Systems on 5.21.21 15th Marine Expeditionary Unit's Western Pacific 21-1 deployment. Image by Lance Cpl. Mackenzie Binion, Cpl. Patrick Crosley, Sgt. Desiree D King, Staff Sgt. Kassie McDole, Lance Cpl. Brendan Mullin, Cpl. Britany Rowlett and Sgt. Sarah Stegall.



and experience working with them. Finally FSO's will need to be able to use all this information to coordinate the effects from multiple fire support assets not just HIMARS and ROGUE, but also Airforce and Navy assets to overwhelm possible missile defense systems.

I believe there will always be a role for Marine artillery providing direct support fires to ground based maneuver. However the new role Marine artillery is preparing for will need to be seen as just as important and given the same level of attention that our traditional role has received. The proposed force design changes to the artillery TO&E to predominately rocket artillery units with anti-ship capabilities will have major impacts on how we train our Marines, most notably how we train artillery officers. I have no doubt that the enlisted Marines will learn to perform their duties on these new weapons systems to an extremely high level but their performance can easily be undermined if the officer corps is not effective in adapting to this new role. The Marine Littoral Regiment proposed stand up date of early FY22 (Shelbourne, 2021) is just around the corner and the development of the NEMSIS program is moving

exceedingly fast. Marine artillery needs to look towards the future and how it will be incorporated into the Marine Littoral Regiment, what mission sets they will be fulfilling, and what we can do to prepare our Marines for operating in this environment. Once the MLR is established many Marine artillery officers will be required to support this as either Platoon Commanders, Fire Direction Officers or both, it is imperative that they receive the training to succeed in these roles.

In the early days of World War II many nations had the same weapons, communications equipment, tanks, planes and vehicles. However the German's ability to effectively integrate these into combined arms tactics, was instrumental in their decisive action against many nations early on in the war. We are preparing for similar circumstances, when we face not a near peer but a peer rival, with many if not all of the same technologies and capabilities. We must start working towards how we will implement new technologies such as the NEMSIS with new formations such as the MLR to support new mission sets such as sea denial. This must be repeatedly tested and refined in order to develop the tactics, training and doctrine needed to effectively

accomplish this mission. The era of Marine rocket artillery is beginning to take shape and is moving at an unprecedented speed, the Commandants quick and unexpected divestment in tanks shows just how fast change can occur and Marine artillery must be ready for this.

About the Author:

Captain Mikita enlisted in the Marines in 2007, commissioned in 2016 and has served in roles from Cannoneer to Battery Executive Officer. His last assignment was as the Detachment Commander for the HIMARS Detachment, 15th Marine Expeditionary Unit. He is now assigned to the Marine Artillery Detachment, Ft. Sill Oklahoma.

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MODERNIZING DANGER CLOSE FOR 21ST CENTURY COMBAT

BY MAJ JORDAN M. FUNDERBURK

The Field Artillery must remain prepared to deliver close supporting Fires in future combat. The U.S. Army's development of long-range precision Fires will increase the capabilities of artillery to strike deep, but ground forces will still close with the enemy. At the front line, warfighters depend upon timely and effective Firepower to defeat their adversaries. Today, Fire missions in close proximity to friendly troops are designated "danger close" within the call for Fire. Generations of fire supporters equate danger close to a target distanced 600 meters or less from friendly troops, no matter the circumstances. However, technological advancements have made the distance of 600 meters an arbitrary line. It is time for the Field Artillery to modernize both the definition and procedures behind a danger close mission to match the realities of modern capabilities and facilitate timely and effective firepower on the front lines.

HOW WE GOT HERE

The U.S. Army first used the phrase "danger close" in 1967, introduced within FM 6-40, Field Artillery Cannon Gunnery. Yet the story of how the term, procedures, and associated distance entered Army doctrine goes back to the American experience in World War I. In 1918, the U.S. Army published the manual *Instructions on Artillery Fire*, which instructed gunners to adjust aim-points and reduce changes to tube elevation if the target was close to friendly troops. The manual reflected the close coordination seen in World War I between infantry advances and rolling barrages of artillery Fires just ahead of the troops. Following the war, the U.S. Army's artillery doctrine refined these tactics. The 1932 *Field Artillery Field Manual* dictated standing barrages stay 200 to 400 yards ahead of the front line. The manual also added

instructions to constantly check the setting and laying of the guns when firing close to friendly troops.

World War II spurred further refinement of definitions and procedures for Fires close to friendly troops. The 1945 version of FM 6-40, *Field Artillery Gunnery*, introduced the concept of creeping adjustments and the terms "close" and "deep." The manual required observers to classify missions as close or deep for naval gunfire but left it optional for ground artillery. Close was any target within 600 yards of friendly forward elements. The naval guns had varied dispersion patterns, with ships using five and six-inch guns for targets in close support of advancing troops. Thus, the Field Artillery adopted its definition from naval gunfire practices.

It was the American experience in Vietnam that provided the final impetus to explicitly adopt danger close into Field Artillery doctrine. U.S. Army doctrine before the war saw few changes besides verbiage and updating the distance measurement from yards to meters. However, as the U.S. Army saw increasingly intense combat in Vietnam, the Field Artillery doctrine evolved to acknowledge the frequency of close supporting Fires. An article in the August 1967 magazine *Artillery Trends* claimed that the 1st Cavalry Division fired up to 50% of all their missions toward friendly troops or into an area virtually surrounded by converging forces. The 1967 version of FM 6-40, covering both gunnery and Fire support, introduced the term danger close and mandated the term's use in ground artillery Fire missions. FM 6-40 also required the Fire Direction Center (FDC) to provide the Probable Error in Range (PER) to the observer. By the 1970s, artillery doctrine further refined the concept by providing different danger close distances for

mortars and naval gunfire, requiring the use of the gunner's quadrant on the gunline, necessitating creeping Fires in adjustment, and recommending delay fuzes.

WHERE DOCTRINE STANDS TODAY

With traditions rooted in naval gunfire support and the U.S. combat experiences in Vietnam, the Field Artillery's use and definition of danger close has remained largely unchanged for the past half-century. Computerized fire missions and advanced munitions have not spurred an update to the legacy definitions and procedures. Meanwhile, call for Fire procedures have become antiquated and convoluted over time.

The term danger close has a range of definitions across Joint and Army doctrine. ATP 3-09.30, *Observed Fires*, defines it as, "the method of engagement when the target is (or rounds will impact) within 600 meters of any friendly troops for mortars and artillery, 750 meters for 5-inch naval guns and Tomahawk Land Attack Missile." Slightly different definitions appear in ATP 3-09.23 *Field Artillery Cannon Battalion*, ATP 3-09.32 *JFIRE: Multi-Service Tactics, Techniques, and Procedures for Joint Application of Firepower*, and in JP 3-09.3 *Close Air Support*.

Additional definitions for rotary and fixed-wing Fires, and related terminology such as Risk Estimate Distances (REDs) confuse the situation further. ATP 3-09.32 *JFIRE* defines danger close for air-to-surface munitions as not a common distance for all, but instead as the number of meters for 0.1 percent Probability of Incapacitation (PI) for each specific munition. In other words, these platforms define danger close by the specific munition to account for the complicated differences amongst today's munitions. Referred to as REDs, these distances

are also listed for all artillery platforms and most munitions. As a familiar tool to most observers, REDs provide a more comprehensive assessment of risk in close Fires and may provide an adoptable solution.

Danger close procedures are not contained within one publication or concretely explained. ATP 3-09.30 contains two procedural requirements. The first requirement is for the requestor to announce "danger close" in the call for Fire when the target or expected round impact is within 600 meters of any friendly troops. Additionally, if the target or friendly troops move and are no longer within 600 meters, the requestor must transmit "cancel danger close." The second requirement is the requestor must adjust using the creeping Fire method. This method allows adjustments of only 100 meters or less and directs the observer to walk the rounds closer towards the target, avoiding large range corrections.

Various manuals contain additional procedures, which are not explicitly required. The first is the Fire Command, Use Gunner's Quadrant, found in TC 3-09.81, Field Artillery Manual Cannon Gunnery. The manual instructs the FDC to announce the command "when the FDC desires the gunner's quadrant be used to set or check quadrant elevation. This is more often used when firing danger close or precision fire missions, which require greater accuracy." The second additional procedure is found in ATP 3-09.23, Field Artillery Cannon Battalion, and states, "Whenever possible, the most accurate weapon system and shell, fuze, and charge combination should be used for danger close situations." Finally, ATP 3-09.30 provides an example transmission of a danger close call for fire where the observer requests a delay fuze setting. While not explained elsewhere in the publication, this suggests a technique of weaponeering specifically for danger close missions. The use of a delay fuze would slightly bury the round into the surface before detonation, thus reducing the explosive effects.

Some U.S. Allies have recognized the need for modernized danger close doctrine. Both the British and

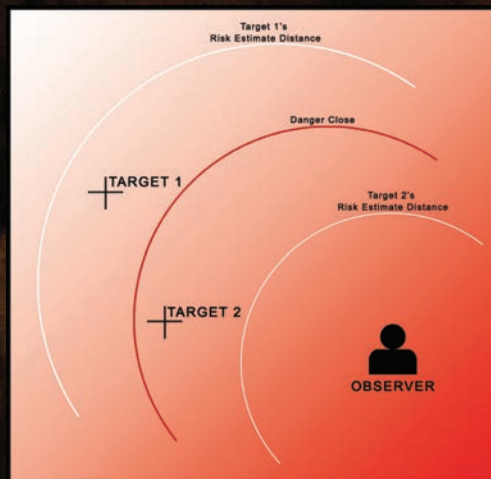
Canadian armies developed danger close definitions and procedures to more accurately assess which Fire missions pose a hazard to friendly troops. In doing so, both the observer and ground force commander have a greater understanding of the risk involved in every unique mission fired close to troops. While differing in specifics, both nations expand the concept beyond an arbitrary distance in meters. Observers or Fire Direction Centers calculate danger close based upon several factors, such as gun-target line and Angle T, PEr, PI at various percentages, range-to-target, and the degree of protection of friendly troops. Important distinctions within the methods are the balance between simplicity and shared understanding, risk responsibility, and duties of involved personnel. Both the British and Canadian methods provide a useful guide towards updating U.S. danger close doctrine.

TODAY'S CLOSE SUPPORTING FIRES

The need for change is evident. While artillery Fire posed increased risk at 600 meters in 1945, then 75 years of modernization forces a reframing of the risk. When viewed from the frame of the five requirements for accurate predicted Fires, the Field Artillery has both lowered and raised the risk for fire missions within 600 meters of friendly troops. Technologies and techniques, such as global positioning systems, laser rangefinders, and meteorological modeling have increased accuracy since danger close was last defined. Still, other advancements, such as rocket-assisted projectiles, have increased risk to troops within 600 meters of the target. Are 600 meters enough to correctly warn observers and commanders of the risk to troops when firing either a rocket-assisted 155 mm round at max range or an Excalibur round?

With three calibers of artillery in the arsenal and numerous munition types, the Field Artillery must distinguish the significant differences amongst them. A broad definition of danger close would cover most munitions but unnecessarily delay fire missions for more accurate or smaller munitions. A firing unit may also experience a "boy who

cried wolf" scenario where every mission becomes labeled as danger close, so cautionary procedures are gradually ignored. Consider combat in dense urban terrain, where 600 meters from the front line is the deep area. Here, all close supporting Fires would be labeled danger close, thus dulling the urgency and warning behind the term. On the other hand, a narrow definition of danger close would expedite fire missions but leave observers, commanders, and firing units unaware of the increased risk of a mission. An infantry platoon leader firing 155 mm rocket-assisted projectiles one kilometer from his position may be unaware of the risk he is assuming. Any changes to the danger close doctrine must consider the entire fire support system and the range of environmental variables.



Target 1 is greater than 600 meters from the observer but less than the munition's Risk Estimate Distance. In this scenario, there is an increased risk of fratricide, but the observer will not announce danger close.

Target 2 is less than 600 meters from the observer but greater than the munition's Risk Estimate Distance. In this scenario, the fire mission may not pose an increased risk, but the observer will still announce danger close. This announcement will show the firing unit's processing of the mission.

SOLUTIONS

Potential updates to the danger close doctrine should consider three questions. First, is 600 meters the correct distance that artillery Fires produce increased risk? Second, do the proposed gunline and observer procedures enable a shared understanding of the risk? And third, do the current procedures decrease the risk to friendly troops? Changes to doctrine should also consider three criteria. First, simplicity – the pro

cedures must be sensible, reasonable, and memorable for both forward observers and combat troops likely to call for fire. Second, protection – the procedures must trade any delays to fire mission times for valuable protection of the friendly force. Finally, comprehensiveness – the procedures must encompass digital and degraded capabilities, varying intensities of combat, joint and multinational interoperability, and factors of the operational environment such as terrain.

The concept underpinning the term danger close remains valid and should remain as a definition – danger close is a warning to friendly troops of the increased risk from particular fire missions. However, the conditions defined whereupon a fire mission produces increased risk need adjustment. Six hundred meters is not the universal line where all rounds suddenly have increased risk, and unnecessary delays in mission processing or misunderstanding of risk could have catastrophic consequences.

The first option is to change the definition from 600 meters to a different distance from friendly troops. A distance of 400 meters would reflect improvements in the Five Requirements for Accurate Predicted Fire and align closer to historic close combat engagement ranges. Unfortunately, while this answer is the simplest, no universal distance will comprehensively cover every munition available today.

The second option is to adopt observer and FDC calculations similar to the British or Canadian methods. The definition would change from 600 meters to an “it depends.” While this option is fully comprehensive and offers the most protection via shared understanding, the option is the least simple. Instead, these advanced procedures and calculations should perhaps be offered as an addendum for special situations and a shared understanding of risk.

The final option is to adopt the approach used with air-to-surface Fires and define danger close by the RED of face Fires and define danger close by the RED of each munition. This option presents the best

balance of simplicity, protection, and comprehensiveness. Similar to the air-to-surface munitions in ATP 3-09.32, each Howitzer and rocket platform would list every munition available and the associated 0.1 percent PI, which would equate to danger close for that munition. Artillery REDs also capture a generalized accounting of PEr, since each RED is given for various ranges. In addition to specifying all munitions not currently listed in ATP 3-09.32, observers would also benefit from listing additional PI percentages.

The Field Artillery should also update procedures required during a danger close mission to protect troops and remove ambiguity. The imperative for timely and accurate Fires is high, and clear doctrine will particularly reduce risk when units fire danger close missions without a habitual relationship to the friendly troops in danger. The two current procedures should remain in doctrine – both the requirement to announce danger close in the call for fire and the creeping method of adjustment in 100-meter increments. Drawing from the 1967 FM 6-40 and allied forces techniques, today’s doctrine should require FDCs to provide the PEr and the gun-target line in the Message to Observer, however if it’s a precision munition, the circular error probable could be transmitted. Both of these actions will increase shared understanding between the observer and FDC, remind the observer of critical factors to consider when assessing risk, and compel the FDC to consider risk mitigations during a danger close mission. Lastly, the Field Artillery should clarify if an observer can assess and accept the risk of a danger close mission, or if the ground force Commander must approve each mission. Since the proposed definitional change draws from the air-to-surface munitions concept, which requires transmission of ground force Commander initials, confusion may increase.

The firing battery needs clear procedures for danger close missions. TC 3-09.81 should again require the gunner’s quadrant to be used during degraded danger close missions gunner’s quadrant to be used

during degraded danger close missions instead of only mentioning the option. For digital missions, Howitzer section chiefs should also check elevation to the tenth of a mil. Finally, specific weaponeering options to reduce risk to friendly troops should be explained. ATP 3-09.23 offers a detailed explanation of considerations for danger close missions, but no manual describes technical and tactical fire direction options. Based on historical doctrine, a few techniques include: firing delay fuzes in adjustment to reduce explosive effects, firing precision fuzes or munitions, and selecting a lower charge to increase the angle of fall. Clear procedures, which are the same across all Field Artillery doctrine, will speed mission processing and increase protection to friendly troops.

CONCLUSION

The Field Artillery holds a proud tradition of delivering timely and accurate Fires to Soldiers in close combat. Danger close, as a concept and procedure, grew from this heritage and remains in our doctrine today. However, technological advancements have outpaced the concept’s relevance. The arbitrary distance of 600 meters works for neither GPS-guided rounds nor unguided munitions fired at max range. Without fixing the doctrinal definition or procedures, future Soldiers may misunderstand the underlying risk of a fire mission, resulting in catastrophic consequences. The best answer is adopting each munition’s REDs as the basis for a new danger close definition and updating the procedures for modern warfare. This option reinforces the importance of a common understanding of risk between the troops in contact and the firing unit while creating a robust doctrine to facilitate safe, timely, and effective Fires.

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1-2nd SBCT and 5th SFAB leaders finalize coordination for combined operations at JRTC rotation 21-02 at Fort Polk, Louisiana.

A LOOK IN THE MIRROR: FIRE SUPPORT AS A PARTNERED FORCE

By MAJ Trevor Williams

Our American military has grown accustomed to having the resources, authorities, and planning priorities to bring our world-class assets to bear at the time and place of our choosing. However, we must train to fight without the luxury of a myriad of resources seemingly on call when preparing for future conflict. To defeat a near-peer adversary, the U.S. will surely do so as part of a larger force, applying and merging the 2018 National Defense Strategy pillars of increased lethality through strong alliances and partnerships. This article will highlight methods in which the Fires community can improve aggregate operational lethality through efforts to incorporate international partners into our tactical processes. We must endeavor to build comprehensive force capability through combined targeting efforts, delivery synchronization, and dynamic coordination to fully leverage multinational contributions.

During the 1-2nd Stryker Brigade Combat Team's (SBCT) "Ghost" Joint Readiness Training Center (JRTC) rotation in November of 2020, the Brigade played the role of a foreign nation's Army in support of 5th Security Force Assistance Brigade's (SFAB) training from the competition through conflict. SFAB training objectives specific to Fires included efforts to "plan and synchronize Fires through a Brigade-level targeting process" and "synchronize timely and accurate Fires." This presented the BCT's Fire Support Element (FSE) with a unique opportunity to conduct targeting and Fire support from an unfamiliar perspective of planning and fighting without all of our common collection and delivery assets. Further, the experience illuminated Fire support procedures that allowed us to better understand how we might fight in future Large-Scale Combat Operations as part of a collective force. Through

transition into conflict with a near-peer adversary, BCT level targeting, detection, delivery of Fires, and assessments must embrace combined force capabilities.

The operating environment of this JRTC scenario was fascinating because it condensed the competition timeline to approximately one week, then transitioned directly into the conflict. At the outset, the BCT and SFAB teams faced threats from a Northern conventional military poised on the border, with Islamic and communist insurgencies in the Area of Operations. Then, the invasion from the Northern border instigated force-on-force operations against a near-peer adversary. Unlike other Combat Training Center rotations, this scenario offered both the SFAB and the BCT the opportunity to set conditions for combined operations through relationship building and synchronization.

The 1-2nd SBCT entered the rotation at a higher readiness level

than many of the future military partners the SFAB might encounter. Accordingly, during the competition phase of the rotation, the BCT and SFAB conducted separate targeting cycles because the units had different objectives. Playing the role of a host nation forces in competition with an insurgency, the BCT focused non-lethal targeting on building relations with regional security forces, growing rapport with the spheres of influence, and understanding the human dynamic of the operating environment. Meanwhile, the SFAB targeted systems and individuals to best support host nation activities to undermine conventional threat actions. In this phase, our organizations worked to develop processes to build synchronization in the form of a shared set of targeting priorities.

Combined targeting

When competition transitioned to conflict, both organizations quickly concluded that parallel targeting was ineffective. Working through two different decision cycles with varied asset priorities creates unnecessary friction with partnered forces. The targeting cycles required complimentary priorities to ensure both forces worked towards the same end state of defeating conventional enemy forces while maximizing the effectiveness of finite resources. Through united targeting working groups, our teams established targeting guidance and priorities, synchronized the Intelligence Collection (IC) plan, and determined the best means of delivery from our respective organic and Echelons above Brigade (EAB) assets.

Next, the BCT and SFAB arranged both battle rhythms to ensure both Commanders were available for nightly target decision boards to make informed decisions according to each nation's operations over the next 72 hours. As part of a larger fighting force, the targeting battle rhythms should avoid nesting or parallel planning; they should be unified and comprehensive beginning in competition. This lesson learned could be extraordinarily valuable in future operations

because it produced transparency across both teams that seemingly increased our lethal efficiency. Merging targeting cycles seems like a fairly easy accomplishment, but it does not come without friction. Developing partnered nation capacity comes with the burden of foreign disclosure and operational security concerns that create risk for Commanders. We must consider this challenge while providing actionable intelligence without over-classifying information due to risk aversion. Intelligence, operations, and asset allocation must be fully synchronized within any good targeting cycle. As a trained and lethal American formation, the BCT is familiar with owning the collection and delivery platforms within a 72-hour cycle. However, in this scenario, the 1-2nd SBCT intelligence and Fires warfighting functions experienced the challenge our partners and allies often face: making recommendations and decisions based on requests to utilize another nation's resources according to an incomplete intelligence picture.

BCT and SFAB formations operating with partnered militaries must identify Foreign Disclosure Representatives (FDR) to limit concerns of untimely and incomplete intelligence pictures that inhibit friendly forces' ability to act. Further, these FDRs must have streamlined access to Foreign Disclosure Officers that can rapidly process requests to provide the right information at the speed of relevance. In this JRTC scenario, operations and Fires relied on shared workspaces to conduct targeting with matching digital systems classifications. SFAB classified intelligence production occurred in a separate location as a protective security measure. Nevertheless, this gap created a level of uncertainty because of the lack of complete information available.

The BCT FSE and IC teams accounted for the information gaps with refined processes to ensure we requested capabilities and effects rather than specific systems to best advocate for resources. We found more success in requesting support from the SFAB through specific tasks and purposes with flexible

timing due to our lower resourcing priority. The impact on Fire support came in the form of almost strictly conditions-based triggers vice timed triggers because we controlled neither the timing nor the fulfillment of our asset requests. This required the IC and Fires teams to coordinate layered plans dependent first on our organic mortars and M777A2 Howitzer with the ability to upgrade our lethality through high-end SFAB resourced collection platforms and long-range delivery assets such as General Support (GS) HIMARS and air interdiction sorties. For example, during their counterattack, the BCT requested armed Intelligence, Surveillance, Reconnaissance (ISR) in the deep area. Unfortunately, due to other priorities, the ISR we received was unarmed and the BCT had to shift to other organic delivery systems to take advantage of the SFAB's available IC platform. Thus, future Brigade-level partnered operations must be very specific about the assets available during targeting working groups to limit the risk of unrealistic expectations.

Delivery synchronization

The SFAB and BCT conducted parallel Joint Fires planning early in the rotation, which did not lend itself to quality synchronization during execution. Future SFAB and BCT operations in a combined operational environment must commit early to unified planning efforts. The separation of defined organizational target responsibility became critical to efficient target prosecution. Once the rotation moved from competition to conflict, the BCT and SFAB identified the need to fight off of one mutual High Payoff Target List (HPTL) vice separate targeting priorities that would de-synchronize dynamic activity between both nations' Fire support elements.

The lethal arm to this agreement came in the form of a deliberately agreed-upon Attack Guidance Matrix (AGM). While non-standard, our combined AGM went a step further than identifying specific delivery weapon systems paired with defined HPTL targets; we outlined distinct delivery responsibility according to each nation's system

capabilities. Specifically, both the BCT and SFAB agreed that the SFAB would target Air Defense Artillery and conventional long-range artillery targets in the deep area, with the BCT engaging target categories such as command and control and maneuver in the close area. This extra level of detail produced efficiency in dynamic Fire mission processing; our organic BCT cannons and mortars were unable to prosecute deeper targets that defaulted directly to SFAB resourced GS HIMARS. Our united efforts to streamline information flow capitalized on matching Named Areas of Interest and High-Value Target code names that we lacked during the counterinsurgency-focused competition phase of the rotation. Synchronized and complimentary target detection and prosecution generated confidence in the SFAB and BCT partnership. This effort can drive teamwork within future multi-national operations.

Both organizations agreed upon graphic control and Fire support coordination measures to synchronize operations and avoid international fratricide. As part of typical BCT operations, we built the framework of battlefield geometries to ensure permissive Fires while simultaneously protecting our forces with Critical Friendly Zones and No Fire Areas. Additionally, the use of Common Sensor Boundaries expedited the delivery of counter-Fire from host and partner nations. Once the FSE completed target list worksheets, the BCT shared these "fighting products" with our SFAB counterparts before and after our technical rehearsals. After reflecting on the rotation, it would have been more effective to include SFAB advisors in the technical rehearsals to gain an understanding of the effects our organic indirect Fires would achieve.

Working with another military organization requires a constant push and pull of information to ensure all products, coordination measures, and graphics are accurate at any given time. This thought lends itself to a significant point for the success of future Fires integration with partnered forces: Liaison Offi-

cers (LNO) with the right tools, authorities and communications platforms are essential in both forces' operations centers. As our Brigade Fire Support Element and the SFAB accumulated lethality, we worked through various options of a combined Tactical Operations Center (TOC), LNOs in companion TOCs, and a hybrid of separate TOCs and a shared fusion cell.

This rotation proved that the most effective and efficient manner to create desired Fires effects on the battlefield came in the form of a combined fusion cell. As our rotation moved from a deliberate defense to a counter-attack, the teams jumped TOC locations to best control operations. To synchronize processes, including IC and Fire support, the SFAB and 1-2nd SBCT both operated separate TOCs with SFAB advisors embedded in the BCT TOC to act as LNOs and communicate with collection and delivery assets. Our teams constructed a small fusion cell to provide an additional synchronization node. As we prepare to leverage Fire support with future partnered militaries, U.S. forces must carefully consider the use of a fusion cell as well as choosing the right leaders to serve in the LNO package. This two to a four-person team must have the operational knowledge and interpersonal skills to advocate for their Commander's equities within a diverse staff. Using the BCT/SFAB operational framework, the LNO package should include a Fires or intelligence leader who can speak to asset availability and articulate capability. They must also possess the digital systems and requisite skills to provide 24-hour intelligence and resourcing feedback.

Dynamic coordination

Brigade-level dynamic Fire mission execution coordinated with the SFAB drove lethal effects in support of maneuver elements during the JRTC rotation. The requirements for a combined Common Operations Picture (COP) and secure communications medium became essential components to dynamic coordination between our partnered forces. Battle tracking is one of the most

important jobs of a Fire supporter; this task became quite complicated in this scenario construct because our BCT FSE conducted air and ground clearance with forces outside of our organization and typical communications architecture.

At the outset of our rotation, SFAB rotary-wing movement through the battlespace congested gun-target lines due to the BCT's lack of direct communications with pilots due to the scenario of multi-national operations. Joint airspace management typically creates confusion and risk due to a lack of real-time situational awareness. To remedy this gap, the SFAB and BCT aviation elements coordinated air corridors and communications at multiple echelons to ensure both organizations had an understanding of rotary-wing locations. The SFAB retained positive control of rotary-wing assets and the BCT controlled organic ISR. Additionally, we leveraged both the previously discussed fusion cell, LNOs, and a combined COP to overcome this friction.

Creating a real-time combined COP seems simple enough. However, we must put ourselves in the shoes of future partners and allies that do not have access to U.S. military high-end digital resources that feed our COP. In this scenario, 1-2nd SBCT did not have direct access to the Air Tasking Order, Airspace Coordination Order, or Special Instructions for each day and relied on our advisors to keep our TOC informed of changes to the airspace COP. On the ground, our teams worked to merge feeds that conjointly displayed the collective force in real-time. To that end, the use of a combined analog COP coupled with a digital COP on a shared medium such as Command Post of the Future became vital to our ability to dynamically re-task collection and delivery assets. Additionally, working through a shared communications architecture reinforced responsiveness to support operations. Our work with the SFAB proved that partnered forces must build and rehearse the ability to flex assets in space and time according to agreed-upon priorities.

Lastly, as a partnered force without the common sensors, decision

space, and access to EAB assets, the BCT relied on the belief that our SFAB advisors provided the most accurate and responsive intelligence and Fire support. During this rotation, the BCT depend on SFAB resourced deep area collection, GS Fires, and air support. The BCT FSE consistently requested more information from our SFAB advisors to confirm the prosecution of targets according to reliable intelligence and rules of engagement. Brigade leadership had to trust the SFAB owned intelligence or risk missing the opportunity to strike enemy targets. SFAB work to foster productive relationships in the competition phase laid the foundation of trust for dynamic prosecution of targets in the conflict phase. Thus, U.S. Fire supporters must build professional relations with international intelligence officers and Fire supporters to eliminate barriers of trust due to operational security, language differences, and foreign disclosure constraints.

The SFAB worked diligently to develop a layer of confidence that became increasingly significant to Fires delivery as the Area of

Operations grew in kinetic activity. Relying on our combined AGM, JRTC injects forced timely engagement decisions such as cross-boundary counter Fire, while the partnered organization quickly responded to Calls for Fire in support of troops in contact. Deliberate and combined IC/Fires rehearsals shaped battle drills that led to our shared proficiency to process Fire missions for both targets simultaneously. Future multi-national operations must leverage these lessons to share, rehearse, and communicate to best bring all forces' capabilities to bear against a shared enemy. Only then can we become an unbeatable combined force capable of defeating a near-peer threat.

Application for Fires readiness

After nearly two decades of fighting counterinsurgencies as the biggest kid on the block with all of the toys, we must learn to share our Fire support systems and intelligence with partners or risk increased friction and a lack of synchronization. Using the lessons learned from this combined BCT and SFAB rotation, future Fire supporters can improve

lethality through combined targeting cycles, delivery synchronization, airspace deconfliction, and dynamic coordination. When we can seamlessly integrate with another nation's operations, Fire support, and intelligence teams, we can prepare our combined forces to defeat future well-resourced and highly trained adversaries.

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37th IBCT conducts monthlong training rotation at JRTC - FORT POLK, LA, UNITED STATES 06.16.2021 Photo by Spc. Grace Jacobs

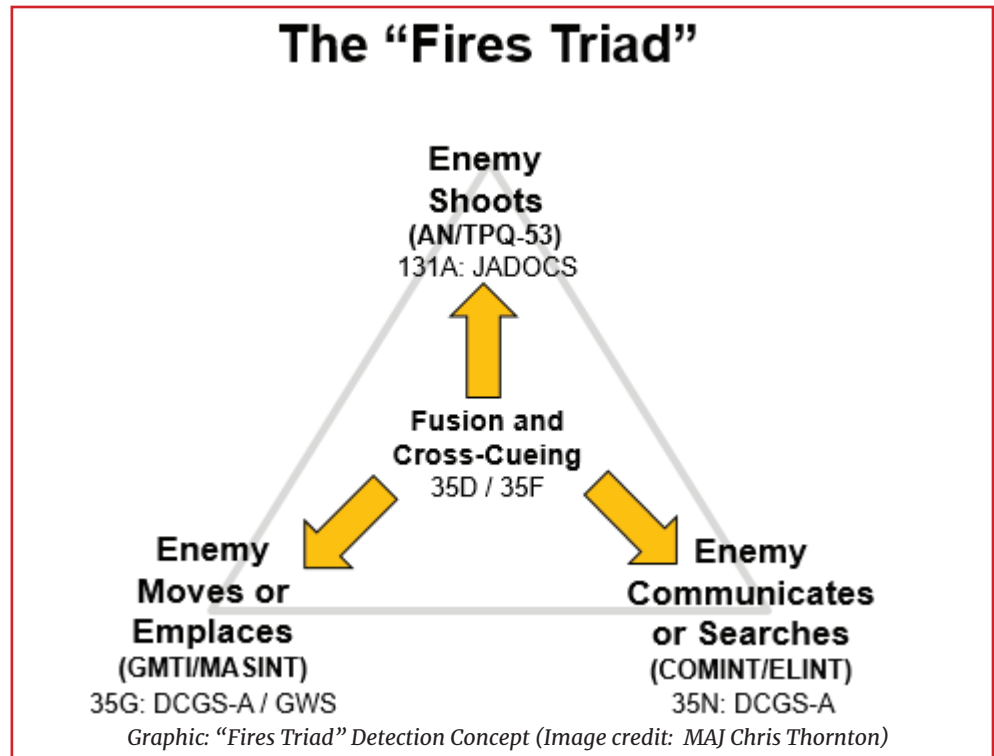
THE FIRES TRIAD

BY: MAJ Christopher D. Thornton, MAJ Michael A. Benner, MAJ Jeremy Crallie

The current generation of Aerial-Intelligence Surveillance and Reconnaissance capabilities, the E-8C Joint Surveillance Target Attack Radar System (JSTARS), the E-3 Sentry Airborne Warning and Control System (AWACS), and the RC-135 Rivet Joint were known in the Joint community as the “Iron Triad.” These assets were designed to work together as a team—complementary sensors that would find nearly any target in a theater of operations. However, in Large-Scale Combat Operations (LSCO), we fully expect that the “Iron Triad” will not always be present to support the division and corps deep areas. Therefore, there is an urgent need for the Division Artillery (DIVARTY) and Field Artillery Brigade (FAB) to have the capability to interpret whichever sensors are available: a “Fires Triad” of detection in order to rapidly identify targets and deliver timely and accurate fires even in an Anti-Access/Area Denial (A2AD) environment.

We’re Often Not Fast Enough

Warfighter Exercises are the capstone training events for U.S. Army Divisions, Corps, and Army Service Component Commands. Taken individually, the primary objective of these exercises is to enable units to rehearse mission command processes against a peer threat. However, these exercises also provide an opportunity to identify and address significant capability gaps with potential Doctrine, Organization, Training, materiel, Leadership and Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions. Throughout FY20–21 series Warfighter Exercises, the Mission Command Training Program consistently observed that the tactical intelligence and fires enterprise does not link sensors to shooters quickly enough for consistently effective counterfire and count-



er-battery fires.

While airspace clearance can be cumbersome and digital fire mission processing requires significant practice to conduct in a timely manner, a significant contributing factor is that the intelligence Processing, Exploitation, and Dissemination (PED) specialists best suited to support counterfire and counter-battery fires do not exist at the field artillery units tasked with executing these missions as the Counterfire Headquarters (CFHQ). While several divisions have task-organized temporary PED teams to ensure success during the Warfighter Exercise, PED capabilities of Division Artillery (DIVARTY) and Field Artillery Brigades (FABs) need to be expanded for sustained Large-Scale Combat Operations (LSCO).

The World Class Opposing Force (WCOPFOR) provides a realistic “uncooperative sparring partner” for Army divisions and corps. The Integrated Fires Command (IFC) is the principle organization of the WCOPFOR responsible for providing

long-range rocket and cannon fires. The IFC typically consists of artillery, aviation, missile and Special Purpose Forces (SPF) components, which are task-organized to best achieve the objectives of the WCOPFOR. The integration of sensors and shooters under a single headquarters provides the WCOPFOR efficient sensor-to-shooter processes and the ability to mass fires in dispersed formations to achieve effects on key critical friendly capabilities such as air defenses and radars.

Of all the IFC’s capabilities, artillery proves to be the WCOPFOR center of gravity. On average, approximately 75–90% of friendly forces casualties during Warfighter Exercises are due to WCOPFOR indirect fire systems from 2019 to present. Through the use of its artillery, the WCOPFOR is able to seize and maintain the initiative early in Warfighter exercises and significantly disrupt the movement of friendly forces.

Besides advantages derived from WCOPFOR’s flattened sen-

sor-to-shooter links, there are systems capabilities that contribute to their ability to successfully employ indirect fires. The average displacement time of most WCOPFOR artillery systems remains under ten minutes. As the average time for units to identify an enemy system with a sensor has consistently been approximately two minutes, followed by an additional nine minutes to clear airspace and process a counterfire mission, a unit has a very short window of opportunity in which to engage targets before they displace.

Both predictive analysis of future enemy Position Areas of Artillery (PAAs) for effective counterfire and the ability to conduct reactive counter-battery fires are required to destroy enemy fire formations, and both components are particularly important in Large-Scale Combat Operations due to the large number of enemy artillery formations. Integration of Ground Moving Target Indicator (GMTI) and Electronic Intelligence (ELINT) information into the DIVARTY or FAB counterfire analysis process is recommended as it not only facilitates the predictive analysis through survivability moves within an enemy PAAs, but also allows continued sensor contact through displacements of enemy firing units and sensors and across gaps in ground radar coverage.

To track enemy firing batteries through displacement within or between PAAs, and identify the sensors that enable long-range fires, some divisions have started adding Geospatial Intelligence Analysts and Signals Intelligence analysts to interpret theater-level intelligence feeds. We have observed that incorporating additional PED capabilities at the DIVARTY or FAB is an effective method that enables proactive counterfire and reactive counter-battery cueing procedures. By having a capability to interpret GMTI and ELINT indications of enemy firing batteries and associated sensors at the point of execution, these DIVARTYs and FABs are in effect the streamlined sensor-to-shooter links IFC achieves through its task organization and

structure.

Current PED Capabilities and Relevant Doctrine

The primary tool DIVARTY and FAB S-2s have at their disposal to analyze enemy indirect fire systems is a density plot product known as a "heat map." This product is as an effective tool to visualize the preponderance of sustained fires in the area of operations, which can drive higher headquarters information collection and targeting efforts, improving deliberate and dynamic targeting. Despite its value in support of deliberate and dynamic targeting, in some cases the heat map is not produced by the DIVARTY or FAB, or not incorporated into division-level analysis of the enemy. The division planning without the "heat map" can also lead to gaps in Intelligence, Surveillance and Reconnaissance (ISR) coverage of enemy artillery formations, and increased delays in sensor to shooter processes.

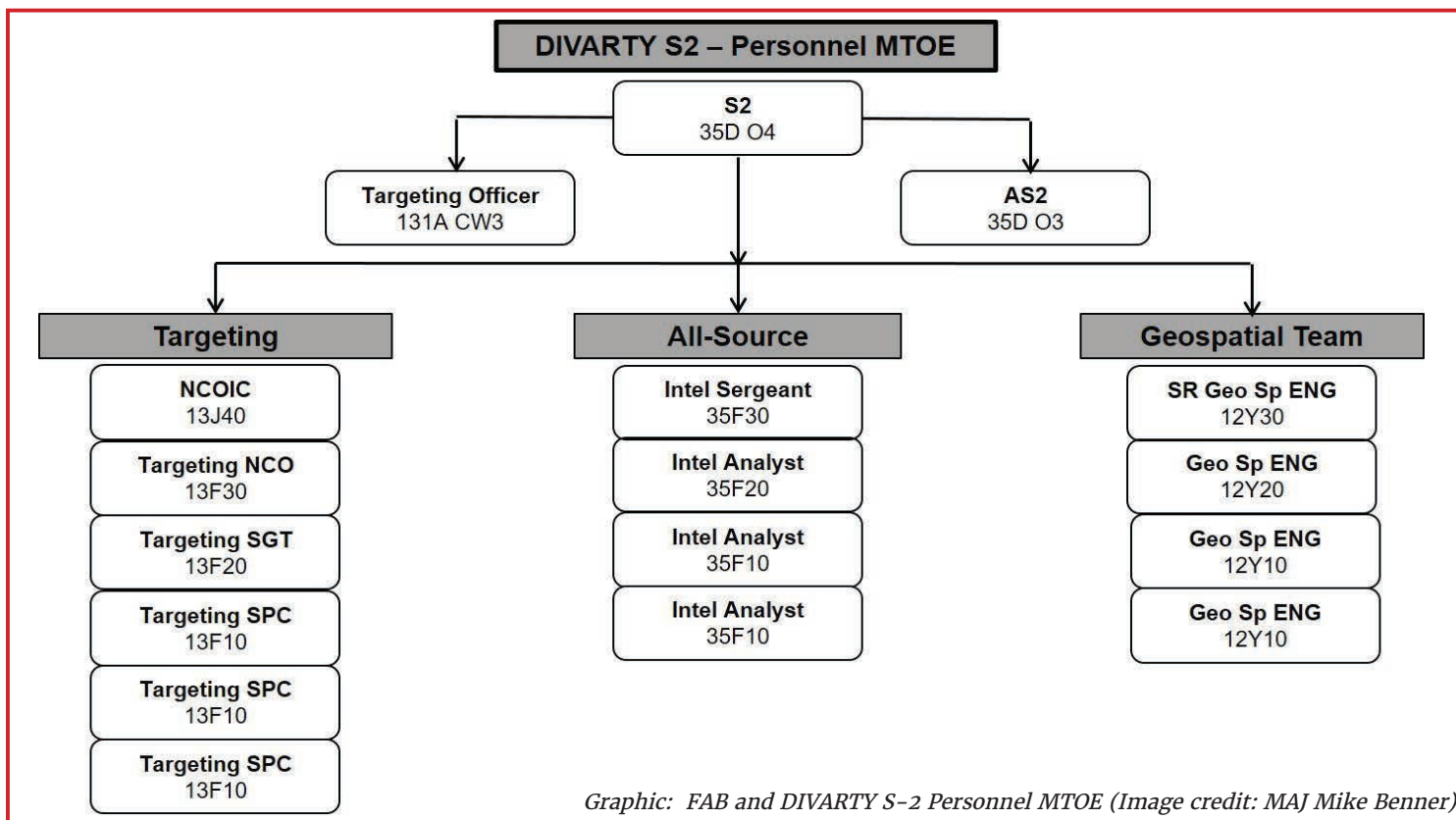
The most effective method to overcome the challenges of providing timely and accurate fires despite short displacement times the Mission Command Training Program has observed in the Warfighter exercise is the incorporation of GMTI capability at the FAB and DIVARTY. Whether provided to a Processing, Exploitation and Dissemination (PED) section at the DIVARTY or FAB, or simply multi-cast to a Joint Automated Deep Operations System (JADOCS) and analyzed by organic all-source personnel not normally trained in interpreting this data, GMTI allows units to provide timely intelligence at the point of execution regarding enemy artillery displacements. As the enemy firing batteries conduct fire missions, the point of origin is revealed to the DIVARTY or FAB Counterfire Officer if it is within the coverage area of the AN/TPQ-53 weapon-locating radar. As the enemy employs its own counterfire radar capability, this is recognized by friendly ELINT sensors. As the enemy conducts survivability moves of sensors and shooters, this is visible via GMTI collection. Using the AN/TPQ-53 acquisitions,

ELINT and GMTI together, leads to particularly effective cross-cueing. When implemented, it also enhances the ability of the S-2 to provide intelligence support to proactive counterfire: when an enemy artillery formation is observed departing a PAA for a secondary position, the S-2 section can determine its heading and speed via GMTI to attempt to predict its destination, providing an opportunity for clearance of airspace and ground for organic or Joint fires and/or dynamic retasking of friendly Unmanned Aerial Surveillance systems.

DIVARTY and FAB S2 sections are manned and equipped to conduct all-source intelligence, geospatial engineering, and targeting activities given current personnel and equipment authorizations on their Modified Table Organization and Equipment (MTOE)ⁱ. Their intelligence staffs are manned to collect, process, and analyze one type of asset: ground-based counterfire radarⁱⁱ. However, this prevents the synergy between these sensors and complimentary GMTI and ELINT capabilities.

DIVARTYs and FABs further lack an organic ability to employ Joint Worldwide Intelligence Communication System (JWICS) or NSANet without the Trojan equipment required to access the Trojan Data Network. FABs (but not DIVARTYs) do possess a single signals intelligence (SIGINT) officer to assist in planning, but no additional SIGINT staff to process or analyze raw SIGINT or ELINT information such as lines of bearing or specific frequencies as it is collected. Lacking a Tactical Intelligence Ground Station (TGS) section and its ability to ingest theater- and national-level feeds such as GMTI and ELINT, the formation is also unable to receive these feeds organically.

Despite these limitations, collateral-level GMTI and ELINT processing on organic Distributed Common Ground System-Army (DCGS-A) is all that a DIVARTY and FAB require for effective deliberate and dynamic targeting. Some DIVARTYs and FABs have filled these gaps in MTOE through requests for augmentation from the divi-



sion G-2 section, and the division can attach a TGS section from one of its Brigade Combat Teams (BCTs) to receive intelligence feeds without an additional burden on its limited SATCOM data. Filling these gaps through attachments creates their own costs, as any soldier or piece of equipment attached to that DIVARTY or FAB generates a personnel shortage in another unit. Those costs may be feasible to impose in an exercise of short duration with limited numbers of training audiences and lower command enablers, but is likely not feasible when a corps or division is fully deployed with all BCTs and functional and multifunctional brigades in a LSCO environment.

Although there is no specified requirement for a DIVARTY or FAB staff to process, collect, or analyze anything but its AN/TPQ-53 radar acquisitions, there are doctrinal requirements and processes in corps and division-level fires and intelligence doctrine which collectively provide a template for how to utilize GMTI to achieve more lethal, timely, and accurate fires^{iv}. Corps and division level intelligence doctrine describes how a Geospatial Intelligence (GEOINT) section,

comprised of both imagery analysts and geospatial engineers, provides the capability to process and analyze Measures and Signatures Intelligence (MASINT) feeds such as GMTI. Field Manual 3-09, Fire Support and Field Artillery Operations, published in April of 2020, acknowledges the requirement to incorporate tracking a moving target into its dynamic targeting process^{vi}. Corps and division intelligence doctrine also provides a template of how to monitor mobile High-Pay-off Targets through target detection enabled by the integration of a Field Artillery Intelligence Officer (FAIO), a field artillery Warrant Officer with the Division G-2 Analysis and Control Element (ACE)^{vii}. Finally, targeting doctrine lists whether a target is moving or stationary as one of the essential targeting information conditions, which is a doctrinal argument for the inclusion of GMTI analysis at the FAB or DIVARTY.

Relying solely on the Corps or Division G-2 staff to interpret these feeds is possible, but risks delays in sensor to shooter links and fire mission processing, particularly if communication between the Division Main Command Post (MCP) and the DIVARTY or FAB is degrad-

ed or denied. The previously referenced doctrine extractions and unit practices provides a rationale which can be applied to the DIVARTY or FAB requiring the capability to process these intelligence feeds. Units that have task-organized to receive them have demonstrated that with the required expertise and capability to leverage GMTI and ELINT, they can more effectively deliver timely and accurate fires despite WCOPFOR range overmatch and short displacement times.

Interim Solutions and Proposed Changes to Facilitate More Lethal Fires

In preparation for Warfighter Exercise 20-1, 1st Cavalry Division (1CD) formed a multidisciplinary PED capability at their DIVARTY to fuse AN/TPQ-53, GMTI and ELINT information to enable more effective counterbattery fire in support of dynamic targeting. They formed this team primarily with manning from the division's aligned Expeditionary Military Intelligence Battalion (EMIBn). This team provided not only the 35G geospatial analysts to interpret and track the GMTI data in support of counterfire, but also allowed rapid tipping and cue-

ing based on ELINT signatures of enemy counterfire and air defense radars.

The 1CD DIVARTY trained on integrating GMTI and ELINT with AN/TPQ-53 acquisitions with the multidisciplinary PED team over a series of Command Post Exercises (CPXs) against a live WCOPFOR, routinely achieved success against the enemy Integrated Fires Commands (IFCs), destroying 75-90% of enemy firing systems and 50% of enemy radars within 36 hours, preventing massing of fires on friendly forces. When the enemy is reduced by attrition of sensors and delivery systems such that firing as battalions and batteries is no longer feasible, reducing the enemy to disruption fires by the remaining delivery systems. Their multidisciplinary PED team did not eliminate 75% of enemy firing systems in Warfighter Exercise 21-1 within the same timeframe as in their CPXs, but inclusion of the capability did ultimately force the WCOPFOR to shift from the massed fires to harassment fires by their remaining delivery systems.

Across FY21 Warfighter Exercises, we have observed training audiences that leverage GMTI at a minimum at the FAB or DIVARTY have overall been more agile and lethal than those that have not. The addition of SIGINT specialists, when available, also proved valuable. 1CD DIVARTY demonstrated the PED team construct in Warfighter Exercise 21-01 facilitated both reactive counter-battery fires and proactive counterfire by leveraging its ability to interpret theater and national-level intelligence feeds, and that interpretation of ELINT was value-added for cross-cueing of sensors and destruction of enemy 1L-220U ZOOPARK 2 counterfire radar systems.

To achieve this end, the 163rd EMIBn augmented the 1CD DIVARTY's organic all-source capabilities by providing Military Occupational Specialty 35G GEOINT Analysts, 35N SIGINT Analysts, a TGS and a Trojan Spirit and associated subsystems with a TACON command relationship to the 1CD DIVARTY. TGS subsystems like

the Surveillance Control Datalink Ground Data Terminal and Joint Tactical Terminal allowed the DIVARTY not only to receive data from these sensors directly to reduce the burden on the network, but when coupled with specialized analysts experienced with the intelligence feeds, enabled the formation to analyze this data within the scope of its role as CFHQ—counterfire and counter-battery fires short of the Fire Support Coordination Line (FSCL).

GEOINT analysts tracked enemy firing batteries through PAA displacements and survivability moves observed via GMTI on the MOVINT Client software installed on the DCGS-A laptops and/or Geospatial Intelligence Workstation. These formations could be distinguished based on whether they were assessed as wheeled or tracked vehicles, number of tracks, and proximity to AN/TPQ-53 acquisitions prior to movement. SIGINT and ELINT analysts received division reports of enemy counterfire and air defense radar systems in chat and focused their attention on ELINT near PAAs. Augmented by single-source intelligence specialists, the DIVARTY S-2 section fused this data with AN/TPQ-53 acquisitions based on expected enemy PAAs.

There are a number of factors to consider for effective counterfire and counter-battery fires, such as well-rehearsed digital fire mission and clearance of fires procedures, proactive clearance of fires, and a deliberate targeting process that identifies alternate sensors and shooters should the primary unavailable. The multi-disciplinary nature of the PED team and a shared understanding of sensor capabilities and datalinks meant that, even if certain capabilities, such as GMTI, were not available, the DIVARTY maintained the capability of aggressive predictive analysis and dynamic targeting and could ensure effects against enemy fires and sensors. The ability to leverage all available intelligence feeds at the point of execution increased both the agility of the formation to identify high-payoff targets and the accuracy of its fires.

Task organizing additional personnel and equipment not organic to the DIVARTY is a luxury not all units can afford: many divisions in the active Army have manning shortfalls in these specialties, and even when there is an EMIBn to provide additional specialists, exercises with an aligned division must be balanced against that battalion's other commitments. National Guard divisions do lack aligned EMIBns to provide augmentation to their divisions, and even if they did, the number of days these personnel would be available for exercise support would be limited. Increasing incorporation of artificial intelligence into the intelligence process may simultaneously reduce manning requirements for PED and analysis and increase the value of fielding of the TGS' successor to DIVARTYs and FABs in the future to increase their situational understanding, analytical agility, and, ultimately, their lethality.

Many of the benefits experienced by 1CD at Warfighter Exercise 21-01 in terms of situational understanding, more agile dynamic targeting and counterfire, and enhanced lethality can be achieved by a DIVARTY or FAB under exercise conditions through training and division-internal task organization. A secure facility able to deliver simulated threats and assets is available at most Foundry sites with the correct enablers. Organic 35F All-Source Intelligence Analysts can be trained to rapidly interpret GMTI data on the Geospatial Intelligence Workstation (GWS) or DCGS-A with MOVINT Client software installed in this environment. Key emitters such as the ZOOPARK and CHAIR BACK radar systems, identified by ELINT, received by the TGS' Joint Tactical Terminal antenna and processed by the Division G-2 SIGINT cell, can be provided in a dedicated chat channel and at the collateral level and analysts at the DIVARTY or FAB can fuse this data to target these systems. However, this still leaves the FAB or DIVARTY heavily dependent upon the upper-tactical internet for this data, which would most likely come from the Division MCP.

Modifying existing MTOEs through either zero-personnel growth or low-growth changes would dramatically improve the DIVARTY and FAB's ability to collect, process, and analyze the disposition of enemy artillery, either prior to or after firing, with the ability to execute proactive counterfires as the desired endstate. For example, replacing the 4-person 12Y Geospatial Engineer section with two 35G GEOINT analysts and two 35N SIGINT analysts would deliver a modest organic PED capability without personnel growth. Another consideration would be whether or not to replace the 125D Geospatial Engineering Technician with a 350G GEOINT Technician to ensure the unit maintains an understanding of geospatial datalinks and Measures and Systems Intelligence capabilities and datalinks.

Dependency upon upper tactical internet and the division's MCP for the majority of its connectivity and intelligence feeds presents multiple questions for how these formations will truly conduct LSCO for the current and future Army. If the space domain is truly to be contested in future near-peer conflicts, near-peer threats will also present a robust anti-access/area denial threat, and will challenge friendly forces in the electromagnetic spectrum, a division in LSCO cannot expect that a DIVARTY or FAB would be able to receive relevant intelligence feeds and remain connected and aware at all times. With even a modest multidisciplinary PED capability and a flexible collection plan, the frequent command post displacements and shifting availability of aerial sensors due to A2AD expected in LSCO further complicate the ability for a division to consistently provide and interpret these intelligence feeds to units not equipped to receive them.

Divisions and functional and multifunctional brigades must plan through such transitions with effective communications planning in mind. This means being able to operate under both data plans that employ the upper tactical internet and theater- and national-level intelligence feeds and able to shift

to data plans on alternate and contingency communications methods as required. Such communications have depth because they rely heavily upon US Message Text Format (USMTF), orders consisting of small files such as spreadsheets pushed between command nodes by systems such as High Capacity Line of Sight (HCLOS) radios to enable mission command and the orders process when the upper tactical internet is degraded or denied. While this is exceptionally challenging, it will be critically important for success in LSCO.

Ultimately, an interim manning solution to provide the "fires triad" to these units under exercise conditions should be seen as just that: an interim solution. Cross-trained analysts not backed by the necessary specialties and lacking the equipment that provides intelligence feeds can lead to success under exercise conditions but will likely not be sufficient for LSCO. A shift in the capabilities of the FAB and DIVARTY to provide a modest PED capability would put the "fires triad" at the point of execution and would allow these formations to adapt to the available

sensors them in combat, which will and intelligence feeds available to vary by theater of operations, and change during the operation, as the enemy presents multiple dilemmas across domains. To do less is to fail to provide the King of Battle with the eyes he will need to dominate the division and corps deep area in large-scale combat operations.

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TACTICAL VS. TECHNICAL FIRE DIRECTION IN WARFIGHTER 21-02

By CPT Jennifer Melfi

Recently the 4th Infantry Division Artillery (DIVARTY) conducted Warfighter 21-02. The simulated tactical scenario involved a large battlespace that necessitated moving and shooting over 100km. The scenario involved a number of challenges including canalizing terrain, multiple wet gap crossings and a mix of urban and rural areas. The DIVARTY Fire Control Element (FCE) facilitated both rocket and cannon artillery fires using tactical fire direction. The FCE had to work through three major friction points during Warfighter 21-02 in order to perform effective tactical fire direction: ammunition management, airspace clearance and Field Artillery battalion positioning.

Within a Division Artillery (DIVARTY), the FCE is led by the Fire Control Officer (FCO), which subsequently works on the DIVARTY Current Operations (CUOPS) floor in the S3 shop. The FCO is typically a pre-command Field Artillery (FA) captain in one of the first positions that they will have after completing Captains' Career Course. The FCE is vital to the ability of DIVARTY to control the fires occurring within the Division area of operations. The primary mission of the DIVARTY FCE is to conduct tactical fire direction with all of the FA battalions that are in a support relationship to DIVARTY during an operation. According to ATP 3-09.24 (Techniques for the Fires Brigade), the FCE "controls the delivery of tactical field artillery fires in support of current operations. It provides tactical fire control through automated mission command systems with manual backup and communications equipment" (p. 2-12). It is important to make the distinction between tactical and technical fire direction when discussing the FCE. TC 3-09.81 (Field Artillery Manual Cannon Gunnery) defines tactical fire direction as "processing calls for fire and determining the appropriate method of fire, ammunition

expenditure, unit(s) to fire, and time of attack" (p. 1-2). Tactical fire direction is conducted at the Field Artillery battalion fire direction center (FDC) and above. Technical fire direction is defined as "the process of converting weapon and ammunition characteristics (muzzle velocity, propellant temperature, and projectile weight), weapon and target locations, and met information into firing data" (p. 1-2). Technical solutions that produce firing data occur at the platoon FDC level.

One of the most important responsibilities of the FCE is ammunition management. Ammunition management is extremely important in order to mass fires, provide sufficient fire orders and increase artillery lethality. The FCO must know the ammunition hauling capabilities of all subordinate FA battalions both organically and within their Forward Support Companies (FSCs). The FCO is also responsible for preconfiguring ammunition Combat Configured Loads (CCLs). While DIVARTY is technically a brigade level element, it does not have a Brigade Support Battalion (BSB), so DIVARTY must go through the Division's sustainment brigade for logistics. Therefore, the CCLs must be created at the Division Support Area (DSA) and transported to the FA battalions. This takes a significant amount of time and the FCO must be in close communication with the DIVARTY S4 shop in order to predict when these CCLs must be configured and transported.

Ammunition management was a large friction point when conducting tactical fire direction during WFX 21-02. This problem is related to the issue of retaining situational awareness regarding the Field Artillery battalions, because being forced to use long range munitions when a 2-3km movement forward would allow us to use short range munitions put a strain on our sustainment capabilities. DIVARTY utilized a concept called "fires forward" to

push the Field Artillery battalions as far up on the battlefield as possible in order to maximize the use of short range munitions such as M26 rockets, which have a maximum range of 30km. Being within 30km of the target enables the use of cannon artillery projectiles such as the High Explosive Rocket Assisted Projectile (HE RAP). We had a virtually unlimited supply of M26 rockets and HE RAP, therefore pushing fires forward allowed us to provide sufficient fire orders and increase lethality. The FCE was constantly in communication with the Battle Captain regarding current and future positioning of the battalions across the battlefield.

Another important responsibility of the FCO is to be the staff officer that communicates with the Division Joint Air Ground Integration Center (JAGIC). The JAGIC is responsible for deconflicting both Blue and Green Air above the Coordinating Altitude (CA) as well as clearing the ground beyond the Fire Support Coordination Line (FSCL). DIVARTY is responsible for clearing air below the CA and ground below the FSCL and above the Coordinated Fire Line (CFL). The FCO must understand the delineation between their responsibilities and the responsibilities of the JAGIC in order to reduce fire mission processing times. The JAGIC along with Division Fires is responsible for identifying targets across the battlefield, and the DIVARTY FCO is responsible for determining the fire order for those targets and disseminating the fire order to the battalions. The FCO/FCE does not conduct any targeting, which is an important distinction. Because the JAGIC is extremely busy during the targeting process deconflicting air and ground, it is impossible for them to also control the subordinate FA battalions, which is where the FCO steps in with the tactical fire direction.

In order to facilitate airspace clearance with the Joint Air Ground

Integration Center (JAGIC) at Division during WFX 21-02, it was necessary to know what the Maximum Ordinance (MAXORD) when firing rockets and cannon artillery. The MAXORD is the highest altitude in feet that a projectile reaches during its trajectory. The FCE must know MAXORD in the case that it breaks the Coordinating Altitude (CA), below which airspace can be cleared by the DIVARTY Air Defense Airspace Management (ADAM) section. If the projectile breaks the CA, the JAGIC must clear Blue and Green air in order to avoid fratricide. The MAXORD is calculated by the Advanced Field Artillery Tactical Data System (AFATDS) that has all gun information built in that is needed for a technical solution. The AFATDS within the FCE has no gun information built in and is configured to only communicate with brigade and above level elements. The FCE facilitated airspace clearance by using MAXORD reference sheets that gave a rough estimate based on the range to the target. This shortened fire mission processing time as the battalions did not have to calculate firing solutions and then transmit the MAXORD back to the FCE.

Additionally, it is important to remember what the commander's intent is while conducting tactical fire direction. This includes providing fire orders that are sufficient in volume to get the intended battlefield effects as well as ensuring that those fire orders are timely and ac-

curate. The FCO must maintain situational awareness of the locations of all FA battalions and make adjustments to positioning guidance in order to range the desired targets. The FCO must also maintain situational awareness of all Fire Support Coordination Measures (FCSMs) across the battlefield. The FCO must be in constant communication with the Battle Captain regarding positioning to create shared understanding and communicate with the DIVARTY Counterfire Officer regarding the High Payoff Target List (HPTL) so that fire orders will create the desired effect on the target.

This leads to the last major friction point during WFX 21-02, which was tracking the locations of both the battalion FDCs and the firing platoons. This was challenging due to DIVARTY having anywhere from five to nine battalions in a General Support Reinforcing (GSR) role at any given time. The FCE had to know the firing platoon locations in order to create appropriate fire orders, particularly when using rockets due to a limited supply of long range munitions. A fire order would be sent to the battalions and the firing platoons would be unable to create a firing solution with the recommended munition due to being unable to range the target. This occurred because the FCE was tracking the battalion FDC location, not the firing platoon location. There would often be a 3-4km

difference between the two, particularly for rockets who were spread over a large area in order to increase counterfire survivability. This was the difference between firing a M26A2 rocket which the battalions had in ample supply and firing a M30 rocket which were extremely limited.

Ultimately, the DIVARTY FCE had the most success by being proactive with tactical fire direction and pushing fires forward in order to utilize short range munitions, as well as retaining awareness of all unit locations in order to determine fire orders. Proper positioning of the battalions allowed for massing on targets as well as sufficiently large fire orders to get battlefield effects. Additionally, short range munitions put less of a strain on our sustainment assets due to limited long range munitions, as well as simplifying the process of airspace clearance due to lower MAXORDs.

About the Author:

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U.S. Army Soldiers from Charlie Battery, 3rd Battalion, 29th Field Artillery Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division, fire 155H ammunition rounds from a Paladin Artillery System at targets at the National Training Center, Fort Irwin. Photo by Spc. Randis Monroe

Kill Chain Sustainment

By: LTC Samuel Linn, MAJ Nathan Levy and 1LT Matthew Eden

The promise of a digital kill chain is so enticing, and so easy to visualize, it is easy for the actual experience of digital sustainment training to be completely demoralizing. The prototypical comment or thought of “if I have a cell phone in my pocket that can open my garage door from another continent, why can’t my digital equipment deliver a call for fire 20 kilometers away?” is both reasonable and salient. Top Guns committed to pursue digital excellence two years ago, and have directed our best minds and massive effort into understanding the digital tools, developing our processes, and investing in our people and organizational culture, in an effort to master the digital kill chain from the FO in an Infantry Platoon to the 155 rounds exiting the tube of our M777 howitzers. The following is an overview into our program, which we have named “Kill Chain Sustainment”. It is detailed, robust, time consuming, and has proven effective in dramatically improving our digital kill chain’s readiness and reliability. As a word of caution, the ability to reliably close the digital kill chain is not a problem we believe we have solved – there are significant and persistent network, program, and support issues that we the Army need to address to optimize our BCT kill chain. That said, having put our 100% into what is on our MTO&E and in our Motor-pool, the following represents our best effort to that end.

Every After Action Review (AAR), White Paper, and comment from our Combine Training Centers (CTCs), as well as the FA Journal, discuss the need for a disciplined Digital Sustainment Training (DST) program. Most articles discuss DST, but don’t thoroughly explain the concept enough for a unit to run with the idea. In 1996, then Colonel, Raymond T. Odierno co-authored an article in the Field Artillery Journal “AFATDS: Digitizing Fighting With Fires”

In his article GEN Odierno (Retired) discussed the need for what he called “Fire Support Sustainment Training (FSST).” His concept, which was still in development at the time the article was published, was original. “(FSST) consists of weekly individual training on AFATDS and a monthly 36-hour field training exercise (FTX) where we concentrate on division-wide collective tasks that develop the entire fire support team from the division FSE down through the platoon FDC.” In 2020, COL Caldwell and LTC Nemec of NTC wrote a similarly themed article about how to improve call for fire processing in units. During our research this stood out as the best concept for DST on a six-week linear progression model. Many of the Top Guns had previous experiences with use of a nodal DST program that was compartmentalized and did not integrate the entire kill chain. DST was Battery or FA Battalion internal, generally did not include Fire Support Teams (FiSTs), and was not a routine battle rhythm event. What we call Kill Chain Sustainment (KCS), is part of disciplined command maintenance every Monday, from all sensors to shooters and back to sensors, as well as everything in-between. KCS improved our digital/voice communication and user operability across the Brigade Combat Team’s kill chain.

For any new organizational undertaking units should consider Knowledge Management (KM). The Army defines KM as “The process of enabling knowledge flow to enhance shared understanding, learning, and decision making. The four components of knowledge management are people, process, tools and organization.” The Brigade Kill Chain is a KM problem: How can the kill chain enable decision making (rapid execution of fires), through people, processes, tools, and organization?

- **People** is the human dimension of the Kill Chain. In a Brigade Combat Team (BCT), the Kill Chain encompasses more than just Field Artillerymen and women with their organic equipment. People in the BCT Kill Chain can also include leaders at echelon, mortar men, intelligence, aviation, signal, and protection representatives.
- **Processes** are the analogue/digital Standard Operating Procedures (SOPs) and Tactics, Techniques, and Procedures (TTPs) that link people and tools in the Kill Chain. Every method of communicating between sensors and shooters is a process. Processes help with task and time management as well as on-boarding new personnel.
- **Tools** in the BCT Kill Chain is the network of collaboration. It can include information management tools like the Advanced Field Artillery Tactical Data System (AFATDS), Precision Fires-Dismounted (PF-D), Mortar Fire Control System (MFCS), Joint Battle Command-Platform (JBC-P), Data Dissemination Services (DDS), Distributed Common Ground System-Army (DCGS-A), Theater Air Integration System(TIAS). Analogue tools can include PACE Plans, Validated Common Operating Picture (COP), and targeting inputs/outputs.
- **Organization** in the BCT Kill Chain is the culture of collaboration and decision making. If the culture is not enforcing, using, or adhering to defined roles for People, Processes, and Tools, shared understanding will be limited and effective KM cannot be implemented.

The purpose of Kill Chain Sustainment is to align the efforts of people, processes, tools, and organization to create a well maintained, seamlessly integrated, and lethal

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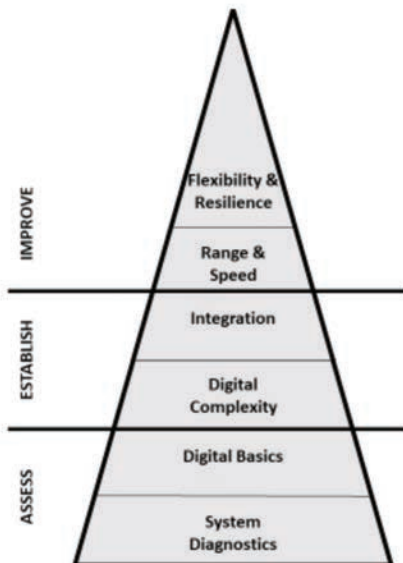


Figure 2: KCS Phases and Efforts- The different phases of the KCS program are listed across the left side, and the efforts are contained in the main diagram.

*Note: Systems Diagnostics should be conducted throughout all phases.

Precision Fires-Dismounted (PF-D,) may require more hands-on troubleshooting and testing of each individual cable and component.

Tasks completed during System Diagnostics:

- Establish the full Kill Chain (PF-D/LFED/AFATDS/Guns) with each PF-D sending a When Ready (WR) Fire Mission.
- Any system unable to complete to send the WR mission and receive digital shot/splash/rounds complete must conduct further troubleshooting and identify specific components of the system that is NMC
- Fill out and turn-in DA Form 5988s for digital systems
- This effort should be conducted during every follow-on phase of KCS. If a system is unable to complete the closeout criteria for a specific event, a specific component should be identified as NMC, then added to the unit's Equipment Status Report (ESR)
- Test power output of the radios to ensure proper wattage.
- Clean antennae mounts.
- Test vehicle mounts and cables

Digital Basics: The Digital Basics effort is intended to disseminate existing digital knowledge and identify any gaps requiring attention. We found this to be a great opportunity to train incoming personnel on digital systems and communications troubleshooting, as well as to review and apply any lessons learned to existing SOPs. The main method to conduct Digital Basics is to have each subordinate unit to teach their review and apply any lessons

learned to existing SOPs. The main method to conduct Digital Basics is to have a review and apply any lessons learned to existing SOPs. The main method to conduct Digital Basics is to have each subordinate unit to teach their Soldiers how to complete a specific task. Following this class, a SME should pick a random Soldier from each unit and test them on their ability to complete the task. If they are unable to successfully perform, the entire unit should be retrained on the task.

Examples of tasks conducted during Digital Basics:

- Digital communications troubleshooting using the system troubleshooting guide
- Set up the communications configuration and ensure that the parameters are the same between radio and digital system
- Load COMSEC from an SKL
- Adjust data distribution
- Process FMs from, to, and/or through each device (When Ready, At My Command, and/or TOT)

Kill Chain Establishment: Kill Chain Establishment focuses on the building blocks of the minimum amount of training a unit needs to be familiar and proficient with the digital kill chain. A unit can conduct a partial KCS cycle completing these events in six week to be ready for a culminating training event. Kill Chain Establishment has three efforts:

Digital Complexity: The Digital Complexity effort is used to challenge and stress digital systems to further advance the ability of the Fires enterprise.

Examples of tasks conducted during Digital Complexity:

- Process multiple types of fire missions from sensor to shooter, and back to sensor again.
- Have all devices establish and send an FSCM, compile the FSCMs at the BDE Fires/BN FDC level, and ensure that the FSCMs automatically redistribute. Conduct FSCM scrub to ensure delivery of FSCMs on each device.
- Send Target List Worksheet (TLWS) down to FO level and have FOs submit target refinements to process new Fire Missions
- Conduct a full Fire Support Technical Rehearsal (with a pre-determined TLWS)
- Send a large number of missions at once to test the maximum number of missions that can be processed at once.

Integration: The integration focus is best used to integrate higher echelons, adjacent units, counter-fire elements, and mortar units.

Examples of tasks conducted during Integration are:

- Integrating AFATDS with DDS server in the TIDAT system with the BDE S2
- Integrating ADAM/BAE's TAIS for a complex airspace problem
- Incorporate adjacent and higher headquarters AFATDS into Kill Chain
- Incorporate BN mortars into the Kill Chain.
- Disseminate FSCMs to both CPOF and JBC-P.

Kill Chain Improvement:

Range and Speed: The range and speed focus should be used to improve establishment and transmission times as well as test and improve the range of all systems.

Examples of tasks conducted in this effort are:

- Test power output of the radios to ensure proper wattage.
- Clean antennae mounts.
- Test vehicle mounts and cables
- Incorporate new and innovative communications methods
- FDCs and FSEs configure communication routing methods (relay)
- Use SPEED Analysis tool to determine FM range estimates in training area
- Send the unit out to the multiple points in the training area to stress technical range limitations
- Stress BDE Fires and BN FDC TOC/TAC digital handoff

Flexibility: Flexibility is used to test

the adaptability of the kill chain and the ability of individual units to assume control of the higher echelon in case the tactical situation deems so.

Examples of tasks conducted in this effort are:

- *PLT FDC assumes control from the BN FDC*
- *Each BN FSE connect directly to BN FDC*
- *BN FSE assumes control of BDE Fires*
- *FDCs and FSEs configure communication routing methods (relay)*
- *Kill Chain Working Group plans a simulation in which there are faults and system failures injected, and subordinate units are required to follow the PACE plan and assumption of control plans to continue mission.*

8-12 Week Training Plan:

KCS Cycle Planning: We found that it is possible to execute an abbreviated KCS cycle in 8 weeks (Kill Chain Assessment and Kill Chain Establishment). However, to fully execute a KCS cycle (Assessment, Establishment, and Improvement) it can take as long as 12 weeks, while taking into account block leave, training events, and other requirements. The Kill Chain Working Group meets bi-monthly to plan future iterations and assess ongoing KCS operations. The BDE FCO and BN FDO chair the working group, with participation from subject matter experts from across the kill chain. They review the both short range and long term training calendars, guidance from the FA BN Commander, and the long term goals for improving the kill chain. With this information at the forefront, they discuss possible plans for the next 8-12 weeks of KCS. The Kill Chain Efforts are used as a framework for planning, but may occur in any order or combination that supports the goals of the working group. Below is an example of an 8 week plan that we created for our third third KCS Cycle:

Week 1

- **Phase:** Assess
- **Effort:** Systems Diagnostic
- **Plan Overview:** Each PF-D sends a When Ready FM from sensor to shooter, utilizing the entire kill chain in order to establish connection and validate

equipment. Digital Shot/Splash/Rounds Complete be received at the PF-D and End of Mission must reach PLT FDC. Any non-mission capable system must provide a specific broken component or fault.

Week 2

- **Phase:** Assess
- **Effort:** Digital Basics
- **Plan Overview:** AFATDS Operators report to DIVARTY IT Lab. BN FDC and BDE Fires give them a block of instruction on proper data distribution settings and configuration for LAN connection. The settings are then reset and each operator must fix the settings and establish LAN connection. The remaining systems then establish a FM line of sight connection, and a When Ready mission is sent from sensor to shooter and all associated messages are received digitally.

Week 3

- **Phase:** Establish
- **Effort:** Integration
- **Plan Overview:** Task each Maneuver BN Mortar PLT to participate in KCS. They are required to establish connection with their Mortar Fire Control System (MFCS) to the BN FSE and receive one Fire Mission and an FSCM from each PF-D in their BN.

Week 4

- **Phase:** Establish
- **Effort:** Digital Complexity
- **Plan Overview:** Use Electronic Warfare (EW) team to test the RF signature for different forms of communication (FM Voice, FM Digital with different message types and packet sizes). Use data to advise commander on communications plan and to provide feedback to program managers and software developers on which type of communication had the smallest RF signature.

Week 5

- **Phase:** Assess
- **Effort:** System Diagnostics
- **Plan Overview:** Conduct

standard System Diagnostics. (This week fell on BN CoC, so we needed a plan that validated Kill Chain while not taking up much time).

Week 6

- **Phase:** Establish
- **Effort:** Integration
- **Plan Overview:** Task Maneuver and FA BN CP's to participate in KCS. Transfer FSCMs from the AFATDS at echelon to the CPOFs/JBCPs in order to ensure the ability to update geometries in real time.

Week 7

- **Phase:** Establish/Improve
- **Effort:** Digital Complexity/Range and Speed
- **Plan Overview:** Validate HF capabilities and ensure that indirect routing is set up in the AFATDS. This will increase both range and speed by using HF and having each AFATDS serve as a retrains.

Week 8

- **Phase:** Improve
- **Effort:** Flexibility and Resilience
- **Plan Overview:** Conduct a 2-day FTX in which you give a full OPORD and conduct technical rehearsals. Then conduct notional Fire Missions as planned. Have the EW team serve as OPFOR and measure RF signatures and use those signatures to target friendly units. Inject system failures at all levels and test the unit's ability to connect to the next higher echelon in order to continue operations.

We have found it to be extremely important to have realistic goals for each KCS Cycle and to make sure that it is nested with the long and short range training calendar. Our first KCS cycle was far too ambitious for our capabilities at the time, forcing us to reassess and re-plan. Each cycle should build upon one another to ensure the greatest capability leading to major collective exercises.

Additional Considerations:

Be Flexible: Have a back-up plan in the case of last minute taskings, COMSEC issues, maintenance issues etc. The back-up plan can be as simple as the single standard everyone knows during System Diagnostics or Digital Basics.

Concurrent Training: Each week's plan and release criteria can be assessed as the minimum standard. We found it useful to encourage concurrent training at the subordinate levels to take full advantage of Soldier's time. Concurrent training can be as simple as OE-254 set-up races or incorporation of Threat ID-pictures into digital Calls-For-Fire. Keep the AARs: Periodically review multiple AARs at the KCS-Pre-Brief to ensure you are not returning to bad habits.

Use a PRM-36 or Vapor: Use these tools to test the power output of ASIP radios IOT identify network issues. ASIP radios (RT-1523) have power output requirements at Low(.01w), Medium(.1w), and High(5w) settings. The PRM-36 or Vapor can test the power output of radios, mounts, and antennas to ensure your systems are working within a 10% variance of the requirement. If that power requirement is not met, range will severely be restricted.

Find the Motivated Experts: As commitment to KCS continued, we found that we needed to hunt the motivated experts for particular systems in the Kill Chain. At times, Soldiers at the rank of Specialist were the source of information regarding troubleshooting that were not recorded in manuals or references. Two different Specialists even conducted formal and informal classes on AFATDS and PF-Ds inside the Battalion and with adjacent units. One of our Specialists was even awarded a Certificate of Appreciation from PEO-C3T when he found power through-put failure in a NETT Warrior basic hub. That discovery led to a new cable developed for the battalion to test, and in less than 6 months it was fielded to Army units.

Develop a unit Troubleshooting Guide: From FO to gunline there are could limit reception of a Message

four digital platforms that require technical competence: PF-D, LFED, AFATDS, and M119/M777 FCC/CDU. Between these nodes there an infinite number of combinations of failures. At times, a PF-D End User Device (EUD), Ultra Link, cables, and radio can be fully functional, but a break elsewhere in the chain to Observer. Troubleshooting guides developed from Fort Sill, CALL, PEOs, and companies often do not include steps to troubleshoot in a unit environment. We were able to develop and continually update a unit troubleshooting guide for different systems. Working with outside agencies and resources greatly increased the troubleshooting knowledge.

Support Outside of the Battalion: In the fires community, we often don't have organizational expertise to fix every problem set. We found that with the Digital Kill Chain, there is no single service to fix or resolve all of our problems. In a span of 15 months, Top Guns worked with other units, local Field Service Representatives (FSRs), the local Mission Training Center (MTC), the local CECOM Trailboss, PEO-C3T, PEO-Soldier, PM Mission Command, FS C2, Army Futures Command, software engineers, Item Managers (IMs) and multiple Fort Sill representatives.

What we found was that our systems cross several programs. There might often not be a subject matter expert that can fix one problem. Establishing relationships to find the correct POC to point us in the right direction was crucial. In the case of the PF-D, the Army has not yet sourced an FSR requirement for the software. We had to rely on a separate PEO's FSR to load software, and call support engineers to attempt to resolve connectivity issues. Also with the PF-D, at one point we needed simple power cables for the EUD, but the wrong part kept arriving after we ordered. After making some contacts, we were told by the IM to order the wrong part again, then forward the document number to the IM, and the IM would then manually change the order to the correct part.

Conclusion

A Field Artillery Battalion is the human network of a BCT – with a Soldier in every maneuver platoon in the Brigade, we exist to combine the five requirements for accurate predicted fire, to deliver effects with precision and rapidity, and in accordance with the commander's targeting guidance. The digital targeting guidance. The digital tools layered on top of our human network are a patchwork of systems, going through varying degrees of upgrades and updates, that must all work together at once to provide the digital kill chain we all can visualize. The ability to see accurate target location and description enter the kill chain and process digitally by echelon is a beautiful and ruthlessly efficient thing to watch when fully established. The system, because of its fragility and fragmented structure, relies more heavily on empathy and trust than anything else – once a seed of doubt that someone else's part of the network is the cause of an incomplete chain, it is easy for all other nodes to give up hope. A master-the-basics approach that squeezes uncertainty out of the kill chain from the start, consisting of NCOs and Officers willing to first understand, not just their own node on the kill chain, but the links between nodes and how their actions impact the nodes up and down the chain, we found essential to any measure of success. If we learned one lesson, it is that it is a complex and fragile system requiring significant investments for any measure of success. Any expertise we developed we saw as an opportunity to provide the Army, Army Capabilities Managers, Program Executive Offices, and other Army R&D, procurement, and testing agencies feedback into our experiences, that they may impact and improve our next iterations and innovations in future kill chain development.

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ARNG Fires as a Warfighting Function Revisited

By LTC Bradley Rittenhouse and LTC Chin Kim

Introduction

With the reemergence of cross domain fires across all echelons, commanders of the Fires proponent must clearly understand the vision and endstate of the new fires capabilities and organizational designs being developed and established for Waypoint Force 2028 (WP28) Multi-Domain (MDO) Capable and AimPoint Force 2035 (AP35) MDO Ready. After years of persistent conflict, there has been substantial atrophy in Field Artillery (FA) skills and erosion of leader and professional development within the Fires Warfighting Function (WfF). The ability to mass and synchronize fires at scale has been degraded and at risk in LSCO. (Fig. 1).

The purpose of this article is to set conditions for the ARNG Fires community, at all levels, to not only understand fires at echelon, but to fully contribute and be functional at a warfighter exercise. Developing this deeper understanding of the institutional Fires knowledge will provide the necessary foundation to provide requisite experience to support maneuver forces. This article does not replace Doctrine, but rather gives a guide to the resources available to the Fires WfF. This article also includes many concepts that are still being designed and developed for the foreseeable future.

Corps Realignment for WP28 (A concept)

The corps facilitates the action of three to five divisions in Large Scale Combat Operations (LSCO). Based upon METT-TC the Theater Army dictates the type of density of the corps. Divisions are set for specific mission types such as Joint Forcible Entry, Penetration, or Standard (Heavy/Light). Each of these divisions has a specific mission that can be applied in a number of scenarios.

The mechanism at the operational echelon for LSCO, from a historic perspective, was corps artillery, the single organization with the requisite authority, capability, and capacity to synchronize operational

Fires Command (OFC) integrates joint, inter-organizational, and multi-national targeting capabilities. The OFC is the command to plan, coordinate, and deliver joint all-domain fires to shape JFLCC/CORPS AOR. The OFC as an assigned headquarters is designed with the capability to strike targets beyond 500 kilometers. The OFC as currently conceptualized expands the former corps artillery structure to contain a functional FA command with hooks into two specific domains Space and Cyber to integrate lethal and non-lethal fires. OFC will have primary responsibility to execute Force Field Artillery (FFA) responsibilities for the CORPS, C2 multiple FA BDEs and be the CORPS FSCoord/Fires Synchronization/TGT Development. The OFC will have the ability to destroy the enemy Integrated Fires Command, enable freedom of maneuver for airpower, deliver deep joint fires, and mass reinforcing fires for subordinate divisions.

The current structure for corps requires a minimum of two assigned field artillery brigades. The scale and scope of LSCO necessitates multiple FABs. One FAB will be the counter-fire headquarters and the other will be the corps DS/GS field artillery headquarters. Current ROAs call for one additional FAB per Corps controlling three or more Divisions as re-enforcing. The corps FSCoord is the OFC commander and has command responsibility of the assigned FA BDEs. The OFC is the Force Field Artillery Headquarters (FFAHQ) for the CORPS.

Important to mention is the Tactical Command Post (TAC) that most artillery Soldiers know at the BCT level. The function is no different at the corps level primarily focused on conducting dynamic targeting operations. The TAC collaborates with the MCP for support as it relocates and synchronizes deep targeting requirements to support operations. At a minimum the TAC Fires cell include an AFSCoord, FSO, FSNCO Air Liaison Officer, Targeting Warrent, and Fire Support Specialists. A



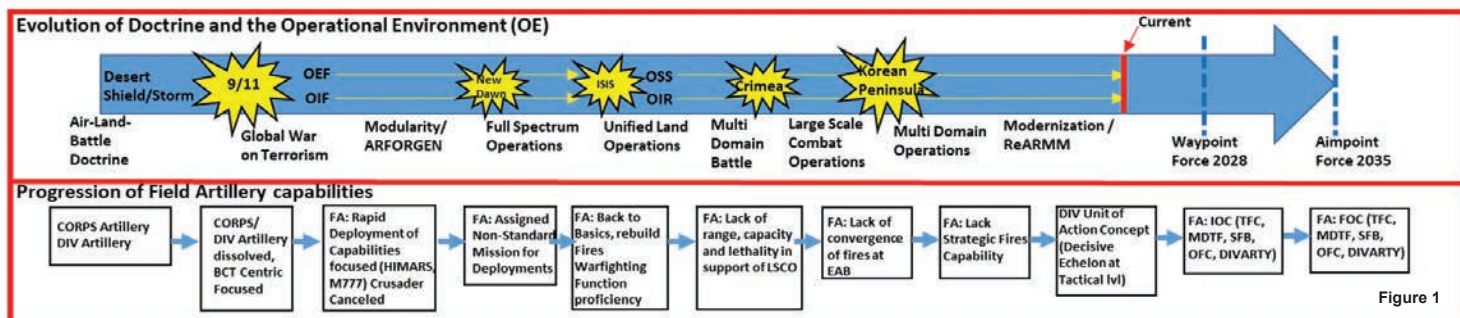


Figure 1

Corps TAC also include the Deputy for the OFC.

The AMD Cell and Space planners would also provide the current air picture and support dynamic targeting in support of the TAC which are rolled up under the Corps Fires Cell. These newly advanced capabilities of these AMD/Space sensors are essential to FA fires and Targeting. The TAC will have the capability to conduct deliberate/dynamic Army and Joint targeting.

As the ARNG fires community have experienced over the past decade of Division Warfighters, there has been some challenges with the function of the TAC. The most obvious is the utmost importance of the FSCOORD duties at echelon. As we delve further, the FSCOORD duties will be expanded upon as it applies from the operational to the tactical levels.

OFC: Fires Warfighting Function at Corps.

The OFC Fires Cell is composed of the Fires Coordination HQs, ADAM/BAE, Fires Support Element, Space, CEMA and Fires Cell Plans. The OFC Commanders is the corps FSCOORD and thus the senior fires officer assigned to the corps staff. USAF personnel assist the Fires Support Cell with the targeting process. The corps FSCOORD organizes and establishes the JTWG, which affords the corps commander the opportunity to provide input to the Joint Targeting Cycle planning and execution.

The OFC Fires Cell coordinates, plans, integrates, and synchronizes the employment and assessment of fires in support of current and future operations. The OFC Fires Cell develops high payoff targets and presents targets to the Commander or designated representative for attack. The OFC Fires Cell

recommends targeting guidance to the commander. The cell plans, synchronizes, coordinates, and integrates adaptable fires matched to a wide range of targets and target systems. The OFC Fires Cell coordinates target acquisition, target dissemination, and target engagement functions for the commander.

At the corps level, the air and missile defense section is integrated within the Fires Cell to ensure coordination of sense and warning systems, synchronization of fires, and airspace integration. The OFC Fires Cell coordinates activities and systems that provide collective and coordinated use of Army indirect fires, joint fires, and air and missile defense through the targeting process. The OFC Fires Cell includes elements of fire support, the Air Force TACP, the air and missile defense section, and liaison officers from joint or multinational fire support agencies.

The JFLCC/corps requires an Operational Fires Command, aligned Field Artillery Brigades (FAB), and key enablers (Joint/Army) to execute offensive and defensive operations across all domains, prosecuting targets across the JFLCC/corps AOR to enable convergence of effects in support of division tactical operations. The FAB supports corps counter-fire and deep shaping operations. The OFC is designated to command and control the assigned formations.

Field Artillery Brigade (FAB) (ATP 3-09.24, 9 July 2020, Draft)

A FAB's primary task is conducting strike operations and delivery of fires for the CORPS OFC. Strike is an attack to damage or destroy an objective or a capability (JP 3-0). The FAB can be task organized with fires delivery, and sensor systems to support the maneuver

commander's mission requirements. The FAB will be task organized underneath the newly created OFC as its higher headquarters. Depending on the needs of the JTF/CORPS Commander, multiple FABs may be aligned underneath the OFC to provide the maximum effective fires and counterfire capability to the commander to shape the JFLCC/CORPS AOR. The OFC assigns target sets to engage, target priorities, or effects to create. In most scenarios the FAB will be part of joint fires (refer to ATP 3-92 and ATP 3-93 for more on corps and theater army operations). The Army Service Component Commander exercises administrative control over the FAB through the OFC when operating under the control of the joint force commander or another Service.

In LSCO, the corps and division commanders are responsible for counterfire throughout the depth of their AORs. The corps or division commander can assign the role of counterfire HQ to a FAB, DIVARTY, or a separate FA BN. The counterfire HQ must be allocated the necessary assets to conduct the counterfire fight. During LSCGO a corps OFC should be allocated two FABs, one to serve as the counterfire HQ and one to serve as the GS/GSR role. The counterfire HQ should be allocated CAS and JTACs. The counterfire HQ will coordinate with the division and corps G-2 for sensor tasking authority and additional intelligence capabilities to integrate all available assets into the counterfire fight in a proactive manner.

A FAB could be tasked to reinforce another FAB or a DIVARTY. In this role, a FAB would be tasked to reinforce another FAB in order to provide additional fires capabilities for the supported command. When reinforcing a DIVARTY, this role

enables the FAB to provide fires as-sets not found organically in a di- vision to include long-range fires for division counterfire and shap- ing operations, reinforcing fires for BCTs, and the communications and logistical control assets a DIVARTY lacks.

National Guard FABs are ideal- ly configured for this role because of their combination of both rocket and cannon battalions, brigade sup- port battalion and signal company. The reinforcing FAB could also as- sume the role of the counterfire HQ for the reinforced FAB or DIVARTY. The FAB would assume control of the reinforced unit's WLRs opera- tions if operating under centralized control.

DIVISION as the Unit of Action Way- Point 2028 (Concept)

As documented throughout mil- itary history, the cyclical nature of combat operations necessitates the multiple redesign of our doctrine due to the fluidity of the complex environment. The most recent change that has occurred is the BCT centric concept of operations to the division as the unit of action for LSCO. This concept describes how the division formation, with all the enablers, meets the demands of LSCO. For the purpose of this arti- cle, the Fires WfF will be the center of this discussion.

Facilitating the division forma- tion capabilities and capacity make the division agile, lethal and MDO capable in LSCO. The standard divi- sion will have the capacity to con- trol three to five brigades which include the Division Artillery (DI- VARTY). DIVARTY enable the C2 of fires in support of division opera- tions, shapes the division AOR and integrates lethal/non-lethal fires.

The DIVARTY enables multiple employment options for the di- vision commander to support the main effort, supporting effort, and coverage effects across the division AO. Enhanced weapons and unit types are considered for this forma- tion to include DIVARTY, Extend- ed Range Cannon Artillery (ERCA), Long Range Cannon Artillery, Hy- personic Weapons, and Integrated Fire Protection Capability (IFPC)

and maneuver short range air de- fense (MSHORAD). ERCA is a game changes for the Division as it will be organic to select DIVARTYs. ERCA will provide that GS Long Range Precision Fires (LRPF) for the sup- ported Maneuver BDEs in the close fight. Current initial force mix for ERCA is 2xRA and 2xARNG. Sta- tioning is still pending Senior Lead- er Decision.

DIVARTY (ATP 3-09.90, 12 October 2017)

The DIVARTY is the brigade level command that plans, prepares, ex- ecutes and assesses fires for the di- vision. The DIVARTY commander is the FSCOORD for the division, and is the primary advisor to the divi- sion commander for the Fires WfF.

The Army National Guard (ARNG) have been authorized eight DI- VARTYs. Each ARNG DIVARTY is aligned with an ARNG division. The ARNG FAB primary role will be the GS/GS-R and counterfire BDE to an active component OFC. The ARNG FAB's unique structure of- fers commanders at the division level and above, the fires assets for a wide range of mission types in- cluding deep fires, a corps/division level counterfire capability, and the means to reinforce brigade combat teams (BCT) field artillery battal- ions. The FABs assigned to active component corps OFC are routinely task organized with multiple launch rocket system (MLRS) and high mobility artillery rocket system (HIMARS) battalions. The ARNG FABs may have cannon, MLRS, and HIMARS battalions.

The DIVARTY is the force field artillery headquarters for the divi- sion. The DIVARTY commander as the DIV FSCOORD is responsible for integrating all forms of Army, Joint and Multinational Fires to include nonlethal capabilities. The divi- sion fires cell provides effective ex- change of information to adjacent headquarters, subordinate division elements, and other warfighting functions. The DIVARTY command- er can integrate the division fires cell with all or part of the DIVARTY staff and targeting personnel.

It is important that nonlethal ca- pabilities are integrated with fires.

The FSCOORD, DIVARTY operations officer, DIVARTY intelligence offi- cer, and appropriate staff officers assist the division with the integra- tion of nonlethal capabilities such as electronic warfare, cyber elec- tromagnetic activities, military in- formation support operations, and information operations. These ca- pabilities are integrated into opera- tions using already established joint and Army processes such as intel- ligence, targeting, and the military decision making process (MDMP).

Overall, the division commander is responsible for targeting inside the division AO. The division chief of staff has a key leadership role in synchronizing the division's tar- geting effort by supervising various staff sections that contribute to the targeting process. The division uses decide, detect, deliver, and assess (referred to as D3A) methodology to conduct targeting. The command- er's targeting guidance, mission statement, intent and prioritized objectives set the stage for target- ing. The FSCOORD (DIVARTY CDR) advises the division commander with formulating targeting guid- ance and oversees targeting func- tions.

Some clarity on the roles of the DI- VARTY vs the FAB:

- FABs belong to the corps and aligned underneath the OFC (pend- ing SL decision) to provide GS/GSR fires and counterfire capabilities to shape the JFLCC/Corps AOR
- DIVARTY with its organically aligned BCT FA (DS) BNs (pending SL decision) belong to the Division Commander to weight the main ef- fort and shape the Division AOR
- Currently the DIVARTY receives all sustainment support from the DIV's sustainment BDE or CSSB (Pending DIVARTY as a Formation FDU, or- ganizes BCT FA (DS) BNs under- neath the DIVARTY which will cre- ate a BSB organic to the DIVARTY)
- The pending creation of the DI- VARTY BSB will help overcome the ammunition management chal- lenges for Division FA units for sustained rate of fire for LSCO

FSCOORD Final Note

The importance of the FSCOORD

at all levels cannot be more profoundly important than in LSCO. Fires will be the decisive effort to shape the battlefield in a MDO environment. Fires must be able to provide freedom of maneuver for our Joint Force to close with and defeat our near-peer adversary in high intensity conflict. It is imperative, as the FSCoord, to plan and coordinate fires effectively incorporating the new modernized capabilities and changes to organizational design. The following are key takeaways from lessons learned on how to effectively execute FSCoord duties and responsibilities:

- Planning, preparing, executing, and assessing all aspects of fire support for operations and addressing them in rehearsals.
- Working with the air and missile defense officer in synchronizing and integrating fires warfighting function capabilities with the other warfighting functions in support of operations.
- Developing a scheme of fires to support the operation with the commander, FSCoord, and S-3.
- Planning and coordinating fire support tasks in close coordination with the S-3 to support timely development of the field artillery operations order or field artillery support plan.
- Developing a proposed high-pay-off target list, target selection standards, and attack guidance, targeting synchronization, and fire support execution matrices.
- Coordinating the positioning of fire support assets for operations.
- Providing information on the status of fire support attack assets, target acquisition assets, and field artillery ammunition.
- Recommending fire support coordination measures (FSCMs) to support current and future operations, and addressing them in rehearsals.
- Recommending and implementing the commander's counterfire (including radar zones) and other target engagement priorities.
- Recommending to the commander the establishment, responsibilities, authorities, and duties of a force field artillery headquarters, as necessary.
- Integrating and synchronizing

Army indirect fires, joint fires, and multinational fires with the other warfighting functions.

- Directing and supervising the main command post fires cell to provide fire support for operations and in the development of respective products to support operation plan (OPLAN) or operation order (OPORD) development, including Annex D (Fires) as necessary.
- Advising the commander and staff of available fire support capabilities and limitations.
- Leading the targeting working group, key word is LEADING.
- Coordinating the targeting process. Directing the attack of targets by fires in accordance with the commander's established priorities and desired effects.
- Working with the chief of staff or executive officer, and S-3 to integrate all types of fire support into the commander's concept of operations.
- Participating in and providing critical fires input to the military decision-making process (MDMP).
- Coordinating requirements for fire support personnel to support mortar training and calls for indirect fire by maneuver personnel.
- Accompanying the commander during the execution of tactical operations, when directed.
- Facilitating the synchronization and integration of fires and maneuver.
- Developing an internal battle rhythm to receive running estimates of information and rehearsal times synchronized with BCT and subordinate unit battle rhythms.
- Establishing, in conjunction with the S-6, a communications plan for primary, alternate, contingency, and emergency means for fire missions and reporting.
- Coordinating the deliver function of targeting.
- Directing the attack of targets by fires in accordance with the priorities and desired effects established by the commander.
- Keeping the commander and staff informed of the current status, location, and activity of all fire support assets.
- Working with fires cell targeting officers and S-2 to keep maneuver

S-2s informed of enemy indirect fire capabilities and limitations.

- Ensuring lower echelon FSOs are aware of assigned fire support and field artillery tasks, and are refining targets in accordance with top-down fire planning.

CONCLUSION

This article is not the end all for your fires WfF needs, but rather a starting point to rethinking the artillery doctrine you need to know to be the FA SME. References for DOTRINE are posted throughout for further education and more specific details if needed. The changes are coming fast and furious for the FA, and all inherently positive application of fires at all echelons. Fort Sill ARNG personnel stand by at all times to assist the field in all things Field Artillery.

About the Authors:

LTC Bradley Rittenhouse currently serves as the Deputy Chief of Staff for DCG, ARNG at FCoE. His primary duties include representing the ARNG in regards to mobilizations, deployments, training, and daily inquiries impacting ARNG field artillery units across 54 states and territories. His previous assignments include duty as the Deputy Assistant Commandant, US Field Artillery School; Integration Chief, CDID; Field Artillery Organizational Integrator, National Guard Bureau; Assistant TRADOC Capabilities Manager at FCoE. His operational experience include Field Artillery Battalion Command, Field Artillery Firing Battery Command, and multiple staff positions at FA battalion and brigade levels.

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BONUS Rounds uncrated at the Firing Point.

Destroying Armor in the Deep Fight

Observations from the First BONUS MK II Live Fire

By: LTC Mike Tumlin and CPT Aaron Stout

In the spring of 2021, Battery C (Chaos), 4th Battalion, 319th Airborne Field Artillery Regiment, 173rd Airborne Brigade (C/4-319th AFAR, 173rd IBCT{A}), deployed from Grafenwohr, Germany, to Camp Canjuers, France, for Operation Bonus Strike with the 93^{ème} Régiment d'Artillerie du Montagne (93eRAM) to live Fire and evaluate the 155 mm BONUS MK II Round. Operation Bonus Strike 21 marks the first operational live fire of the BONUS MK II Round outside of testing by a U.S. Army Field Artillery unit. The BONUS MK II Round is an armor defeating munition newly acquired across the U.S. Army and provides a critical capability to Maneuver Commanders in Large-Scale Combat Operations. The purpose of this article is to provide observations and lessons learned during 4-319th AFAR's operational live fire of the BONUS MK II Round to enable effective employment of the capability across the force.

BONUS MKII Round Overview

The BONUS MK II Round is a 155 mm cannon-launched, top-attack, anti-armor shell containing two sensor-fuzed, armor-detecting submunitions. When the munition is fired and reaches the target area, a time fuze activates, causing a small ejector rocket to detach from the shell. This ejector pulls out the two submunitions which then begin scanning a 200-meter area for heat signatures. Upon detecting a target vehicle by its heat signature, the submunition detonates its explosive payload by creating an explosively formed projectile that strikes through the target's top armor. These submunitions are designed to penetrate the vehicle's hull to destroy the target and personnel inside. The BONUS MK II can only be employed using M232 Hotel Charges and the M762A1 Electronic Time Fuze.

When employing the BONUS MK II Round during operations,

Commanders must be aware of the explosively formed projectile hazard area. The hazard area is a 5,000-meter radius added to the perimeter of the dispersion area to account for the potential of the munition to detonate on the ground. The BONUS MK II Round is currently not authorized for overhead Fires due to the low probability of early fuze-function resulting in the submunitions searching for targets short of the target area.

When employed effectively, the BONUS MK II Round provides Maneuver Commanders the ability to destroy threat armor well beyond the range of direct Fire weapon systems. During Saber Junction 19 and 20, two Multi-National Combat Training Center rotations at the Joint Multinational Training Center, the 173rd IBCT(A) effectively planned for BONUS MK II employment during the targeting cycle to identify targets and associated triggers to destroy enemy capabilities in the brigade's Deep Fight.

Firing Line Observations and Considerations

BONUS MK II Rounds are palletized with two plastic containers stacked vertically. Each container stores three rounds and weighs 337 pounds, for a total of six rounds per pallet. The total weight of the pallet is 720 pounds and requires a forklift to move in this configuration. For safe transport, a round cannot be transported in the Loose Projectile Restraint System (LPRS). BONUS MK II Rounds can only be stacked horizontally, not to exceed a height of two stacked containers, and must remain in the containers until a valid Fire mission is processed. We estimate one M10883A1 FMTV is capable of hauling 36 BONUS MK II Rounds and an MTOE-equipped M777 Towed Howitzer Battery has the potential to haul 360 BONUS Rounds, propellants, and fuzes, if not carrying other munitions and no LPRS is installed.

The packaging, weight, and handling requirements create a logistical challenge as the rounds require additional equipment to move when conducting refuel, rearm, and resupply operations. When using the FMTV to conduct resupply operations, 4-319th AFAR is not equipped with the cranes for the vehicle and must disassemble the packaging outside and then reassemble the packaging inside the vehicles. This increases the amount of time to conduct these rearm operations and creates a risk to the force as ammunition sections and the distribution platoon's exposure to potential enemy observation and engagement increases.

At the Howitzer section level, storage and handling requirements for the BONUS MK II Round prevents rapid employment. It is recommended that BONUS MK II Rounds are stored in the three-pack plastic containers until a Fire mission is processed. This creates additional time to unpack and prepare the rounds for firing which Commanders must consider. During 4-319th AFAR's live Fire, storage and handling procedures added 15 seconds to remove the round out of the transport case then fuze before verification by the section chief. This increased time could be mitigated by following standard section ammunition pit-procedures and pre-fuzing rounds for planned targets. For on-call targets, the Howitzer section must work through procedures to fuze the rounds after receiving the mission adding additional time to the Fire mission before the shot.

A final consideration when firing the BONUS MK II Round is the security and survivability of the firing element. During the round's flight, the BONUS MK II Round produces a white trail as it reaches the apogee of the flight path. Our observers have positioned over 16 km from the firing unit and identified distinct trails produced by the round from



Battery C (Chaos), 4th Battalion, 319th Airborne Field Artillery Regiment, 173rd Airborne Brigade live Fires the BONUS MK II Round in Camp Canjuers, France. Battalion FDC with French ATLUS.



BONUS Effects



LHS ammo showing crate storage compared against M795s in LPRS

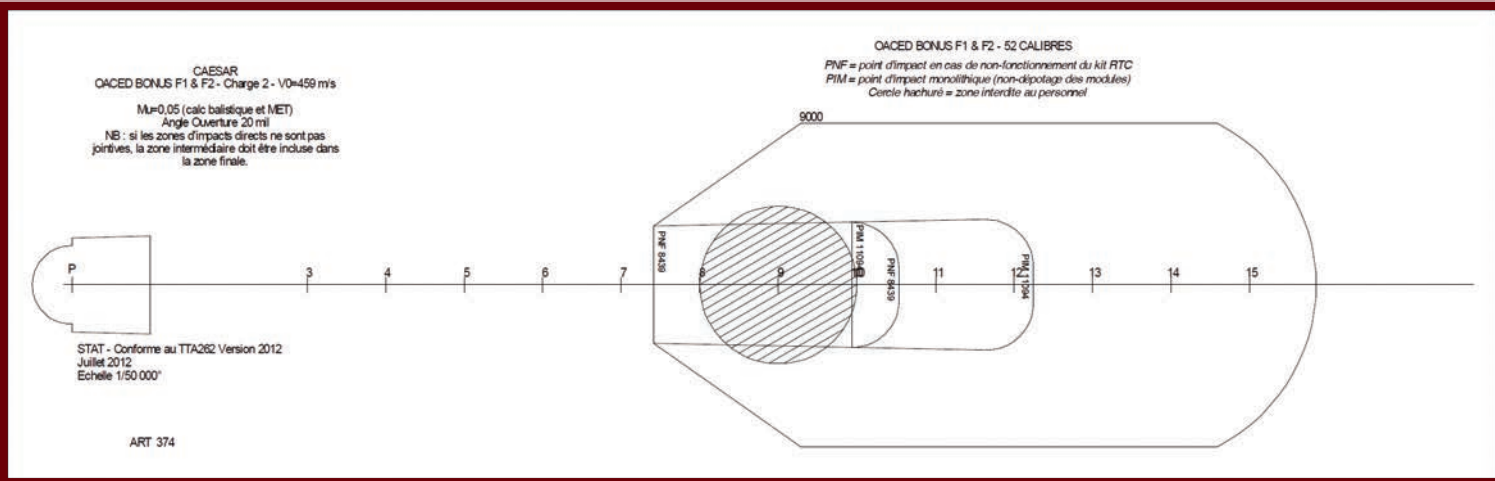
the observation post, which enabled the observers to identify the firing unit's location. This signature presents a security concern for firing batteries when operating in a contested environment and should be accounted for in Commander's survivability move criteria.

Fire Direction Observations and Considerations

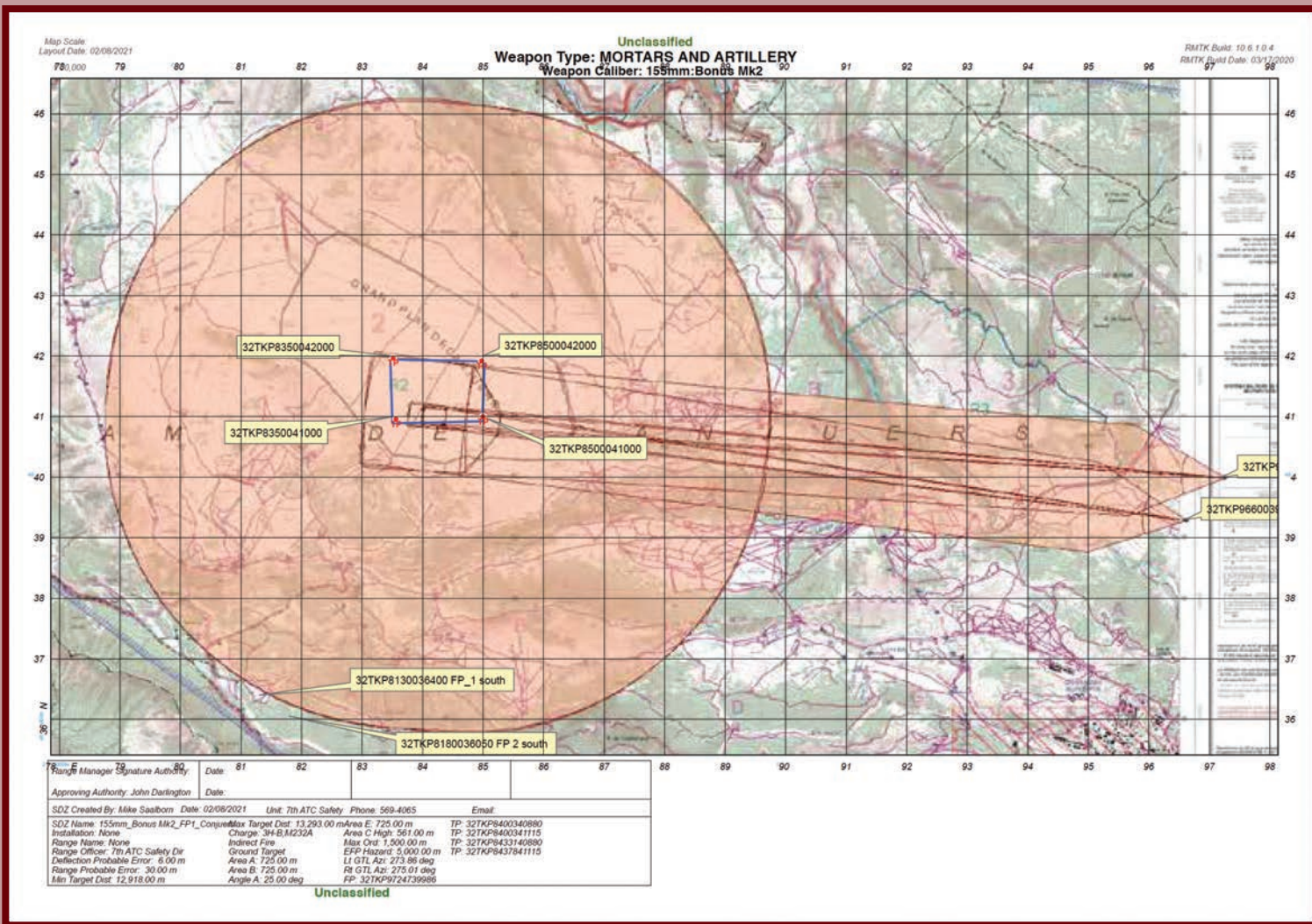
During the 4-319th AFAR BONUS MK II Round live Fire, there were no changes in current procedures required from the Brigade and Battalion level to process the mission to the firing unit's Fire Direction Center. Using the Howitzers in ready status, the AFATDS and the Howitzers were able to conduct their independent safety checks and verify the Fire commands prior to firing.

When computing firing data for the BONUS MK II Round, 4-319th AFAR observed that we were required to add 125 meters to the target altitude to account for activation of the munition and search area for the submunitions. During our live Fire, observers provided accurate target location using the Lightweight Laser Designator Rangefinder 2H and requested Fire on static tank hulks prepared with boilerplates to provide a sufficient and realistic heat signature. The initial round impacted approximately 300 meters long on gun-target line and functioned at approximately 25 meters height-of-burst above the impact area. Observers corrected to adjust the impact of the next round to target, however, the correction only slightly moved the round closer to the target with a similar height-of-burst observed.

In a subsequent Fire mission, the Fire Direction Center applied 125 meters to target altitude which allowed the round to function over the target area, and then identify and destroy the target. This adjustment was based on the recommendation of 93eRAM Fire Direction personnel from experience gained over ten years firing the BONUS MK I annually. The BONUS MK I round is ballistically similar to the MK II, and functions in the same manner described above; the difference being the thermal sensors on the



Comparison of French (Above) SDZ versus U.S. (Below) SDZ.



MK II submunitions have higher fidelity to acquire the highest heat signature on the target.

A key area of focus to further enhance the capability gained for the Maneuver Commander by the BONUS round is the ability to fire the round during degraded operations. Current computational procedures only allow for the BONUS round to be fired digitally from the AFATDS with Howitzers in 'ready status.'

Therefore, the Fire Direction Center was required to use two AFATDS in Hot Box / Cold Box configuration to verify computational data safe. This may present challenges to batteries fighting decentralized platoons due to terrain or mission requirements should they lose digital capability. A proposed fix is to create a manual computational solution building off of the M864 Dual-Purpose Improved Conventional Munition

firing tables to enable firing in a degraded status. Until an approved firing table is developed, U.S. Army Field Artillery units will only be able to fire the BONUS MK II Round digitally.

Fire Support Procedures and Observations

Fire supporters from across 173rd Infantry Brigade Combat Team (Airborne) provided observation during the 4-319th AFAR BONUS live-Fire exercise. Calls for Fires were routed by voice to the Brigade Fire Support Element before routing digitally to the Battalion Fire Direction Center. Currently, digital Fire support software with the capability to select the BONUS MK II Round is not fielded to the force. To request BONUS, forward observers must include the shell selection in the call for Fire request. This creates a delay in the time to modify the Fire mission before it can enter into the digital chain from sensor to shooter. Planned updates to the software will remove this concern and streamline the process along the digital Fires chain in the future.

Alternatively, BONUS MK II employment should be intentionally planned for during the Brigade's targeting process and further managed through Target Selection Standards and Attack Guidance to ensure the Maneuver Commander can fully leverage the capability of the round. The 173rd BDE Targeting Officer noted BONUS round employment must be deliberately planned and accounted for as pre-planned targets. Based on the transportation and handling requirements, as well as the firing procedures described above, Commanders and staff must thoroughly develop triggers to allow sufficient time to initiate the Fire mission and allow Howitzer sections to prepare rounds for use – especially for moving targets.

French Bonus Observations

While the battery conducted training at Camp Canjuers, subject matter experts from the 93eRAM provided lessons learned from their experience shooting the round. The 93eRAM openly shared their observer, Fire direction, and gun-line experience and proved invaluable to the success of 4-319th AFAR. We found French artillerymen's experience pivotal to our employment and successful engagement of the BONUS MK II Round. While training alongside a key NATO ally, 4-319th

AFAR observed several differences in the manner in which we deliver Fires, most notably differences in the Surface Danger Zones (SDZ) for this round.

Standing safety messages for live firing the BONUS MK II Round requires a 5,000-meter hazard area from the target, while the French use a 7,000-meter extension to Danger Area B of their computed SDZ. French artillerymen clarified that there is a greater hazard from the BONUS round at increased distances as opposed to a premature activation for the submunitions. While the French incorporate a larger Danger Area A, they do not include a hazard area as part of their calculations and requirements for firing artillery rounds.

Throughout Operation BONUS STRIKE, the 93eRAM Operations Officer discussed his unit's observed trends when employing the BONUS MK I. Per his experience over ten years of operational use, the BONUS MK I round tends to fire long of the target area. This trend is consistent with our initial rounds fired, observed long on the gun-target line. The solution the French Army has now adopted is to plot BONUS round impact approximately 100 meters short of the intended target. This technique reduces the quadrant required to minimize the probability of the round activating past the target area. Another option is to add 125 m to the target altitude as highlighted earlier in this article to allow the submunitions the maximum opportunity to identify the target within the 200-meter search area. The 4-319th AFAR's observations are limited to live firing four rounds and we recommend further operational testing and live-Fire of the BONUS MK II Round to determine accurate computational procedures.

Conclusion

Operation BONUS STRIKE 21 enabled 4-319th AFAR to evaluate and further learn procedures to effectively employ the BONUS MK II Round from our French counterparts. The BONUS MK II Round provides Maneuver Commanders an all-weather capability to defeat

threat armor in the deep fight. Importantly, this opportunity highlighted a strong NATO alliance and demonstrated our combined ability to destroy adversary armor in the European theater.

About the Authors:

LTC Mike Tumlin is the Battalion Commander for 4th Battalion, 4th Security Forces Assistance Brigade, and the former Battalion Commander for 4-319th Airborne Field Artillery Regiment, 173rd Airborne Brigade. LTC Tumlin has served from the Platoon to Division level in the 82nd Airborne Division, as well as in the Asymmetric Warfare Group and Joint Special Operations Command.

CPT Aaron Stout is the Battery Commander for C Battery, 4-319th Airborne Field Artillery Regiment. He holds a BA in Nuclear Engineering from the United States Military Academy. His previous assignments include Fire Direction Officer, Platoon Leader and Fire Support Officer in 1st Brigade, 82nd Airborne Division, 173rd Brigade Air Officer and Assistant Brigade Fire Support Officer, and Battalion Fire Direction Officer at 4-319th Airborne Field Artillery Regiment.



“In the end, Commanders often find their Brigade and Battalion staff training programs treated as an afterthought.... Due to a myriad of competing demands, some staff training programs often devolve into a series of brown bag lunches and tactical decision exercises. While these types of sessions may help a staff, they lack both the depth and breadth of a holistic training program designed to train our staffs to plan, prepare, and execute operations simultaneously.”

Colonel Michael J. Simmering in “Building Your Brigade Staff Training Program” (2020)

Training Your Staff and Command Posts: The “Artillerization” of TC 6-0

By: MAJ Jeffrey E. Horn, Jr.

Major Smith, the new Executive Officer for 2-48th Field Artillery battalion, is deployed in support of combat operations in the Baltics. After several close calls, he has an ever-present fear of enemy artillery, and is keenly aware of how cumbersome and slow the staff displaces and establishes the main command post. Major Smith hasn’t slept well in days, as he struggled to lead his staff through the operations process. He is burdened with seemingly untrained and thinly manned digital operators, as well as Noncommissioned Officers (NCO) and junior staff officers that have little experience in the Military Decision Making Process (MDMP). He wishes he had more time to train before the deployment, but now his only hope is to improve his organization during combat operations.

Introduction

Field Artillery (FA) command posts (CPs) often struggle with the operations process, integrating and adequately training all mission command information systems (MCIS), utilizing the Noncommissioned Officer (NCO) corps in staff processes, and the general survivability of CPs. Frequently cited causes of these issues are “lack of repetitions” in home station training. While lack of repetitions may contribute to the problem, the real issue is the lack of structure and substance in training the Command and Control (C2) warfighting function (WfF). FA organizations approach the training of CPs in an unorganized, inefficient, ill-defined, and incomplete fashion. The Training Circular (TC)

6-0 series manuals provide an iterative, progressive approach that solves this problem, enabling the C2 WfF proficiency in FA CPs.

The TC 6-0 series manuals (See Figure 1) are training strategy tools that provide a standardized and effective framework to train the C2 WfF within FA CPs. TC 6-0 (Training the Command and Control Warfighting Function) is the introductory guide to the series. TC 6-0.1 discusses a framework training strategy for the training and certification of digital crews. TC 6-0.2 and TC 6-0.4 provide training frameworks for different echelons, from battalion to corps. Each TC contains progressive and iterative Command and Control Training Tables (C2TT) across the commander,

staff, CP, and digital crew.

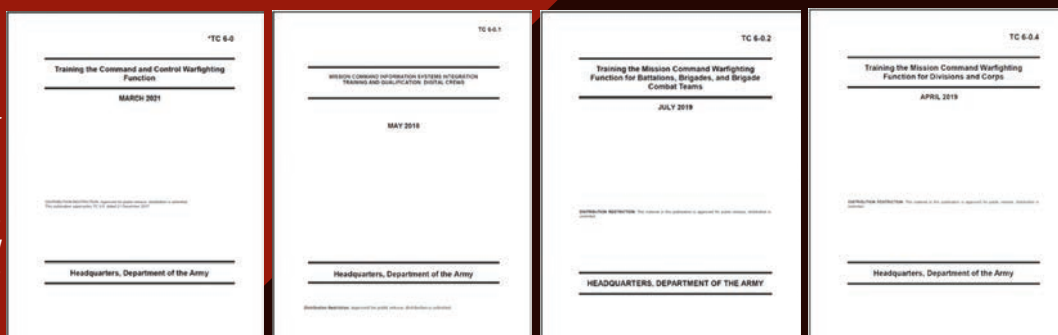
This article recommends the FA community learn to treat the training of staffs and CPs with the same rigor and structure applied to Artillery Tables. FA battalions should integrate the C2TT with the TC 3-09.8 (Fire Support and Field Artillery Certification and Qualification), and all FA CPs should utilize the C2TTs for three reasons. First, the C2TTs maximize efficiencies by providing an iterative and progressive approach to train staffs on the operations process. Second, they provide a structured

Figure 1

The Training Circular 6.0 Manuals

NOTE 1: Titles will be updated to reflect Command and Control warfighting in their next version.

NOTE 2: TC 6-02.1 (The US Army Signal Corps 2019 Training Strategy) is beyond the scope of this article; however, it is a valuable resource to train retransmission teams.



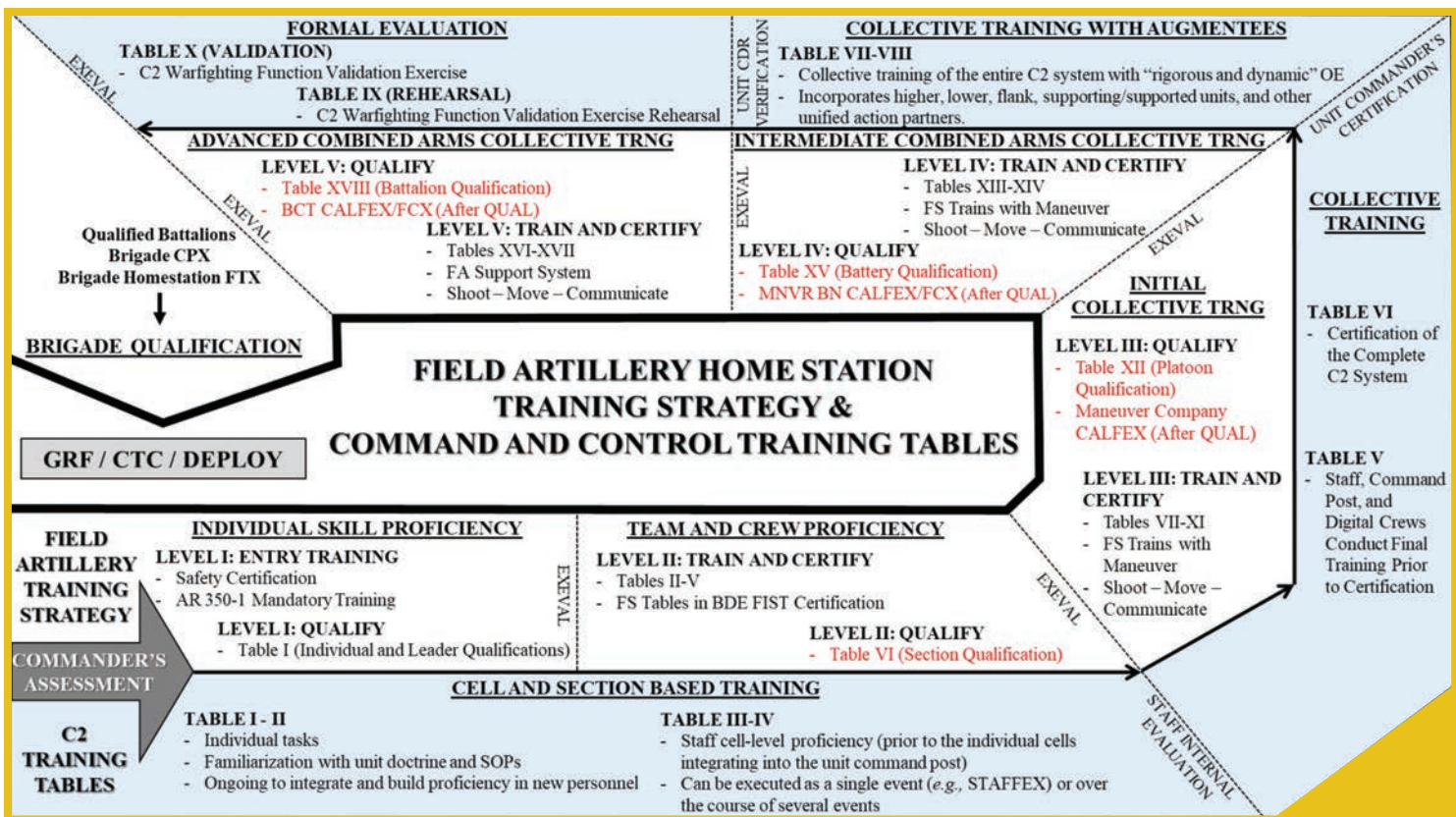


Figure 2: The Field Artillery Home Station Training Strategy and the Command and Control Training

approach to better enable the full integration of all MCIS into fire mission processing, planning, and CP operations. Finally, they provide a crawl-walk-run approach to improve the survivability of CPs.

Training Management Methodology

FA organizations are understandably laser-focused almost solely on Artillery Tables, unfortunately leading many staffs without a basic understanding of roles and responsibilities – much less adequate repetitions on the MDMP. As depicted in Figure 2 and Figure 3, the C2TT are progressive training tables that build from individual skills to collective training with augmentees, culminating with an external evaluation in a “rigorous and dynamic” operational environment. The C2TT, particularly when utilizing the collective task and task set numbers embedded in each table, provide a helpful framework to enable commanders, staffs, CPs, and digital crews to excel throughout the operations process. For FA battalions, the recommended approach is achieved by overlaying the FA Training Strategy with the C2TT (See Figure 2).

The C2TT maximize efficiencies saving time and effort by providing a basic framework for staff training, as well as task, condition, and standards inherent in each of the training tables. Many CP training events result in hours wasted in inefficient planning, preparation, and execution. The C2TT mitigates this problem by creating a common understanding of expectations. For example, as a staff executes a Staff Exercise (STAFFEX) encompassing C2TT III and IV, they immediately understand training requirements and expectations. Further, the C2TTs provide an extensive portfolio of individual, collective, and drill task training and evaluation outlines (T&EO) for leaders to use when establishing clear training objectives. When armed with shared understanding and the right training tools, leaders in the organization are better equipped to maximize every training hour.

A Standardized Approach to the Basics

The C2TT provides a cyclical foundation rooted in the basics across digital crews, the staff, the CP, and the commander. The TC 3-09.8 introduces 27 battalion col-

lective tasks beginning in Artillery Table XVI, but it lacks a structured approach to train the battalion C2 WfF prior to Table XVI. This leads commanders – or more likely their Executive Officers and Operations Officers (S3) – to develop a progressive approach to train the staff, digital crews, and the entire CP prior to the battalion collective tables. While this seems like a mundane task, planning and synchronizing the training of the C2 system is easier said than done, particularly when garrison requirements and other training distractors impede efforts.

If the C2TTs are integrated with the FA Training Strategy at the beginning of a training cycle, units can maximize the collective efforts of the entire CP, enabling C2 WfF

TABLE	COMMANDER	STAFF	COMMAND POST	DIGITAL CREW	TRAINING EVENT	MULTI-ECHELON & CONCURRENT TRAINING OPPORTUNITIES
I	Establish Organizational Business Rules; Develop Training Strategy	Organize and Acclimate Staff to the Organization	Conduct Pre-Combat Inspection	Execute Basic Command and Control Information System Operations	Class	Integrated with Weekly Digital Sustainment Training and/or Command Maintenance
II	Establish the Training Environment	Develop Military Decision Making Process Skills	Identify Command Post Characteristics	Integrate Command Post Systems	Class	
III	Frame the Operation	Establish Staff / Cell Processes and Integrate Warfighting Functions	Establish Command Post Infrastructure	Develop the Common Operational Picture	STAFFEX	Artillery Tables I-V Artillery Table VI FS Tables in BDE FIST Certification
IV	Prepare the Headquarters for Operations	Synchronize Command Post Operations	Conduct Command Post Survivability and Sustainability	Synchronize Operations		
V	Drive the Operations Process	Conduct the Operations Process	Rehearse Command Post Operations	Conduct Command and Control System Rehearsal	CPX	Artillery Tables VII-XI Artillery Table XII MNVR CO CALFEX
VI	Assess and Certify the Headquarters	Conduct Staff Certification	Conduct Command Post Certification	Digital Crew Certification	CPX	Artillery Tables XIII-XIV Artillery Table XV (BART) MNVR BN CALFEX/FCX
VII	Direct Command and Control System Integration	Integrate the Command and Control System	Conduct Command Post Operations	Integrate the Command and Control System	STAFFEX	
VIII	Command Forces and Control Operations	Synchronize Operations with Unified Action Partners	Sustain Command Post Operations	Synchronize Operations with Unified Action Partners		
IX	Command and Control Validation Exercise Rehearsal				CPX	Artillery Tables XVI-XVII BCT CALFEX/FCX
X	Command and Control Validation Exercise				Validation	Table XVIII (DART) BCT FTX

Figure 3: The Command and Control Training Tables and Multi-Echeloned and Concurrent Training Opportunities

proficiency. Figure 4 depicts highlights of basic requirements (embedded in the C2TT) that should be accomplished before the battalion collective tables of the TC 3-09.8. Each of these basic requirements cannot be discussed in-depth

Digital Crew Proficiency

The TC 6-0 series manuals maximize proficiencies in MCIS by leveraging Mission Command Digital Master Gunners (MCDMG) to provide a standardized approach to

A STANDARDIZED APPROACH TO THE BASICS

C2TT I	C2TT II	C2TT III	C2TT IV	C2TT V
Understand unit doctrine applications 150-LDR-8000	Complete unit standard operating procedure review and updates 150-LDR-8001	Develop initial command post architecture 150-MC-5003	Direct common operational picture requirements 150-MC-5315	Determine the Commander's Critical Information Requirements 150-LDR-5019
Establish a leader professional development program 150-MC-8005	Establish planning/training guidance 150-LDR-5321	Delegate authorities (Designate Succession of Command) 150-LDR-5320 / (Delegate Authority) 150-LDR-5319	Provide battle rhythm guidance 150-MC-5123	Establish the COP 150-MC-5315/71-BN-5319
Assess capabilities and establish MCIS requirements 150-MC-5251	Establish inputs and outputs for the staff 150-LDR-5011	Conduct MDMP for Battalion 71-BN-5111 Conduct Mission Analysis 71-BN-5112 and intelligence preparation of the battlefield, Conduct a risk assessment 150-MC-5145, Engage in Course of Action Development 150-MC-5114, Conduct Course of Action Analysis (War-Gaming), 150-MC-5115 Recommend CCIR, 150-MC-5113 Conduct a Course of Action Decision Brief, 150-MC-5009 Prepare an OPORD 71-BN-5119	Refine CP architecture 150-MC-5200	Finalize the battle rhythm (Establish a Battle Rhythm) 150-MC-5123
Understand unit doctrine applications, staff duties, responsibilities, and SOPs 150-LDR-5007	Conduct the MDMP (Conduct The MDMP For Battalion) 71-BN-5111, individual MDMP tasks 150-MC-5110 thru 150-MC-5121	Develop KM Plan (Integrate Shared Understanding Through Knowledge Management) 71-BN-5330	Refine training guidance 150-LDR-5321	Finalize CP Crews, Roles, and Responsibilities 150-MC-5205
Conduct WFF and CP organization 150-LDR-5013	Conduct RDSP 71-BN-5002	Identify power generation requirements (Conduct Command Post Operations) 150-MC-5200	Conduct Rehearsals (combined arms, fires, intelligence, etc.) 71-BN-5122	Displace the Command Post 71-BN-5201
Inventory command post equipment (Conduct Command Post Operations) 150-MC-5200	Develop Running Estimates 71-BN-5144	Establish the COP 150-MC-5315	Practice staff battle drills (see FM 6-0)	Finalize load plans (Conduct Command Post Operations) 150-MC-5200
Identify sustainment requirements for the command post(s) 71-CO-0433	Review commander's decision support template & decision support matrix (Conduct The MDMP For Battalion) 71-BN-5111 / (Conduct the MDMP) 150-MC-5111		Establish the CP 71-BN-0050	Finalize command post architecture 150-MC-5202
Schedule maintenance requirements 150-MC-5200	Conduct section rehearsals 150-MC-5122		Formalize shift crews (Lead A Shift Change) 150-MC-5205	Identify electromagnetic signature 113-25E-3003
Setup the mission command information system for operation 150-MC-5250	Verify section outputs 150-LDR-5011		Verify command post SOP functionality (Conduct CP Operations) 71-BN-5200	Conduct battle drills 150-MC-5200
Prepare mission command information system for transit and Operations 150-MC-5250	Develop section training plans 150-COM-7170		Establish a Battalion Command Post in an OE 71-BN-0050	Establish the COP 71-BN-5319
Exercise MC Under Degraded Conditions 150-DMG-2020	Design command post configuration 150-MC-5202		Establish the command post security plan 19-CO-2204	
	Review command post SOPs 150-MC-5200		Establish a sustainment plan 71-CO-0433	
	Identify functional gaps and commercial solutions 150-MC-5202		Finalize shift crews 150-MC-5205	
	Share data products with the mission command information system 150-DMG-2007		Finalize shift crew responsibilities 150-MC-5200	
			Manage SIGACTS 150-DMG-3009	
			Present a Command Post Update Brief 150-DMG-2016	

KEY			
COMMANDER	STAFF	COMMAND POST	DIGITAL CREW

Figure 4: A Standardized Approach to the Basics (Note: The tasks listed here are not all-inclusive within each C2TT.)

train and certify digital crews. Informal surveys with FA professionals across the force highlight a lack of awareness of the digital crew training tables within the TC 6-0 series manuals. Typically, the extent of the training plan for most digital C2 systems begins with a troop school and then continues

with on-the-job training. While these are important training activities, leveraging the MCDMG and using the digital crew training tables provides a more efficient and effective way to train and certify digital crews.

The TC 6-0 series manuals create a basic framework to exercise a unit's information systems primary, alternate, contingency, and emergency (PACE) plan and ensure depth in digital crews. The TC 6-0.1 (Mission Command Information Systems Integration Training and Qualification: Digital Crews) provides a train-up with a deliberate effort to train the breadth of the PACE plan, including time to cross train personnel and provide depth of digital crews. For artillery organizations, one approach is to integrate weekly digital sustainment training and/or command maintenance with digital crew C2TT I-II, and C2TT III-IV conducted as one or more STAFFEXs concurrently with Artillery Tables I-VI (See Figure 2 and Figure 3). Culturally, FA professionals inherently understand

the value of a gated and progressive training strategy; the strategy to train all C2 digital systems within the CP should be no different.

Leveraging Concurrent and Multi-Echelon Training

For FA battalions, the TC 6-0 series manuals pair nicely with the FA Training Strategy to provide numerous multi-echelon and concurrent training opportunities. Due to the extensive training requirements inherent in the Artillery Tables, concurrent and multi-echelon training opportunities are well utilized in most FA CPs; however, FA CPs often struggle to focus training by providing training objectives during these concurrent and multi-echelon training opportunities. The C2TT provides commanders a tool to focus training objectives, as well as assess their formations with Figure 2 and Figure 3 provide some example multi-echelon and concurrent training opportunities for FA battalions that overlay with the C2TT.

The C2TT maximize the training efficiencies on the operations process by leveraging virtual and constructive training exercises, often as a part of a concurrent or multi-echelon training opportunity. Virtual and constructive training provide opportunities to stress staff processes without the costs and time associated with major collective training exercises. Virtual and constructive training opportunities are now even more vital to maintain staff proficiencies under the Regionally Aligned Readiness and Modernization Model, as units conduct deliberate periods of modernization that may limit major collective training opportunities. Without live training units, this is particularly important to train the collective tables of the C2TT. The simulation capabilities available at most installations mitigates much of the need for live training units to maintain C2 proficiencies.

Conclusion

FA organizations approach the training of CPs in an unorganized fashioned due to an inadequate framework to train, certify, and validate staffs, CPs, and digital crews. The TC 6-0 series manuals and their C2TT pair nicely with the FA Training Strategy from TC 3-09.8, providing a comprehensive approach that enables C2 WfF proficiency in FA CPs (See Figure 2). While the implementation of this framework essentially requires a broader cultural shift, the FA community must learn to treat the training of staffs and CPs with the same rigor and structure applied to Artillery Tables. We must have trained and efficient staffs to effectively fight and survive in large scale combat operations.

About the Author:

Major Jeffrey E. Horn, Jr. is a Field Artillery Officer with III Corps Joint Fires Cell. He commanded twice in the 101st Airborne Division Artillery at Fort Campbell, Kentucky, and served his Lieutenant time in the 3rd Cavalry Regiment at Fort Hood, Texas. He holds a Bachelor of Music from Southern Methodist University, a Master of Arts in Security Management from American Military University, and a Master of Operational Studies from the Command and General Staff College.



Joyce Ott became The First Recipient of The Esteemed Artillery Order of Molly Pitcher on September 1, 2021.



Remembering Joyce Ott, Esteemed, Indeed

By: Patrecia Slayden Hollis

Joyce Ott was an intelligent, soft spoken woman committed to improving the quality of life of the Army Family. For all her gentle ways, she was a dynamic national leader who changed the Army's culture. Under Joyce's leadership, the words, "Camp Followers" or "If the Army had wanted you to have a wife, it would have issued you one" went away.

So, how did she do it? By mentoring, encouraging, and training Army wives, the core of the Army Family, at every level everywhere she went. She had a vision for making the Army Family an integral part of the Army's recruiting, training, and supporting the soldier throughout his career by the Army's respecting and supporting the needs of his family. She wrote a master's thesis for Oklahoma University in 1975 on "The Army Wife," laying out changes to bring the Army Family from outside to inside the Army. Part of her vision was for the Army to train wives in leadership skills: group dynamics, problem solving, conflict resolution, and more. It was

not only radical because it trained wives, but also because the wives were not obligated to lead the community (because of their husbands' positions as commanders or commands sergeant major). The Army was to empower wives with skills and the freedom to choose to lead.

It wasn't easy. Joyce not only met resistance from the Army, but also from some Army wives: those who "wore" their husbands' ranks and positions and felt threatened by the loss of automatic power.

The movement caught fire, and Joyce went on to create and lead the first Army Family Symposium in 1978 that coincided with the Association of the US Army's annual conference in Washington, DC, and the formation of the National Military Family Association.

Army wives came to the symposium from around the world, from all over the US, Korea, Germany, and more—expenses paid by their wives' clubs—to outline the Army Family needs. The Chief of Staff of the Army GEN Edward C. Myers recognized the professionalism

of the symposium, the validity of the needs identified, and, as the symposium's surprise final speaker, stepped up to support the implementation of changes.

On April 1, 2004, retired Lieutenant General David Ott sent out emails telling everyone that Joyce was dying, speechless, after a long battle with multiple myeloma, asking for emails of love to read to her. Mine: "With her beautiful blue-gray eyes focused on you, Joyce Ott says, at that moment, there's no one on earth more important." She died April 2 at 80 years old. Joyce Ott, as the first recipient of The Esteemed Molly Pitcher Award, sets a high standard indeed.

About the Author:

Patrecia Slayden Hollis was a friend of and mentored by Joyce Ott for 31 years. Joyce brought Pat to the 1978 Army Family Symposium to facilitate (then) MG Max Thurman's group. Pat, recipient of Molly Pitcher and Honorable and Ancient Saint Barbara Awards, was Editor of Field Artillery, providing the military content of the USFAA's FA Journal for 20 years. Retiring in 2007, she co-authored *Normandy to Nazi Surrender* with her late father, COL Van Slayden, a fighter-bomber pilot.



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