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Fires

Fires in cyber, electronic warfare and space

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Purpose

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

Cover: *A stinger missile team with the with the 35th Air Defense Artillery Brigade, identify an unmanned aerial vehicle target, during RIMPAC at Pacific Missile Range Facility Barking Sands, Hawaii. (Capt. Rachael Jeffcoat/U.S. Army)*

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Breaking the historic norm in training approaches for increased lethality

By 1st Lt. Lindy Clark

In November 2018 the 2nd Battalion, 44th Air Defense Artillery Regiment returned from our eighth deployment since 9/11 in support of Operations Inherent Resolve (OIR) and Freedom's Sentinel (OFS). While deployed, we conducted counter-rocket artillery and mortar (C-RAM) operations and implemented kinetic and non-kinetic, and offensive and defensive counter-unmanned aerial system (CUAS) capabilities. In reflection of the hundreds of rocket attacks we received during our nine-month deployment, it was well observed that there are opportunities to better train Engagement Operations Cell (EOC) crews to defeat the complex rocket attacks we saw in OFS. In March 2019, 2-44th ADA conducted a combined arms live-fire exercise (CALFEX) to maintain deployment readiness with us scheduled to deploy again in less than a year. With the complexity of indirect fire (IDF) threats increasing, our CALFEX, unlike other C-RAM live-fire ranges before it, challenged EOC and Land-based Phalanx Weapon System (LPWS) crews through increasingly complex scenarios commensurate with what was seen recently in OFS. The tempo of the CALFEX was based on demonstrated crew performance rather than a rigid master scenario events list (MSEL) historically used. The 2-44th ADA executed high-level training and progressively difficult scenarios to test crews' system knowledge and adherence to unit tactics, techniques and procedures (TTPs). C-RAM deployment training methodologies should adopt a conditions-based progression approach infused with increasingly complex scenarios and CUAS engagement sequence training to evolve our proficiency and best keep pace with current and future threats.

In the National Military Strategy (NMS), the Chairman of the Joint Chiefs of Staff (JCS) prioritizes efforts across the department against Russia, China, Iran, North Korea and violent extremist organizations (VEOs). With the C-RAM mission historically focused only on VEO IDF attacks, we have to expand our focus to include near-peer threats in a multi-domain battle. In Afghanistan, 2-44th ADA faced hundreds of IDF attacks with short track times and complex maintenance issues in congested airspace, as well as the challenges of initiating kinetic CUAS engagement processes. C-RAM mission rehearsal exercises (MREs) should replicate the complexities seen in theater and the range of possibilities described in the NMS. While it is impossible to predict and replicate every possible scenario, the training should evolve as various threats evolve. In combat, there are routinely maintenance faults, equipment faults and equipment limitations where a more extensive battle drill is involved. At the 2019 CALFEX, we implemented these lessons learned from our deployment to create a more fluid C-RAM approach to inculcate these themes into our EOC and LPWS crews. C-RAM MREs need

to evolve to properly train battalions on the threats they will face downrange and in future conflicts.

Another challenge we faced during our deployment to OFS was the implementation of both non-kinetic and kinetic CUAS capabilities in theater. The battalion created and implemented a comprehensive CUAS Academy throughout Afghanistan in 2018 to infuse knowledge and awareness of the UAS threat. It was designed to educate and train Soldiers across Afghanistan on the various aspects of a CUAS mission, to include visual aircraft recognition, capabilities and limitations, the current UAS threats, current TTPs for reporting CUAS, and the inclusion of CUAS electronic warfare systems. This training was extremely successful as the CUAS team instructed over 1,000 coalition Soldiers over the course of the deployment.

During the 2018 deployment, 2-44th ADA received a directive to perform a live-fire test of the Howler weapon system in a combat environment. The Howler is a platform that fires a Coyote Block 1C (a UAS with a payload) to intercept and destroy UAS threats. The S-3 operations team developed a joint engagement sequence (JES) with adjacent and higher echelons to enable a safe intercept with the Howler weapon system. The JES cannot be conducted with the C-RAM unit alone, the Air Traffic Control (ATC) and base defense operations center (BDOC) play a crucial role in engaging an aircraft. The biggest challenge we faced with the JES was the amount of time it took to coordinate with the ATC and BDOC. The only way to shorten the process is to properly train the BDOC and ATC crews and create a shared understanding of their responsibilities. While performing the JES in theater, it was observed how critical it is to implement JES training into MREs for deploying C-RAM battalions, as well as units deploying as a BDOC or ATC element.

As part of the potential to improve the training pipeline, pre-deployment training for deploying battalions must include JES training. With protection of friendly aircraft being the top priority for all air defenders, the procedures to engage an air track are much more complex than during an IDF engagement. While the EOC has full autonomy to engage rockets and mortars nearly instantly, the Target Engagement Authority (TEA) to engage a threat UAS is the BDOC commander. Although it is often a lengthy process, the JES mitigates risk of fratricide by incorporating redundant safety checks. Only the BDOC has the ability and resources to validate these safety checks.

When performing CUAS operations in theater, C-RAM units are currently required to train incoming BDOC and ATC crews, some with a three-month turnaround, on the JES to facilitate a smooth and timely engagement sequence. It is important for BDOC and ATC units to participate in the five-module CUAS Academy and learn the JES prior to deploying. This training helps instill the importance of quickly sanitizing airspace and having positive control of friendly UAS flying around the forward operating base.

As the operational environment and enemy TTPs continue to evolve, C-RAM units will intercept threat UAS with the C-RAM weapon system. Prior to engaging an air track, the TEA, EOC and air element must follow critical steps to ensure the protection of manned aircrafts and friendly UAS: positive identification, airspace sanitation and confirmation that the threat is hostile. When the C-RAM battalion is training the BDOC, it is paramount that all TEAs are present, understand their responsibilities and understand the risks involved when engaging an aircraft. At a minimum, the EOC, ATC and BDOC should conduct rehearsals with a simulated UAS engagement, and if possible, conduct a live fire to refine the agreed-upon JES.

The 2-44th ADA capitalized on these lessons learned during the CALFEX by replicating scenarios seen in theater to provide the most realistic training possible. Our S3 operations team created six levels of increasingly difficult IDF scenarios that closely replicate those seen in combat for both EOC and LPWS crews. This type of training motivated crews to develop a mastery of the systems and challenged their ability to work together and solve complex equipment problems under pressure. The levels of difficulty ranged from level one, a single RAM event with no injects best described as an easy "granny shot," to level six, involving extremely difficult scenarios with multiple rockets and/or mortars, maintenance faults and equipment failures during the engagement.

Rather than keeping one crew in each EOC for a six-to-eight-hour window, EOC crews were constantly either conducting a live certification, training against challenging simulation scenarios or learning about the current UAS

threat in the five-module tactical CUAS Academy taught by the mobile training team. This constant rotation enhanced training by eliminating downtime when the LPWS was conducting maintenance or performing a reload. When a crew was performing exceptionally well during the live certification, the lead trainers would present increasingly challenging scenarios. Rather than following a rigid MSEL and giving each crew the exact same scenarios, the lead trainers were able to easily interchange EOC crews in and out of the live and simulation EOCs to provide crews the training that was most beneficial for them. If a crew was struggling to perform against low-to-intermediate scenarios, they were immediately given an after-action review and then placed in a simulation EOC to re-train with two experienced observer coach trainers. Once that crew demonstrated improvement on battle drills and adherence to unit TTPs, they were given another opportunity to enter the EOC to engage live rockets and mortars.

Once that crew demonstrated improvement on battle drills and adherence to unit TTPs, they were given another opportunity to enter the EOC to engage live rockets and mortars.

Leading up to the CALFEX, the 2-44th ADA designed and refined the procedures to engage a UAS, developed unit TTPs and taught 17 EOC crews the battle drills in a matter of weeks. Further, we increased the difficulty level in UAS engagements at the 2019 CALFEX by flying both hostile and friendly UAS, and incorporating realistic injects into the JES. The S-3 operations team used the same six level difficulty model to challenge crews on CUAS engagements and create a more complex training environment. The 101st DIVARTY and the 1/101st Air Defense Airspace Management/Brigade Aviation Element cell were instrumental in making this event successful. Prior to the CALFEX, these entities participated in a two-day JES training event where we taught them the BDOC and ATC roles. They provided feedback throughout the training to improve the JES and make it a more fluid and user-friendly sequence. They made the training much more realistic for the EOC crews by incorporating injects similar to those that will be seen in combat.

In Joint Publication 3-0, the JCS states that the integration and synchronization of joint Fires and joint fire support are essential to the success of joint operations. When defeating unmanned fixed-wing and rotary-wing aerial systems, detailed coordination and training are critical for a safe and effective execution. During the live fire, we exercised the JES with DIVARTY and the ADAM cell performing the role as the BDOC TEA and the ATC. With their participation and knowledge on airspace management operations, the 2-44th ADA validated the JES and made improvements to unit TTPs for future training. The lessons learned will serve to improve and better integrate UAS intercept operations into future MREs.

In order to train a battalion that is prepared to fight the complex IDF attacks and future threats, MREs should not follow a structured MESL, but rather challenge crews based on how they perform and progress. Future C-RAM live-fire ranges should move away from easy RAM shots and start infusing difficult scenarios that test discipline and adherence to unit TTPs. The training should also incorporate kinetic CUAS operations to teach units how to execute the JES with BDOC and ATC elements. C-RAM deployment training needs to more closely mimic the 2019 CALFEX to provide high-level training for EOC and LPWS crews and prepare for the evolving threat in combat.

1st Lt. Lindy Clark is currently the training and exercise officer in charge for the 2nd Battalion, 44th Air Defense Artillery Regiment. She is an air defense officer who has served as a Counter-Rocket Artillery and Mortar battle captain and Intercept platoon leader during the 2018 deployment in support of Operation Freedom's Sentinel. Clark holds a bachelor's degree in Engineering Management from the United States Military Academy.

Vehicles from 3-4th Air Defense Artillery Regiment, 108th Air Defense Artillery Brigade, were staged in the snake pit, Feb. 11, at the Fort Bliss railyard for the upcoming Roving Sands Exercise. (Sgt. LaShawna Custom/32nd AAMDC)

'Roving Sands' Exercises Missile Defense Expeditionary Operations

By Capt. Brandon Nalley

Task Force Spartan, headquartered by the 108th Air Defense Artillery Brigade, and composed of missile defense units and support elements from six different installations to include the Kentucky and Texas Army National Guards, with a total Soldier package in excess of 2,500, ceased tactical operations in support of Roving Sands 2019 on March 10.

Roving Sands is the Army's only brigade-level air defense artillery training exercise designed to test units the way the National Training Center and Joint Readiness Training Center do.

Utilizing the immense landscape, units brought Soldiers and equipment to execute operations in the 642,000 acres of the Fort Bliss, Texas, training area while being presented with challenges in logistics, coordination of units and maneuver that can't be replicated anywhere else. The wide skies of southern New Mexico were also ripe for air threat interdiction.

Reintroduced in 2018, Roving Sands serves as a tool to test missile defense forces' abilities to shoot, move and communicate in a contested environment after 15 years of consistent rotations to static positions around the world.

Missile defense assets under the command of the 108th ADA Brigade Headquarters consisted of three Patriot missile battalions and a Terminal High Altitude Area Defense (THAAD) missile system, together capable of defeating short-, medium- and intermediate-range ballistic mis-

Soldiers from 3-4th Air Defense Artillery Regiment, 108th Air Defense Artillery Brigade, cleaned off the tracks after downloading their equipment Feb. 11, 2019, at the Fort Bliss railyard for the upcoming Roving Sands Exercise. (Sgt. LaShawna Custom/32nd AAMDC)

siles, with the Patriot missile units capable of destroying tactical aircraft as well. Task Force Spartan, through simulations, identified, engaged and destroyed over 80 tactical ballistic missiles, six fixed-wing aircraft and four high-speed cruise missiles.

Brig. Gen. Clement Coward, commander of the 32nd Army Air and Missile Defense Command, said that "Roving Sands is critical to the air defense community's ability to remain ready to 'fight tonight.' It provides us the ability to exercise mission command and integrate our role as air defenders in multi-domain operations."

Units were tested by an opposition force in the support area to include rotary air threats provided by the 3rd Marine Aircraft Wing, creating a complex problem set requiring transitions from movement to maneuver as well as self-securing operational sites. Task Force Spartan also faced chemical attacks, where "dirty routes" had to be utilized and the 299th Chemical Company conducted decontamination. Commanders and senior non-commissioned officers balanced the need to defend themselves while also defeating air threats through problem solving and critical analysis of mitigating risks.

Over the 10-day exercise, battalion headquarters moved as far as 70 kilometers, with some batteries going as far as 95 kilometers. The operational requirement for these movements were complicated by sustained winds over 36 miles per hour, producing blinding sand storms and punishing conditions to establish infrastructures including tents and antennas. Task Force Spartan was also exposed to temperatures below freezing and a rare snow, early in the operation. Operational and environmental conditions tested all forms of support and logistics. The greatest tests coming from enemy forces and the sheer distances that had to be covered

by physical movements as well as communications.

"With the support of 50th and 51st Signal Companies, we successfully provided connectivity for 185 total users on the Secret and Non-classified Internet Protocol Router Networks for 96.3 percent of the operation. While 3.7 percent of time without internet seems minimal, the enemy gets a vote in terms of disrupting our lines of communication, thus forcing verification of our Primary, Alternate, Contingency, Emergency plan," said Maj. Charles Hines, the communications officer for 108th ADA Brigade.

External logistical support was provided by the 372nd Combat Sustainment Support Battalion. The Army National Guard involvement supported cooperative efforts with active service units to enable future training and forward deployed theater operations. Bravo and Alpha Companies from the 50th Expeditionary Signal Battalion Enhanced and 51st Expeditionary Signal Battalion respectively, provided and maintained upper tactical internet, critical to maintaining seamless mission command through all phases of the operation.

Providing observation, coaching and training over Roving Sands units were air defenders from the 11th and 31st ADA Brigades. These individuals provided feedback to the units while facilitating mission command training through coverage of command groups, staffs and key leaders in their respective assignments from brigade level to individual batteries.

Roving Sands 2019 also drew the attention of multiple visitors. Early in operations, Congresswoman Veronica Escobar, U.S. Representative for Texas's 16th congressional district, toured the 108th ADA Brigade Headquarters, Charlie Battery, 3rd Battalion, 4th Air Defense Artillery's Patriot site and Bravo Battery, 62nd THAAD's site. Her visit covered air and missile defense operations of the Army and the important role that Fort Bliss plays in the future modernization and training of ADA forces.

Other visitors to the 108th ADA Brigade Headquarters included missile defense professionals from the German Army and the Japanese Self-Defense Forces who discussed mission command, planning operations and training objectives. The meeting between the three organizations created greater understanding of allied operations in protecting our common interests.

Like most exercises, units involved in Roving Sands 2019 will take away experiences to drive future operations as well as immense pride in finding success in the face of tough, realistic training. Additionally, and maybe most importantly, all of Task Force Spartan increased its capacity to deter and defeat missile threats in an unfamiliar environment.

Col. Charles Branson, commander of the 108th ADA Brigade, reflected on this year's Roving Sands saying, "The 108th ADA Brigade 'Spartans' is a competent, disciplined, lethal force to be reckoned with. Due to rigorous, realistic campaigns such as Roving Sands, which provide every assigned Military Occupational Specialty an opportunity to hone and perfect their craft, the Spartans remain ready to fight tonight, anywhere in the world! Deeds Above Words, Swift and Sure!"

Capt. Brandon Nalley is the Public Affairs Officer for the 108th Air Defense Artillery Brigade.

Toward understanding future wars with near-peer competitors in an era of Fires

By Steven Yeadon

Marines with 3rd Battalion, 12th Marine Regiment, 3rd Marine Division, conduct live-fire training during the Artillery Relocation Training Program 19.3 in Hokkaido, Japan, Oct. 16, 2019. The program provides 12th Marine Regiment with essential live-fire training in different regions of Japan to increase combat readiness and support the Treaty of Mutual Cooperation and Security. (]Lance Cpl. Kolby Leger/U.S. Marine Corps)

Editor's note: *This article is the second in a series of two articles considering the serious aspects of near-peer competition.*

The previous article in this series assessed the capabilities of near-peer Fires units by analyzing their technologies and doctrine. This second article's goal is to better understand the modern battlefield considering near-peer technologies and doctrine for Fires units to propose ways to enhance U.S. and multinational forces, considering new threats. This analysis will now address the ways in which the battlefields of the future against near-peer powers are changing in distinct ways due to the threat of near-peer Fires.

The changing face of wars with near-peer adversaries

First, given the ability of massed area Fires to destroy even large, mechanized formations; command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) assets have become more important on the modern battlefield through their ability to find enemy troops and coordinate Fires against them. This increases the importance of finding and destroying such assets.

Second, the increased importance for C4ISR assets to detect opposing units and coordinate massed Fires against them increases the need for electronic warfare. There is a need to detect and locate opposing forces us-

ing wireless communications to swiftly destroy them. Electronic warfare will also be essential to disrupting the sensor-to-shooter cycle by jamming communications and disabling access to networks.

Third, there is a need for C4ISR assets for U.S. troops that can resist or circumvent electronic or cyberattacks and achieve information dominance before an enemy does.

Fourth, U.S. troops and opposing forces will need to learn how to prosecute wars and win on battlefields with intermittent or no access to networks or wireless communication. This calls for a decentralized command structure and both creativity and initiative by U.S. commanders in field.

Fifth, opposing aircraft now present an enormous and immediate threat from both the information they gather for Fires units and from their ability to provide close air support or close combat attacks. These assets include rotary-wing aircraft, fixed-wing aircraft, tiltrotors, unmanned aerial systems (UAS), and small unmanned aerial systems. This necessitates a robust air defense capability for modern troop formations that can tackle all aerial threats economically, especially proliferating drones such as quadcopters. This puts much greater emphasis on the need for Short Range Air Defense and High to Medium Air Defense (HIMAD) for all U.S. military ground units. However, as cruise missiles and ballistic missiles proliferate, HIMAD and Terminal High Altitude Area Defense will be vital for protecting U.S. and allied military forces. This is especially true of static forces such as those stationed in forward military bases or airfields.

Sixth, there is further emphasis on efforts to actively counter enemy rockets, artillery, mortars, cruise missiles and drones on near-peer battlefields. Ground units may have to become reliant on these defensive capabilities to survive detection by an enemy. Thus, efforts to provide indirect fire protection capabilities (IFPC) to troop formations may become critically important for the protection of all ground forces.

Seventh, reconnaissance forces now present an enormous and immediate threat from the information they gather for Fires units. Thus, the detection and destruction of opposing reconnaissance units has become vital to the survival and success of U.S. and multinational forces alike in an era of proliferating area-effect munitions and precision-guided munitions. Reconnaissance assets that include unmanned ground vehicles (UGV), both mounted and dismounted scouts, special operators, intelligence collectors and paramilitary forces. This increases the need to locate and destroy enemy ground reconnaissance units, especially those hiding the fact they are opposing military forces.

Eighth, the Marine Corps Operating Concept states that the future of warfare will depend on a "battle of signatures":

> *Tomorrow's fights will involve conditions in which "to be detected is to be targeted is to be killed." Adversaries will routinely net together sensors, spies, UAS and space imagery to form sophisticated "ISR-strike systems" that are able to locate, track, target and attack an opposing force. In complex terrain, adversaries will collect targeting information through eyes and ears and spread it through social media. No matter the means of detection, unmanaged signatures will increasingly become a critical vulnerability.*[1]

Thus, a decisive factor for land warfare is to stay undetected, because detected forces face swift destruction by enemy Fires. As Ukraine shows this idea of a "battle of signatures" looks to already be in effect against near-peer competitors.

Ninth, the increasing ranges of field artillery may limit a rapid response to an enemy artillery attack on U.S. ground forces to friendly counterbattery Fires, fixed-wing aircraft, rotary-wing aircraft and tiltrotors. This is due to the extremely slow speeds of maneuver that ground vehicles have in relation to the increasing ranges of Fires. Simply put, enemy Fires originating dozens of kilometers away must be countered with platforms or weapons with enough speed or reach to threaten enemy artillery. A limitation aircraft can mitigate because of their speed. This means that the suppression or destruction of opposing air defense artillery assets is of high importance, so that friendly aircraft have the freedom of maneuver to destroy enemy Fires units that have revealed themselves by firing on friendly forces.

Tenth, current and future armored vehicles and armored units will need to change in response to these emerging threats. To remain effective, ground vehicles will likely require Active Protection Systems to protect them from top-attack mines and antitank sub-munitions. These systems include the Israeli Trophy active protection system or the under development Modular Active Protection System. Ground vehicles will likely have to rely far more on low observable technologies than currently for their survival, since detection may lead to swift destruction. Armored vehicles will likely need laser-detection capabilities to protect them against laser-guided munitions by allowing the employment of countermeasures, such as smoke grenades that obscure the vehicle from laser light.[2] Ground vehicles may need increased speed of maneuver to close with enemy forces more quickly and reduce their vulnerability to artillery attacks.

1 *MARINE CORPS OPERATING CONCEPT (MOC) How an Expeditionary Force Operates in the 21st Century, (Washington, DC: Headquarters Marine Corps, September 2016), 6, https://www.mccdc.marines.mil/Portals/172/Docs/MCCDC/young/MCCDC-YH/document/final/Marine%20Corps%20Operating%20Concept%20Sept%202016.pdf?ver=2016-09-28-083439-483.*

2 *Walter Williams, "Threat Update Krasnopol--A Laser-Guided Projectile for Tube Artillery," https://fas.org/man/dod-101/sys/land/row/krasnopol.htm*

That is if such mobility does not sacrifice low-observability. This is because increased mobility will give an enemy a shorter window of opportunity to detect and orchestrate Fires against U.S. forces before an engagement.

That said, the U.S. Army is interested in equipping its armored vehicles with laser detection systems, technologies to reduce a variety of signatures and active protection systems.[3]

Eleventh, against a near-peer competitor, a greatly reduced sensor-to-shooter time cycle will present challenges to a slow or immobile force, especially command posts and C4I infrastructure. This demonstrates the need for all military assets to be mobile within a few minutes.

Twelfth, against a near-peer competitor, a greatly reduced sensor-to-shooter time cycle and improvements in enemy counterbattery Fires will present challenges to a slow or immobile field artillery force, such as towed artillery.

Through radar tracking of projectiles back to their source; the use of advanced command, control, communications and intelligence (C3I) assets; drones; and counterbattery Fires an enemy could force the need for artillery units to almost constantly maneuver. Thus, Fires units will need to keep mobile by using "shoot and scoot" maneuvers before counterbattery Fires destroy them, particularly counterbattery Fires using massed area effect munitions.

This will present enormous challenges to towed artillery, which may have to rely on actively countering rockets, artillery, mortars, guided missiles, and ballistic missiles to survive. Another solution would be the procurement of 105 mm lightweight and 155 mm medium weight self-propelled howitzers to assist Infantry and Stryker units instead of towed howitzers. These technologies already are being demonstrated with the Hawkeye Mobile Weapon System, a soft recoil 105 mm howitzer able to be transported by vehicles as light as a high mobility multipurpose wheeled vehicle,[4] and the Brutus self-propelled howitzer, a soft recoil 155 mm howitzer able to be transported by vehicles as light as a five-ton cargo truck.[5] The need for mobility could place greater emphasis on the M142 High Mobility Artillery Rocket System and the M240 Multiple Launch Rocket System self-propelled artillery systems until 155 mm and 105 mm artillery become more mobile.

An "Ascendancy of Fires?"

This quote from the Federation of American Scientists Military Analysis Network pertains to one prediction of how precision-guided weaponry may change the future of warfare, an idea termed the Ascendancy of Fires:

> *The Ascendancy of Fires is a concept that describes the combined results of the improving ability to "see the battlefield," while simultaneously attacking at depth with precision lethality. The Ascendency of Fires describes a potential trend where land warfare is becoming more like sea and air warfare, i.e. forces will fight at increasingly greater ranges in "demassed formations." In this setting, combat elements conducting superior information operations and employing state-of-the-art smart/brilliant munitions, robotic vehicles and swarms of unmanned aerial vehicles, can conceivably shape the battlefield and conduct decisive operations, possibly without coming in visual contact of each other. This would produce a dispersed combat situation where small, powerful, highly mobile tactical units employing precision Fires, fight almost independently over incredibly large distances. The national mandate to win quickly with minimum casualties remains the driving factor in the emerging Ascendancy of Fires.*[6]

This concept of an "Ascendancy of Fires" is originally descended from a statement in Field Artillery Journal attributed to the late Gen. Glenn K. Otis in 1995. [7]

A serious question can be raised in 2019, "Are we approaching an 'Ascendancy of Fires?'" It is conceivable that this concept first explored in the 1990s may already apply to current battlefields against a near-peer power. In Ukraine, as explained earlier,

> *The pursuit of increased artillery range is a trend necessitated by greater dispersion on the battlefield and made possible by a combination of unmanned aerial vehicles on the battlefield and the increased capability of counterbattery radar. Increased emphasis on counterbattery radar and Fires disrupts opposing fire missions by forcing the enemy to move.*

Thus, modern near-peer battlefields have already begun to be characterized by both dispersion and long-range Fires aided by UAS and counterbattery radar.

Are other predictions such as the fusion of UGVs, UAS swarms and long-range precision-guided Fires operating in an environment of information dominance next? Should U.S. ground units be formed around the predicted principal of small, lethal, highly mobile tactical units employing precision-guided Fires as they fight almost independently over incredibly long distances? Can new principals such as a "battle of signatures," discussed earlier, advance an understanding of an

3 *Jen Judson, "US Army to bring new vehicle protection technologies to fleet as early as 2020," Defense News, 29 August, 2018, https://www.defensenews.com/land/2018/08/29/army-to-bring-new-vehicle-protection-technologies-to-fleet-as-early-as-2020/.*

4 *"Hawkeye," Mandus Group, http://www.mandusgroup.com/hawkeye/.*

5 *Todd South, "A potential mobile artillery dynamic duo for the Army: 'Hawkeye' and 'Brutus'," Your Army, Army Times, 6 November 2018, https://www.armytimes.com/news/your-army/2018/11/06/a-potential-mobile-artillery-dynamic-duo-for-the-army-hawkeye-and-brutus/.*

6 *John Pike, "Indirect Fire," EAS Military Analysis Network, published February 6, 2000, accessed October 14, 2018, https://fas.org/man/dod-101/sys/land/indirect.htm.*

7 *Glenn K. Otis, "Ascendancy of Fires the Evolution of the Combined Arms Team," Field Artillery Journal, (June 1995): 18, accessed October 14, 2018, http://sill-www.army.mil/firesbulletin/archives/1995/JUN_1995/JUN_1995_FULL_EDITION.pdf.*

"Ascendancy of Fires?" A full analysis that brings the concept of an "Ascendancy of Fires" up to date for 2019 is beyond the scope of this analysis, but it may be vital to understand an updated version of an "Ascendancy of Fires" to outthink potential enemies.

However, discussion of a potential "Ascendancy of Fires" would not be complete without the arguments critical of an "ascendency of Fires." Col. (Retired) John F. Antal was concerned that these ideas of an "Ascendancy of Fires" would lead military commanders to conclude that this new type of warfare and its long ranges would obviate maneuver. His conclusion was that the lesson of static artillery in World War II France should be a caution to us all.[8] The Maginot Line did not negate maneuver, but it only made it even more important for German forces invading France to go around such defenses. Antal goes on to conclude that, "The U.S. Army must avoid the siren call to become dominated by firepower — as the [WWII] French did with their doctrine…The most significant problem in warfare today is to produce the correct balance of firepower, mobility and protection to create a force that can apply decisive action."[9] Antal also concluded, "Precision strikes that are not backed up with a continuous battle of decisive maneuver are merely artillery raids set out to punish, not defeat, an opponent."[10]

Antal is correct on all these counts. It is a temptation to view modern and future warfare increasingly as dominated by long-range precision-guided or area Fires. When, in fact, the necessity of maneuver and protection will demand equal, if not greater, attention and monetary investment. The U.S. military should not allow future battlefields to be dominated by bloody battles of attrition by Fires working in concert with C4ISR assets. To do otherwise is to invite the unfathomable slaughters of the First World War. Thus, U.S. and allied forces must invest in the enhancement of protection, mobility and lethality for the entire force, so that it can apply decisive action.

However, Antal was wrong on one of his conclusions. He stated, "Victory through precision strike is too costly and will bankrupt the forces ability to train and negate systems required to dominate the maneuver battle."[11] The cost of advanced ordnance possessed by near-peer competitors has not been so costly as to avoid its massed use in Ukraine. That said, in Ukraine, both sides utilize less expensive Soviet-era equipment, compared to the extremely expensive equipment used by Western powers. However, the utility of precision-guided weapons can be seen in the willingness of Western powers to purchase expensive ordnance, such as the Javelin missile, for an anti-armor role against Soviet-era tanks, which often cost less than the Javelin missile used to destroy them.[12]

Conclusion and recommendations

As stated earlier, the goal of this analysis is to better understand the modern battlefield in terms of Fires and propose ways to enhance U.S. and multinational forces considering new threats. The combination of coupling massed area Fires with a variety of sensors may make a "battle of signatures" a reality in any conflict with the Russian Federation and perhaps other near-peer powers.

To overcome these challenges will require a combination of efforts. Fortunately, many of these recommendations are not, in fact, new ideas. However, these are still important concerns to address before a near-peer war, potentially, erupts.

There is a need to improve the survivability of ground vehicles against enemy sensors and shooters through reduced signatures, active protection systems, laser detection systems and increased speed of maneuver. Ground forces will constantly require multiple levels of air defense, especially against inexpensive drones. Air defenses that include robust indirect fire protection. There is a need to rapidly find and destroy enemy reconnaissance units to include covert forces. Ground forces will need advanced electronic warfare capabilities to locate enemy forces, jam their communications and disable their networks. There is a need to rapidly find and destroy enemy C3I assets. U.S. commanders and other troops will need training to operate effectively when technology fails due to enemy action. Ground forces will need to achieve information dominance before an enemy. There is a need to counter near-peer electronic warfare capabilities.

U.S. field artillery will need survivability against enemy counterbattery Fires through enhanced mobility and/or IFPC. There is a need to effectively suppress and destroy enemy air defenses to enable joint aircraft to find and destroy enemy Fires units. Lastly, there is a need to modernize the concept of an "Ascendancy of Fires," given the lessons of the last 24 years, to gauge its usefulness to modern armed forces.

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8 *Lt. Col. John F. Antal, "The Ascendancy of Fires," Defense Technical Information Center, published April 7, 1998, accessed October 14, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/a346267.pdf.*

9 *Antal, The Ascendancy of Fires, http://www.dtic.mil/dtic/tr/fulltext/u2/a346267.pdf.*

10 *Antal, The Ascendancy of Fires, http://www.dtic.mil/dtic/tr/fulltext/u2/a346267.pdf.*

11 *Ibid.*

12 *Sebastien Roblin, "Javelin: The American Military's Ultimate Tank Killer," The National Interest, October 1, 2016. https://nationalinterest.org/blog/the-buzz/javelin-the-american-militarys-ultimate-tank-killer-17895.*

How to build a battalion Patriot master gunner program

By 1st Lt. Zachary Hartzell

Each Air Defense Patriot battalion is authorized 14 Patriot master gunners (PMG). However, attaining this number of PMG certified personnel is a considerable challenge for most organizations. As of Nov. 8, 2018, 2nd Battalion, 43rd Air Defense Artillery graduated its 17th PMG – the most assigned to a single battalion within Air Defense Artillery. This number exceeds the requirement and greatly exceeds the average battalion across the branch. The key to 2-43rd ADA's successful development of Patriot master gunners is the systematic and intentional preparation that PMG candidates undergo prior to school attendance. The following article describes the process that battalion leaders went through to understand the PMG requirement and identify gaps in PMG course preparation. Successful solutions to those gaps are highlighted along with further recommendations for future improvement.

Requirement: Patriot master gunner certified personnel

Patriot organization modification table of organization and equipment (MTOE) allots 14 PMGs per battalion. Master gunners serve as weapon system experts in battery-level roles such as fire control platoon sergeant, launcher platoon sergeant and battery master gunner. They also serve as experts and advisors at the battalion level, filling roles such as battalion master gunner and battalion master evaluator. The purpose of these PMG requirements is to ensure tactically proficient non-commissioned officers (NCO) are paired with platoon leaders to assist in planning training, executing training and completing certifications.

Army-level Patriot master gunner authorizations are further bolstered by 32nd Army Air and Missile Defense Command - Commander's Training Guidance which states: "Non-commissioned officers train Soldiers, crews and small teams, no one else, period." When these NCO positions are filled with PMG graduates, it serves as a force multiplier within the unit. The course is strongly emphasized because it enables the second step of the Eight-Step Training Model: "Train and Certify Leaders" (FM 7-0), ensuring that NCOs have the enhanced skills to plan and conduct training effectively.

The PMG course is designed to develop expert skills and provide a comprehensive understanding of air defense operations, planning and airspace management. This knowledge is implemented in a training strategy to certify units through Air Defense Gunnery Training and developing a defense design plan given threat data and operational constraints. Each student briefs their defense designs to a panel of five Patriot planning subject matter experts including senior Air Defenders from across the force.

Identifying the gap: Soldier preparation

Two years ago, 2-43rd ADA was sparsely equipped with PMG certified personnel, averaging around one per battery. Overworked PMGs and non-PMG platoon sergeants assisted in planning and executing training, but the on-hand number did not match authorized personnel. The majority of platoon sergeants had not received the in-depth training provided by PMG. This resulted in limited knowledge available to train and certify the units, forcing the battalion to spend more time training to the Air Defense Gunnery Table VIII standard.

The initial solution was to send more Soldiers to attend the PMG course. However, the course's reputation for difficulty resulted in some Soldiers avoiding the opportunity for fear of failure. This "reputation" was further exacerbated when many who attended failed to pass. The gap became clear when, through personal interview with the course candidates and former attendees, we recognized confidence as a key driving factor in PMG success. Confidence, in this way is repre-

sented in two facets. The first facet was the confidence to commit to being a candidate, thus overcoming the fear of failure. The second facet was confidence in themselves at the completion of their preparation to believe they were capable of passing. The question became: How does 2-43rd ADA prepare PMG candidates in a way that overcomes the personal barrier of fear of failure and the institutional barrier of insufficient pre-course knowledge to develop more PMG certified personnel and positively change the course's reputation in the battalion?

Solution: Audience focused Pre-PMG course

The 2nd-43rd ADA's solution was to develop an "audience focused" pre-PMG course. The audience focus refers to the tailoring of the program to evaluate and refine instruction tailored to individual candidate's needs. A key element of this tailoring was the application of step seven (conduct an after-action review) and eight (conduct retraining) of the eight-step training model in a mentor-to-mentee relationship, accelerating their knowledge retention.

The 2-43rd ADA pre-PMG course occurs over a four-week period and provides course participants with familiarity of tasks required for each graded event at the PMG course. Instructors for the pre-PMG course come from the battalion standardization team, as well as senior PMGs from across the battalion. The pre-PMG course consists of multiple sections that we utilize to prepare candidates.

1. NCOs recommended were identified by battery leadership to prepare for Patriot master gunner. Recommended candidates demonstrated proficiency in current duties and positions as well as a desire to achieve.
2. Second-43rd ADA's pre-PMG class began similar to the actual PMG course by focusing on radar theory, battery and battalion-level fire control programming (engagement control station and information coordination central tabular entries), tactics and operations. We found the material necessary for this training on the Fires Knowledge Network "Reachback Training" page.
3. Battalion master evaluator and battalion master gunner developed and administered tests to candidates on the material covered in class. They used the tests to evaluate test-taking strategies and guide candidates to improvement.
4. In a group, candidates prepare a one-quarter training strategy utilizing a master activities calendar, current mission essential task (MET) assessment and projected MET assessment. The documentation to support this exercise is derived from the previous PMG course. This nests with the year of training required during PMG.
5. The defense design project at PMG requires an abbreviated military decision-making process (MDMP). MDMP is taught as an overarching process, but specifically how it applies to defense design in an abbreviated form. Sergeants and staff sergeants normally have only an understanding of troop leading procedures, very few are exposed to MDMP. The most useful tools to cover the MDMP process are the Battle Staff Smart Book published by Lightening Press and Air and Missile Defense Intelligence Preparation of the Battlefield (ATP 3-01.16).

The current pre-PMG course is resulting in significant positive results. However, through continual assessment and refinement of the curriculum, 2-43rd ADA is considering implementing the following additional elements:

- Hold the class two months prior to each PMG class to allow for re-training time for any Army Training Requirements and Resources System slotted students.
- Utilize the course as a vetting process to determine personnel that should not attend the course.
- Focus the class to attack MDMP as a staff, creating a defense design brief held in front of a mock board.
- Lengthen the course, if possible, to allow for more in-depth products from training strategy and defense design.

Result: Force multiplier

Second-43rd ADA has successfully graduated eight Soldiers since developing the pre-PMG course. With these newly certified leaders, our training is more efficient and effective at developing tactical and technical proficiency in our organizations. This will allow the unit to be better prepared to respond to the demands of a rapidly changing and dynamic operational environment. The pre-PMG course is a tool to meet the gap between the requirement and reality within the battalion.

Patriot Master Gunner course graduates are organization's enlisted Patriot weapon system subject matter experts. They know how to plan, resource and execute training. Beyond assisting in certification of their organization's mission essential tasks, concentrations of their skillsets elevate the net gains of every unit they are assigned to.

The MTOE positions are all platoon sergeant or higher. They are in positions to teach and lead efficiently. It not only benefits the unit, but also the Soldier's career; opening doors to future broadening assignments to represent the Air Defense Artillery branch and the United States Army around the world.

1st Lt. Zachary Hartzell is currently the Fire Direction Center officer in charge for 2-43rd ADA. He is an air defense officer who has served as a battery trainer and fire control platoon leader. Hartzell holds a bachelor's degree in Mechanical Engineering from Worcester Polytechnic Institute.

Don't sleep on First Army's role

By Capt. Jacob Gatewood

As Forces Command's coordinating authority for implementation of the Army's Total Force Policy, First Army executes a diverse mission with the purpose of improving readiness of the Reserve Component. Serving in First Army allows post-key developmental captains and their NCO counterparts the opportunity to develop their professional expertise while utilizing their experience-honed artillery knowledge to increase combat readiness of Army National Guard (ARNG) partners. First Army observers, controllers/trainers (OC/Ts) utilize tough, realistic training concepts that are tailored to the deployment mission of ARNG partner units at all levels from division down to battery. Buried within this challenging mission is the hidden gem of First Army: building relationships.

The foundational principle of building relationships is often mentioned within the Team of Teams concept. It is also an evaluated competency covered by officer and NCO evaluation reports under "leads." For a bit more clarity, ADP 6-22 defines *Extends influence beyond the chain of command as influencing others when the leader does not have designated authority or while the leader's authority is not recognized by others, such as with unified action partners.* (ADP 6-22, 2012) First Army OC/Ts obviously focus on the first half as it pertains to our own ARNG units and the command relationship with them.

Though it is becoming more prevalent within the junior officer world, most have neither seen nor read "The Iron Major Survival Guide," in which Lt. Col. David Dunphy shares his tips for field grade officers. Dunphy's tips for building relationships include:

"Don't think that by sheer rank and intimidation that you will be able to bull your way through the 'Iron Jobs' to success. You need to solicit buy-in, loyalty and trust, from up, down, left and right, and beyond. Your influence in and outside of your unit will have a direct correlation to your success as an S3 or executive officer, and ultimately, the unit's." (Dunphy, 2011)

The challenge associated with "The Iron Major Survival Guide," is that junior officers do not focus on this vital skill until intermediate-level education, and NCOs may never see it at all. Sure, leaders utilize various methods to coach subordinates to make friends outside the organization, knowing that those relationships may bear fruit in the future. Unfortunately, the ability to extend influence does not necessarily come naturally to all, and is often overlooked. Just like an assignment to First Army. But in this First in Deed provides a clear path.

In order to develop key partnerships, First Army OC/Ts must understand the operational environment of their ARNG partners. National Guard Soldiers have the unique challenge of maintaining readiness while simultaneously serving as members of the civilian workforce. They live complex lives compartmentalized between monthly drill, annual training exercises, civilian occupation requirements and community functions. The time they spend conducting Army Field Artillery training is extremely limited in comparison with their active duty peers. And yet the Enlisted Promotion System, managed at the state level, continues to churn through NCOs at roughly the same rate as regular Army (RA). Essentially, ARNG batteries are able to maintain crew stability on the same calendar timeline as RA batteries, but only get around a month of actual training together per year. Therefore, training time, whether inactive duty training, annual training, or eXportable combat training capability exercises (XCTC), must be effective. OC/Ts are vital at shaping the unit's training schedule to ensure partnered units achieve certification and qualification requirements in accordance with quarterly and annual training strategies while still adhering to this compressed schedule.

First Army OC/Ts assist their artillery brethren to meet these training gates by offering their experience with training management in the regular Army. As former battery commanders and platoon sergeants, OC/Ts can communicate the friction they experienced during similar training events and provide lessons learned. They offer successful tactics, techniques and procedures that were effective during their operational time. Most importantly, they provide an external evaluation for their partners during every phase of training from individual to collective, home station to combat training

Observer-coach trainers work with partner units. (Courtesy photo)

center rotations. The after-action reviews (AARs) they provide are combined into a take-home package that the training unit keeps with them throughout the next phase of training. First Army OC/Ts engage with their partner units through every phase of their training progression, serving as resources for constant improvement.

Planning realistic training is a challenge for the National Guard given their reduced full-time staff and limited resources. As an organization that maintains an enduring relationship with each battalion, First Army OC/Ts utilize a coaching strategy to assist in planning. This technique is not at all dissimilar to our counterparts at combat training centers, the major difference being the ability to hone the unit planning process over time. This timeline doesn't stop after the exercise, unlike so many of our peers, but continues throughout the entirety of the partner unit's readiness and mobilization cycle.

As a vignette, during the 34th Infantry Brigade Combat Team (IBCT) XCTC in the summer of 2018, 1st Battalion, 120th Field Artillery (Wisconsin ARNG) and their First Army partners developed a 72-hour situational training exercise based on the direct action training environment approach used at the Joint Readiness Training Center at Fort Polk and the National Training Center at Fort Irwin. First Army OC/Ts developed the exercise concept while working with the training unit's full-time staff to achieve their commander's intent. The relationship leveraged training resources that replicated an operational environment, forcing batteries to operate using multi-echelon procedures in both day and night conditions.

Before entering the training area, each battery received a battalion operations order complete with templated position areas of artillery, in-position-ready-to-fire times, and an enemy situation which prompted battery commanders to conduct troop leading procedures. OC/Ts were imbedded with battery leadership to provide external evaluation and coaching throughout the scenario.

When batteries conducted movement, they encountered opposing forces that engaged them with small-arms fire, improvised explosive devices (IEDs), and simulated electronic attack. The battalion tactical operations center (TOC) requested routine reports and also provided daily operation and intelligence updates in accordance with the unit standard operating procedure. The scenario forced batteries to maintain constant firing capability in support of maneuver forces, prompting the need for an occasional emergency fire mission during movement. Simulating counterfire and assessing casualties provided an opportunity for batteries to train similar to how they'll fight against a peer threat.

Throughout the exercise, OC/Ts gathered data for the purpose of providing a formal AAR, facilitating an opportunity for battery leaders to discuss methods of improving performance over the next fiscal year. Lane training involved continuous operations over 72 hours; a method different from the standard training executed during previous training events. Batteries operated in both day and night conditions, reacting to injects such as emergency fire missions, regular fire missions, movement orders, survivability moves and dismounted attack. Soldiers were constantly shooting, moving, communicating, decontaminating, medicating, supplying and defending themselves in support of maneuver elements, resulting in confidently trained batteries capable of fighting and winning in a modern operational environment.

If this part of the job sounds just like every NTC or JRTC rotation, that is because it is. The XCTC package has similar capabilities for data tracking as are used at both Fort Irwin and Fort Polk. What is missed by the vignette is the work done before training ever really kicked off. First Army personnel established long-term relationships with their ARNG partners, assisted in planning, executing and evaluating training for years leading up to the XCTC. And continue to work with the unit afterward to implement

Soldiers from the Forward Support Company, 120th Field Artillery, conduct an after-action review. (Courtesy photo)

sustains and improves identified during the AAR process. This is not a one-shot transaction, but a mission of steady mentorship and coaching a unit. If this sounds just like a battalion or brigade commander's vision for their unit, that's because it generally is.

Of course, other assignments exist that allow Army leaders to hone their skills of extending influence. The latest of these being the Security Force Assistance Brigade (SFAB), which executes a similar mission to First Army, though directed toward partner nations. To quote the Sergeant Major of the Army Daniel Dailey, "This [Security Force Assistance Brigade] is the number one priority for the Army's Chief of Staff." This is certainly true and our SFAB structure continues to be increased. But what the First Army mission allows captains above and beyond the SFAB are longer timelines for unit relationships and the ability to work with units deploying to multiple theaters. Soldiers from one First Army battalion mentored units mobilizing in support of Central Command, U.S. Army Europe and Africa Command in the space of just under two years.

To imply that the main benefit of serving as a First Army OC/T is teaching young captains the art of relationship building ignores the purpose associated with this task: to increase the readiness of the Total Force. First Army OC/Ts are the primary element in providing bottom-up feedback through FA doctrinal and command channels. The data captured during unit assessments drives the honest picture of artillery readiness across the Army that allows strategic leaders to make informed decisions.

None of the positive impacts associated with coaching and mentoring ARNG partners, like increased deployment and Total Force Readiness, are possible without first building the relationship. Establishing mutually beneficial partnerships is tantamount to extending influence beyond the chain of command. That influence allows First Army OC/Ts to engage partners with doctrinal-based coaching techniques and incorporate realism into their collective training. This process facilitates a noticeable and lasting impact on the readiness of the Total Army Force.

But not only are the ARNG partners more lethal and adaptive, but also the First Army team mentoring them. The artillery Soldiers who come to this assignment have the opportunity to fine tune the craft of relationship building that is vitally important to successful performance as either majors or first sergeants. The natural outcome of quality key leaders within all artillery battalions is the successful achievement of the commander's vision. As Dunphy says, "When you take care of the boss, you take care of the unit." (Dunphy, 2011) As a premier enabler for helping the Total Force achieve readiness, First Army leads the way in leader development for the future.

Capt. Jacob Gatewood is a 2009 graduate of Slippery Rock University. He has served as a fire support officer and deployed in support of Operation Enduring Freedom. He then served as an executive officer, acting as the commander in support of the Command Team SFAAT deployment to Afghanistan from 2012 to 2013. He completed the Air Assault Course, Pathfinder School and the Joint Firepower Control Course. Upon completion of the Maneuver Captain's Career Course, Gatewood served as the battalion adjutant. Gatewood is currently the commander of A Battery, 2nd Battalion, 82nd Field Artillery.

The best defense is a good offense

Opening windows of superiority with Short-Range Air Defense in multi-domain operations

By Maj. Will Viegas

"After all, the great defense against aerial menace is to attack the enemy's aircraft as near as possible to their point of departure."

–Winston Churchill

The issue

The U.S. Army War College challenged the Army research community to explain how operational level commanders might open windows of superiority and exploit the initiative in multi-domain operations (MDO). Ground-based Short-Range Air Defense (SHORAD) is inherently cross-domain and can be employed to open windows of superiority in both the air and ground, but fundamental changes to air defense (AD) doctrine are required to ensure that AD is prepared to fully support MDO.

A multi-domain concept of employment

The concept of employment (COE) sketch in Figure 1 describes a way in which SHORAD may be employed to open a window of superiority in the air and on land. In the COE, SHORAD possesses sufficient mobility, survivability and lethality maneuvers into the close area ahead of the decisive operation (DO). This SHORAD battalion is given the task and purpose to 'seize Objective Dog and Control SHORAD engagement zone (SHORADEZ) from H+3 to H+6, to open a window of superiority along axis of advance BLUE and enable the DO.' The reader may assess initially that this COE can be described and directed with current AD doctrine since the operational terms and graphics can all be found within ADP 1-02, but in fact this COE is a radical departure for AD that is more akin to offensive counter air (OCA) . The following sections will discuss why this COE cannot be adequately described or directed with current AD doctrine, and identify fundamental changes to AD doctrine necessary to facilitate this COE.

Operational elements

AD doctrine specifies four operational elements: active air defense, passive air defense, attack operations and mission command. The COE provided seems to most aptly nest into attack operations, however, it is key to note that attack operations are conducted by "special operations forces, fixed and rotary-wing aircraft and field artillery units." Arguably, active AD may be used to describe the COE, but this is inadequate since active AD creates an image of providing defense to defended assets in the support areas. If doctrine writers do not assess the term attack operations should be broadened to include SHORAD, perhaps a new term could describe this COE, or perhaps OCA would suffice. Regardless, operational elements frame the way Air Defenders view their role on the battlefield, and in this case, they are inadequate to describe and direct this COE, which has an offensive flavor that is beyond the current terms.

Task, purpose and objective

While there is no prescribed list of tactical tasks that AD units cannot do, there is cultural acceptance that AD units conduct a narrow scope of tactical tasks in support of operations. Typical tasks to an AD unit might be "conduct area defense" or "deny threat aircraft." The author has provided an unusual terrain-oriented task for an AD unit; however, the purpose is not unusual. Commanders often provide AD units the purpose of enabling an operation, but in this case the words "open a window of superiority" imply a temporal nature that is important to the tenet of convergence in MDO. It is also unusual that the COE ties

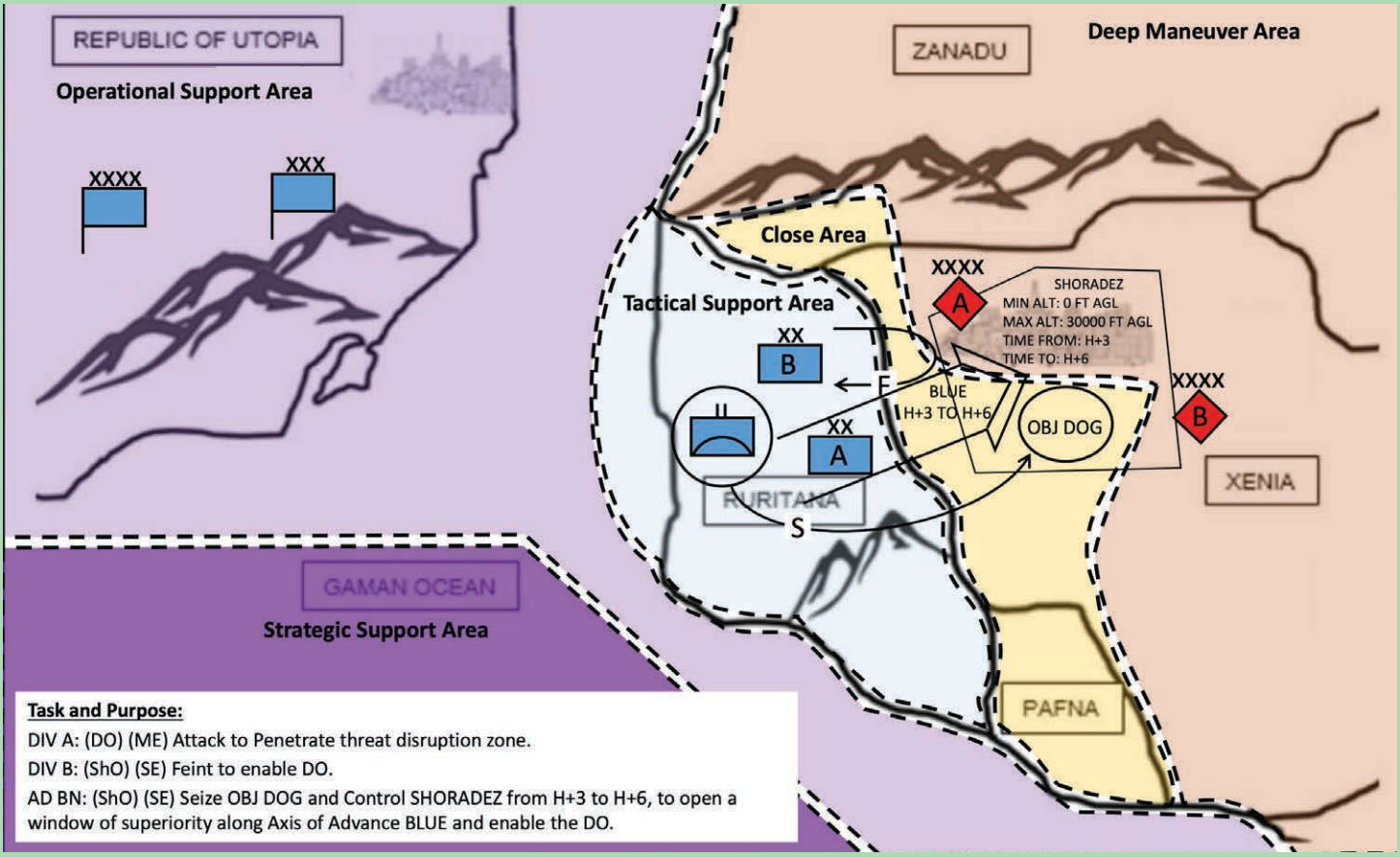

Figure 1. Concept of employment sketch. (Courtesy illustration)

the terrain-oriented task, "control," to an airspace control measure, in this case a SHORADEZ.

In the case of tactical task, purpose and objective, AD doctrine may not require changes to describe and direct the COE, but the way Air Defenders culturally view the scope of their operations must change, and these cultural changes are largely driven by changes in doctrine. The AD community would benefit from a series of vignettes that describe how AD supports MDO. These vignettes need to push the envelope on tasks, purposes and objectives assigned to AD units.

Modes of control and autonomous operations

A key piece of AD doctrine is the modes of control. There are currently two modes of control, centralized and decentralized, both of which require continuous and reliable integration. At a minimum, integration requires timely communication from the engagement control authority to the firing unit. These modes of control are sufficient in support of unified land operations, but the future threat outlined in TRADOC Pamphlet 525-3-1 will contest all domains and the electromagnetic spectrum, which will dis-integrate friendly SHORAD. Additionally, the COE illustrates time-distance that would likely preclude the ability to integrate SHORAD in this operation.

Neither mode of control will support this operation. Arguably, current doctrine has an answer to this in the form of autonomous operations, which "a unit assumes… after it has lost all communications with the higher and adjacent echelons." Autonomous operations are inadequate to describe this COE since autonomous operations are not deliberately planned, but are a consequence of environment or threat. Doctrine developers could create a third mode of control to support this concept of employment. This new mode of control might simply be described as autonomous operations.

Way ahead

The flexibility and adaptability of doctrine is powerful, but at the same time, the flexibility of doctrine can fool writers into believing that it is sufficient to meet the challenges of the future. In the case of MDO, AD doctrine is inadequate. It would be a terrible error to assume that AD is inherently multi-domain since it crosses land and air. AD may be cross-domain, but changes need to occur across all elements of DOT/MLPF-P to create AD units capable of supporting MDO. Fundamental changes to AD doctrine must be made, no punches can be pulled. Concepts developers must question even the most time-tested principles.

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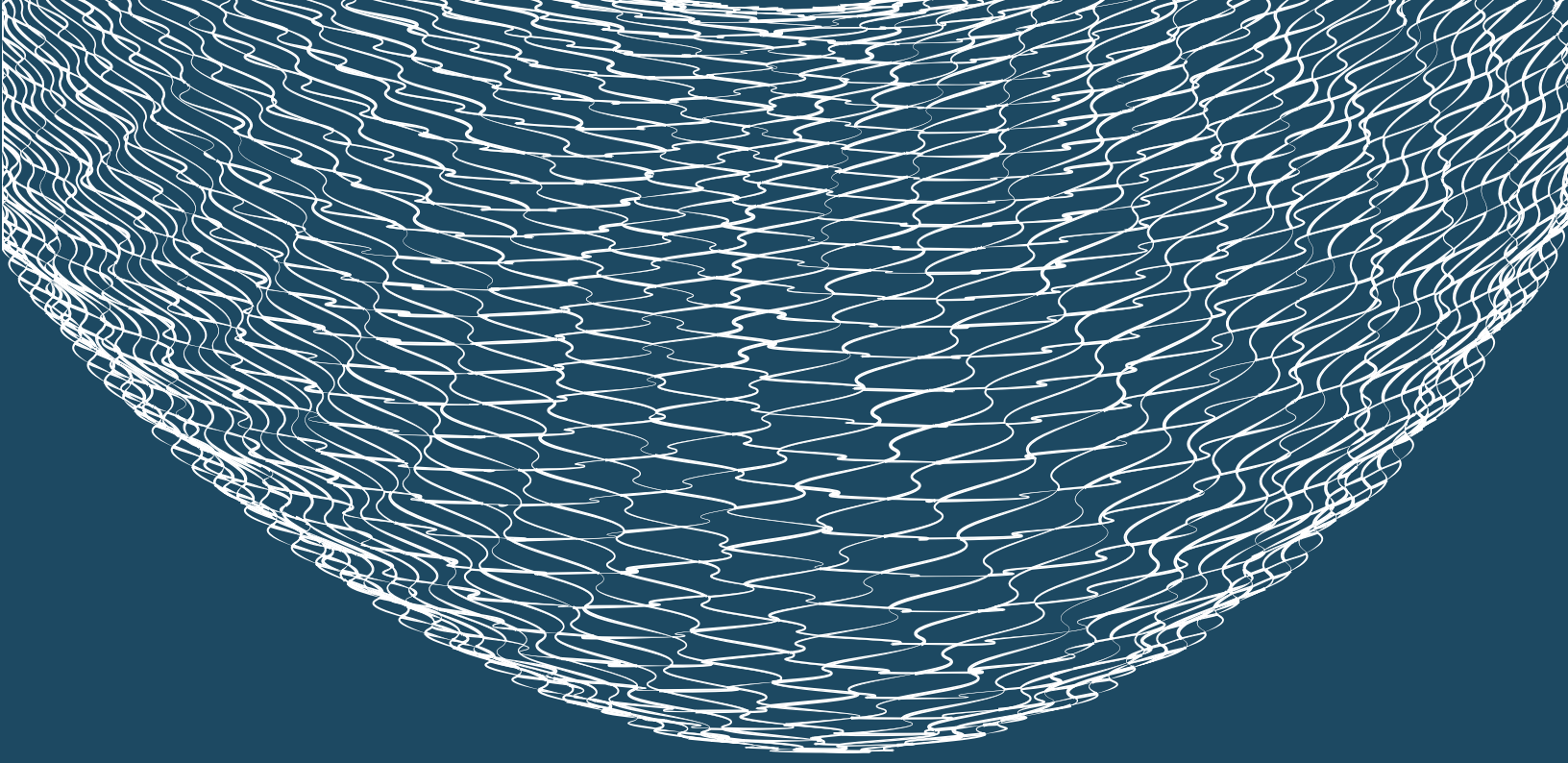
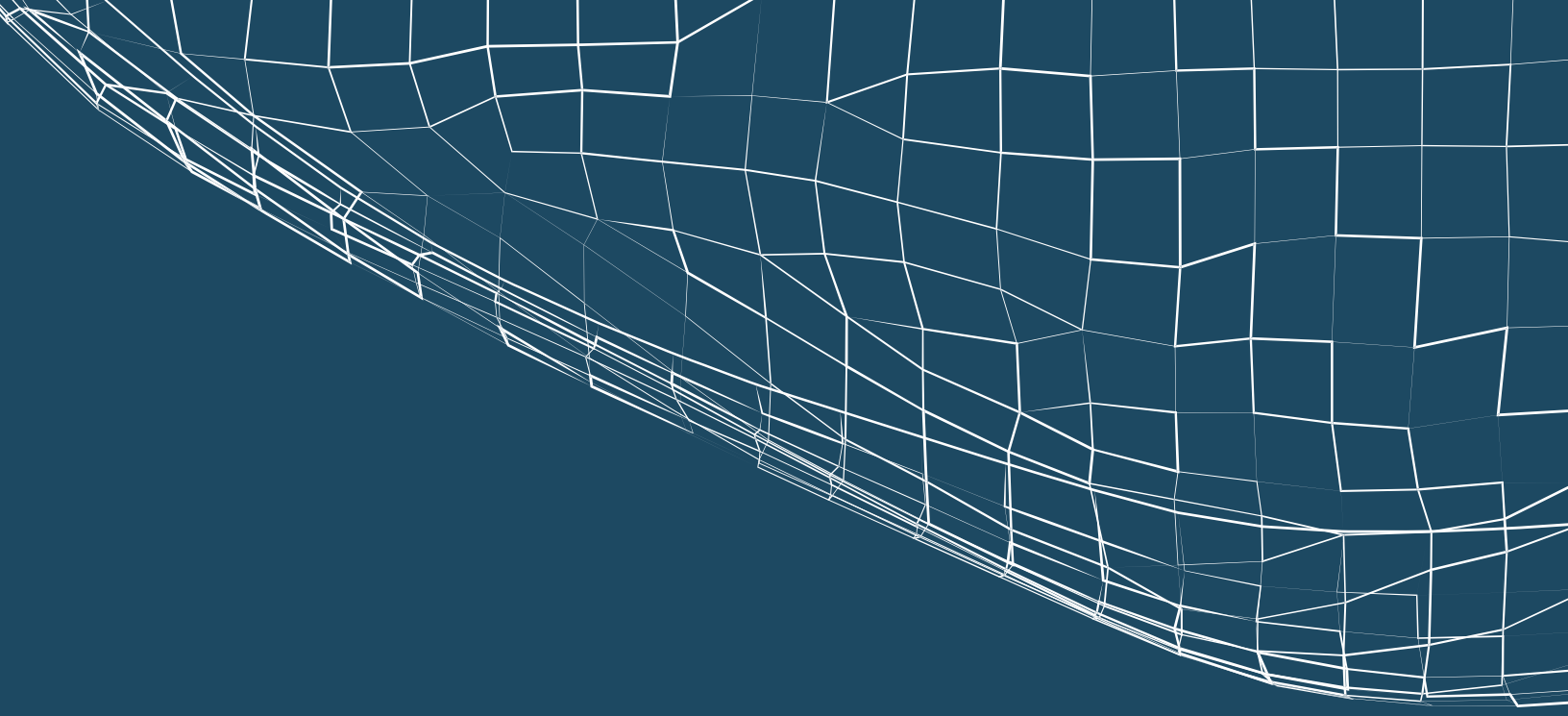


Training to fight at the corps and division level

Tackling the problem of fighting a near-peer threat in a contested environment from a higher echelon

By Capt. Mark Chapman

For the last 18 years, the United States and its allies have been embroiled in the Global War on Terror. A near-boundless war that has primarily taken the shape of counter insurgency operations (COIN) in the Middle East and Central Asia. Now, as the United States Department of Defense moves away from COIN and into a new era of multi-domain operations, America and its partners must move away from training only up to the brigade level. In order to win a large-scale war in a multi-domain battlefield, America must be able to fight at the division or corps level, must be



rapidly expeditionary, capable of fighting both jointly and as part of a coalition, and must have a robust logistical force capable of sustaining a prolonged fight. The need to train for this impending fight goes beyond the directives of the FM 3.0, and this article will highlight why it is critical to train for and win that fight. It will also articulate a solution for training to win that looming fight.

From Capitol Hill and combatant commanders to brigade and battalion commanders, there is a lot of talk about methods to tackle the new problems of the next fight. There is, however, little more than talk. This paper goes beyond a list of problems and offers as a solution, one way to address all four of these challenges. Mastering these four challenges will allow America and its allies to be successful in a multi-domain battlefield.

Russia's invasion of Ukraine in 2014 shocked many Western leaders. Their integration of both lethal and non-lethal Fires contributed significantly to their success. As such, it has been and continues to be studied with great vigor by the U.S. and its NATO partners because of the threat Russia poses. Caught blindsided by a renewed Russian threat, multiple Ukrainian brigades were destroyed. Perhaps more concerning was Russia's incursion into the Syrian civil war as this action showed two key things: Russia's ability to be expeditionary at the strategic level and their ability to set up a formable air defense system. The latter has driven the significant sales of surface-to-air missile platforms in that region and has become very concerning to Western leaders.

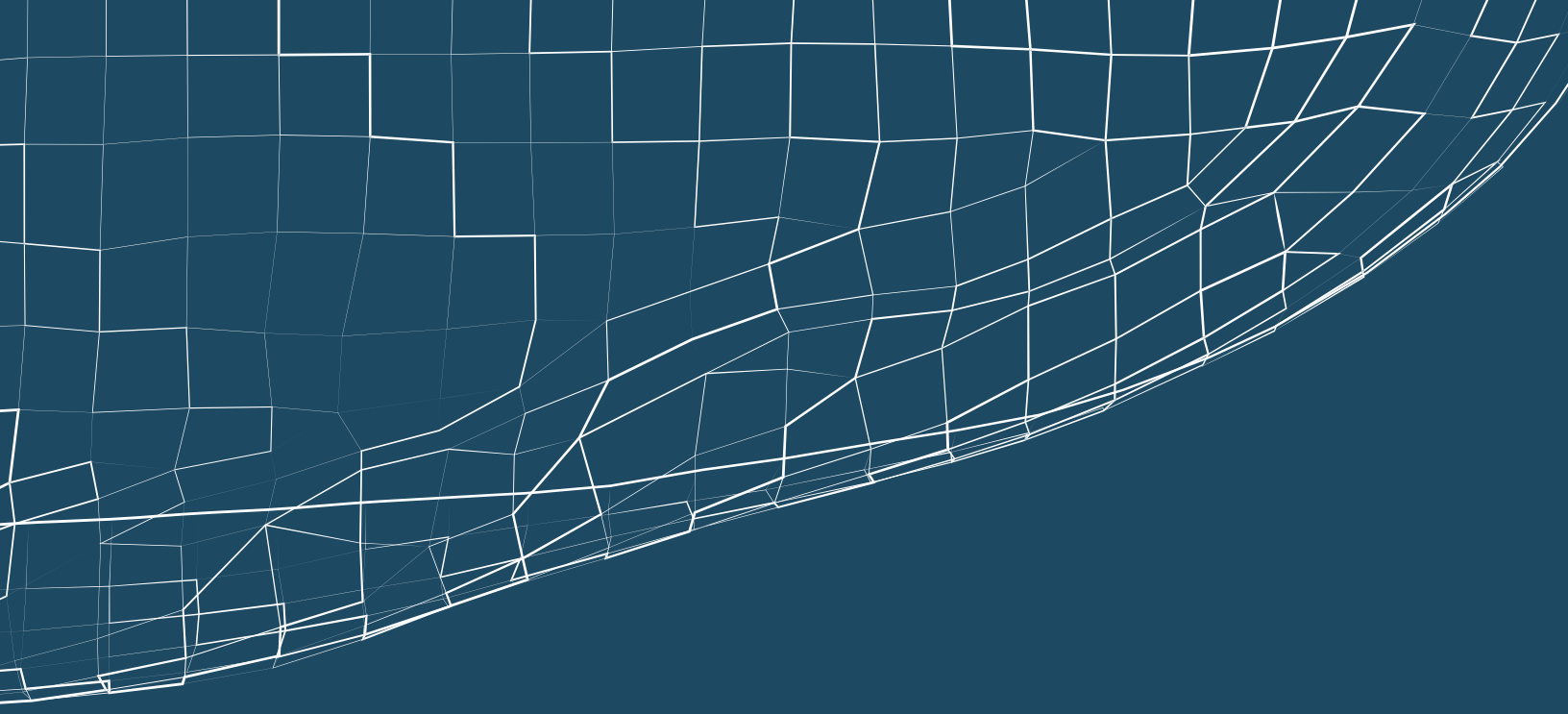
Russia's power projection along its borders and in the Middle East prove that they have not been idle in the past 18 years while NATO has been entangled in COIN operations. They have been quite the opposite, developing new technology and reversing the drastic cuts made by Boris Yeltsin in the 1990s. Vladimir Putin has made and continues to make great effort to modernize and bolster the strength of the Russian military.

Additionally, in the far East, there is another looming threat: China. It continues to improve its military across a broad spectrum including building multiple carrier groups for the navy, constructing new advanced land-based surface-to-surface and surface-to-ship missiles as well as increasing both its jamming and hacking capabilities. All of these pose a clear threat to both the regional and global status quo and emphasize President Xi's goal of making the People's Liberation Army a world-class fighting force by 2050.

Additionally, operating quietly, almost in the shadows of the world stage, China is buying, or negotiating for the use of ports around the globe. While its economic importance for the establishment of a Chinese trade route is paramount, the military aspect of this cannot be overlooked. Each port that China controls provides a logistical base of support for its military in a time of war.

It could be and perhaps should be argued that while over the past 18 years that the U.S.'s foreign policy has been focused on counter insurgency and global terrorism, Russia and China have moved from the status of a near-peer competitor to that of a peer adversary. Both continue to actively flex their military muscle in the forms of large training exercises, weapon sales and outright military incursions. While Russia seems to be focused on military actions, the importance of China's actions perpetrating their long-term strategic goals cannot be overlooked. The time for passive soft diplomacy has passed. America and its allies now must actively deter these potential peer adversaries from upsetting the status quo.

American military leaders at all levels are still fighting with some



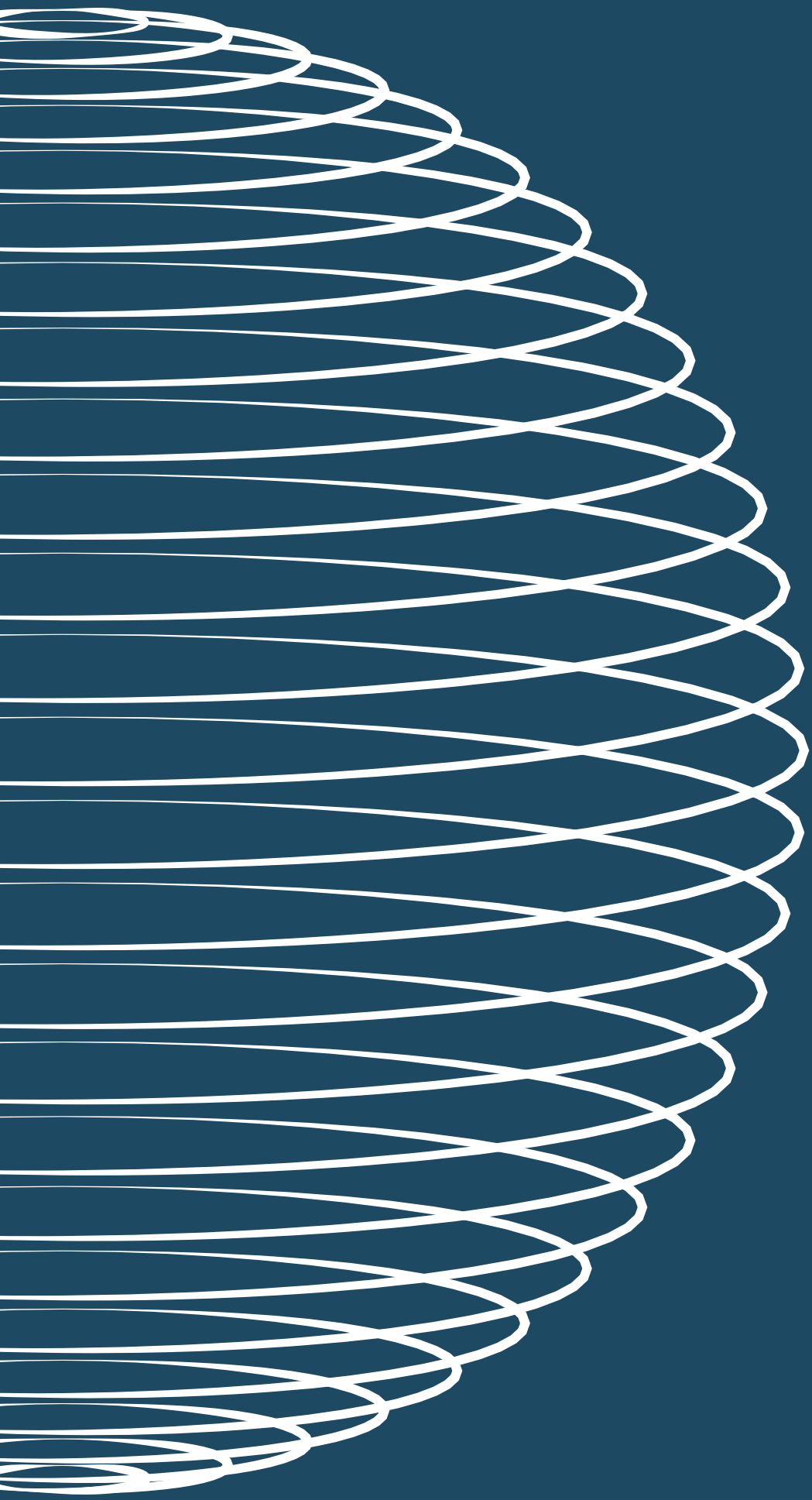
semblance of a COIN mentality, and in order to be successful in the next big fight, they must break away from their COIN hangover now. They must immediately transition their focus from a COIN environment to one against a major power peer threat. This starts with reading, understanding and internalizing, the Army's new FM 3.0. However, merely reading and discussing is not good enough. The American Army must implement the FM 3.0 into all levels of training. Now.

A method to accomplish this for the Army is by training to fight from the corps and division levels, training to be rapidly expeditionary, training joint integration or as part of a coalition, and straining the logistical capabilities of its forces.

During the 2019 Fires Conference at Fort Sill, senior leaders continuously harped on the point that the next substantial conflict would most likely start in an area where the United States and its allies were not expecting it to happen. This highlights two essential items: first, the U.S. military will be reactionary; and second, it must be expeditionary on a large scale. In order to win a large-scale conflict across multiple domains, the United States Army must build up its capacity to fight over vast tracts of land, sea and air, and be able to manage that fight from the division or corps level. In order to train this, the headquarters elements must train to be expeditionary and to fight a sustained fight. If America and her allies go to war with a peer competitor, they will not be able to win the fight at the brigade level. It will require a corps or division headquarters to manage the battlespace and to direct units. In order for America to dominate in the next conflict, the corps and division headquarter elements must be actively involved in training and preparing for this next fight.

This must go beyond the warfighter exercises that are currently being done. It is not enough to post corps and division staffs in air-conditioned buildings for 12-hour shifts while they move pieces around on a map or on a virtual battlefield. Exercises must bind the corps and division staffs to the field for extended periods and must be done in a variety of environments to include a chemical, biological, nuclear and radiological (CBRN) contested environment. If American forces are to be prepared for a large-scale armed confrontation commanders and staffs at every echelon must get used to fighting, living and making decisions in an environment outside of forward operating bases, without tactical internet and with little sleep or information. There is no way to replicate the conditions of an austere or contested environment, without being in that environment. And as America looks to the next fight, it must train for the conditions that it will most likely find itself in.

This can be done in a variety of ways rotating the entire corps or division to combat training centers (CTCs) like the National Training Center or the Joint Readiness Training Center and fighting at a division level or by sending a corps to fight at the White Sands Missile Range against another corps can accomplish this. This idea is nothing new, the Louisiana Maneuvers of 1941, were designed to test the Army's ability to fight over a large area from a higher headquarters in preparation for a war in Europe or the Pacific. Renewing this training will give America's senior leaders the repetitions that will build experience and ultimately allow them to be successful in a multi-domain operation against a peer competitor. In a fight where it is expected that America will lose entire battalions in sustained operations, it is not enough to simply certify its brigade combat teams. It must actively train its divisions and corps to continue to fight even with that type of loss. Logistically, this may mean cutting the number of ro-



tations to the CTCs but making them longer and bigger. Instead of doing 10 brigade-level rotations to NTC per year, the Army could conduct six division-level exercises at White Sands Missile Range or training from NTC in the south to Twentynine Palms in the north. These exercises, though mainly focused on training division staffs, could also act to certify the brigades.

Additionally, emergency deployment readiness exercises (EDREs) are another excellent way for the corps and division levels to prepare for this large-scale conflict. This is something that America has been doing at the brigade level and must now begin to flex its muscle through its division-level headquarters. Though it is a step in the right direction, brigade-level EDREs as part of Operation Atlantic Resolve or "surprise" rotations to the CTCs are not enough if we are to truly prepare for a conflict with a peer competitor.

EDREs accomplish two tasks; they test the readiness of a large unit to be deployed rapidly while also acting as a threat deterrence in whatever theater they deploy to. Deterrence is yet another reason that the United States must conduct EDRES at the division level as stated above, the next conflict will not be one which is fought or won at the brigade level. In order for it to indeed be a preventative measure, a potential adversary must see that the United States has the capability to rapidly mobilize its forces for conflict. By deploying an entire corps or divisions on an EDRE the United States sends a clear message that our forces at every echelon stand ready to deploy, something that will become paramount when the next conflict begins.

When the next conflict begins, it will stretch over vast tracts of land, sea and air. In order to maintain momentum in that environment, the American military must have a robust sustainment plan and forces that are trained and ready to exercise it. The only

way to train this is to actively action it. This means deploying divisions by rail to CTC and or port, and training to sustain them in the field for extended periods. The first few times will be a significantly painful event. However, it is the only way to develop the muscle memory from the officer in charge at the port or railhead on up to the division commander that will allow us to rapidly project and sustain our power in a contested area. The U.S. military as a whole must move away from their COIN hangover where dining facilities and USO lounges are par for the course. The military must train to feed, fuel and equip its fighting forces in austere environments, and it needs to happen now. The next fight, if it is a peer fight, will not be one with forward operating bases (FOBs) rather it will be a one with staggered front lines where corps and divisions need to be sustained and massive logistical packages must be pushed forward to the lines to sustain them. Because our potential adversaries have invested heavily in their anti-aircraft systems resupply will most likely be done via ground. This may mean a greater emphasis on prestaged sustainment packages that are rapidly accessible to the maneuver elements or a greater reliance on logistical trains keeping pace with maneuver elements. Victory in the next conflict may very well be decided by which force can sustain the fight the longest. America must now begin to focus its sustainers on being able to sustain multiple echelons simultaneously, moving away from the COIN hangover and the FOB mentality.

Much like the corps headquarters elements, a way to train sustainers and test or stress their ability is to practice at the CTCs or in the form of EDREs. Similar to the corps and division headquarters, no warfighter exercise will actively stress the capabilities of America's sustainment forces. By actively practicing the massive logistical movement that deploying and sustaining a corps or division requires and capturing the lessons learned, America's military will be able to train to a standard where they will be ready to sustain a protracted conflict over a vast landscape. It is something that must be done now, and something that must be practiced over a variety of different environments.

There is continuing talk at both the tactical and strategic level about fighting jointly and as part of a coalition against an adversary. However, outside of Europe and Korea, there has been little emphasis placed on fighting with our partners as part of a coalition. Additionally, there has been little to no partnership between the U.S. Army and other branches of our military, specifically the National Guard. This must change, and rapidly, in order for America to prepare for the next large-scale conflict. This is a problem that very many officers seem willing to address, yet we have seen very little action.

The American military is good at conducting training with like-minded countries. For the most part, NATO shares like systems, similar doctrine and a similar way of war. In order for America to prepare for a coalition fight, it needs to actively train to fight as part of the large multinational team. This must go beyond the scope of NATO. America must look at building partnerships with militaries that think differently or are in likely areas of potential conflict. For example, the Kuwaiti military is much smaller than the United States and is postured for defense only. Could the United States Army learn something from deploying a corps headquarters there to conduct a three-week training exercise with the Kuwaiti equivalent of a corps headquarters? In addition to a great training event, what message would it send to the rest of the world (particularly China) if the American Army deployed a divisional headquarters to the Socialist Republic of Vietnam for a training exercise? The American military must shift its focus from thinking that countries who do things differently are wrong and find ways to capitalize on their strengths and forge new partnerships in areas we have neglected in the past in order to prepare for the next fight.

The proposed multinational training must go beyond the tactical level. To prepare for a conflict with a near-peer competitor, the United States military must focus on the operational and strategic levels of multinational training. In a near-peer fight, America may have the most significant percentage of ground forces. However, that does not mean that the other forces can be overlooked or discounted. The time to train with them is now. The time to conduct a large-scale exercise with the Japanese, the Australians and the Vietnamese is now, not when a conflict with China is imminent.

The importance of coalition training cannot be overlooked; it projects a powerful statement; one which says that America does not stand alone in its resolve. It is paramount for leaders at all levels to understand the importance of this; for a potential adversary, it is understood that if a conflict is started, it will be between multiple nations and much harder to fight. More importantly, it allows the United States to foster relationships in areas that we have perhaps overlooked in the past. The time to build and foster these relationships is now -- not in the face of impending conflict.

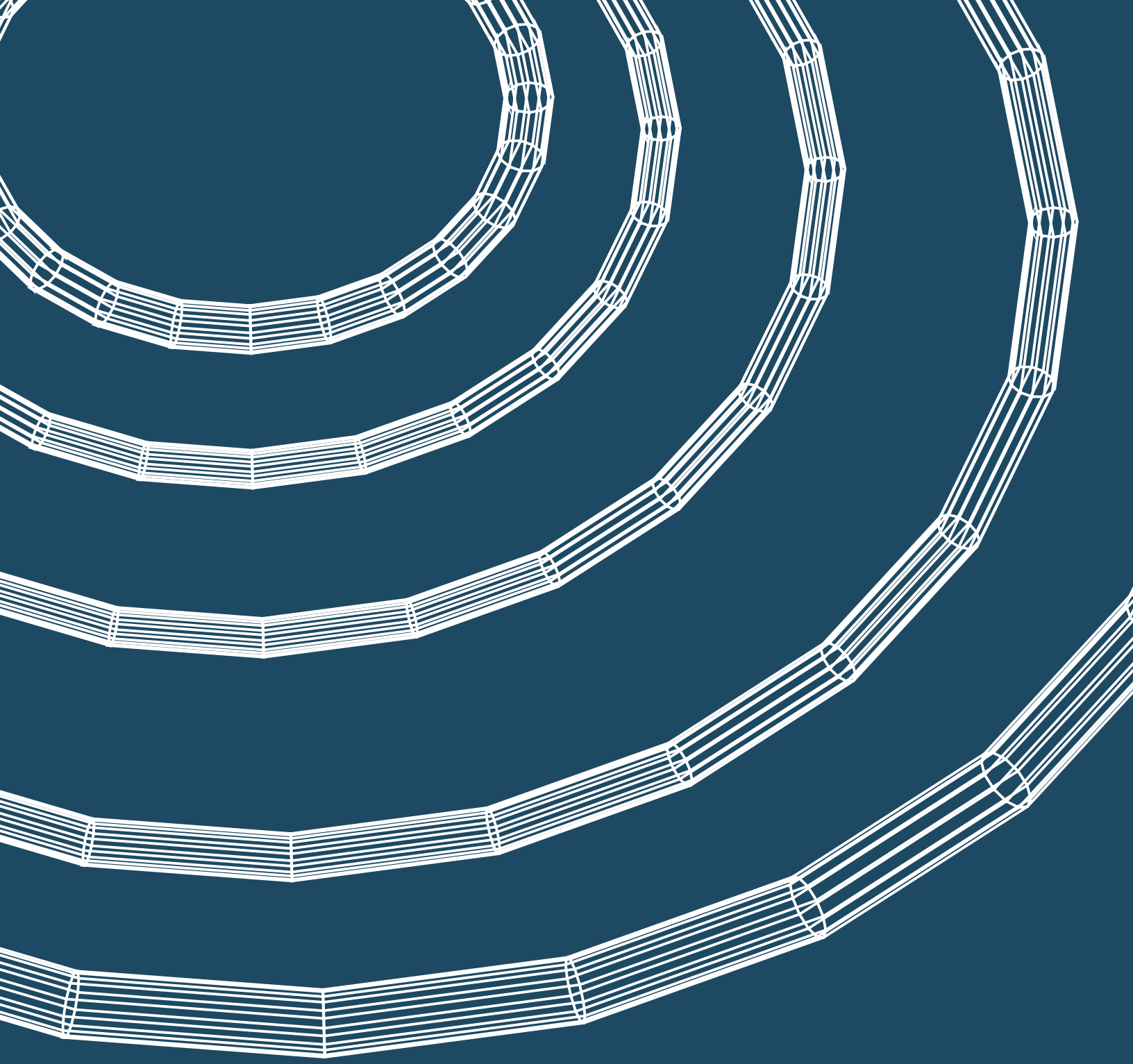
In addition to forging partnerships with forces abroad we must continue to build our interservice partnerships here at home. We must train our forces to fight jointly now. This is a point that is harped upon with robust rhetoric but is very rarely actioned. As a military, we must quit talking about it and actually action it. This starts with interservice integration at the tactical level and builds to the operational and strategic level. Training to fight jointly can be as simple as augmenting an Army light infantry battalion with a company of U.S. Marines

who have light assault vehicles. For the infantry, they will be able to conduct training with a 25 mm chain gun, which is a powerful force multiplier, but the Marines will be able to showcase their capabilities for their Army brethren. Often at the CTCs, there are simulated aircraft that are shot down due to contested airspace. However, there are no Pararescuemen that are allocated to search for them. In a large near-peer conflict, the United States Army is not going to be able to flex a company to secure the crash site or pilot. We must train for that environment now, and that may look like sending an element or flight of Air Force personnel to train at the CTC with their Army counterparts.

Additionally, the active duty component of the Army must get better at incorporating National Guard and Reserve units during field problems at home stations and rotating them into training at the CTCs. By training together in simulated combat situations, the military as a whole will function better as cohesive understanding and trust between multiple echelons are built. It could be pointed out that while the training would benefit the units at the tactical level, the functions of different units would allow the commanders at the operational levels to think outside the box providing everyone with a valuable training event.

National Guard Soldiers bring to the table a wealth of skill sets from the civilian side, which are not usually found in an active duty military unit. These skill sets range from mechanical to medical and from carpentry to information technology. By integrating these skill sets into its forces during training, America stands to build a better force at the tactical level. These skills cannot be overlooked and must be fully leveraged if America is to be successful in their next war.

Currently, there is an overwhelming emphasis on the new concept of multi-domain operations. From the Joint Chiefs of Staff all the way down to the battalion level, units are preparing for the next large-scale confrontation with Russia or China. As of now, there has been much talk about the proposed problem sets. However, the problem set needs to be framed and solutions must be presented. This article presents a solution. Now it must be understood that there are a lot of different ways to solve these problems and that there is a large pool of very highly intelligent Soldiers and civilians looking into ways to fix these problem sets. However, the fact that this article formulates solutions for tackling these problems is what separates it from the rhetoric. This article provides a way to tackle four vital aspects of a large complex multi-domain fight in which America will have to fight from the corps and division level with partners while sustaining that fight for an extended period. This article provides a solution for the integration of U.S.



forces both as part of interservice training and coalition training. The intent of this article is not to undercut those who are working on these and similar problem sets, instead it serves to formulate discussion and stimulate thought on the problem sets listed previously as we continue to train to fight a peer competitor.

One thing remains certain: China and Russia are continuing to make large bounds forward as peer adversaries, and rogue nations like Iran and North Korea are quickly trying to close the gap that stands between them and the West. With all that, it must be understood that the time for passive diplomacy is over, America and its allies must now actively deter this war from happening. In order to be preventive and to counter this aggression America must actively train its forces to fight from a corps or division-level headquarters, to fight jointly, and to be sustained as a means to prepare for potential conflict but also as a means to send a clear message to its potential enemies that the United States and its allies stand ready to rapidly deploy at every echelon.

Capt. Mark Chapman recently graduated from the Field Artillery Captain's Career Course at Fort Sill, Okla. He is currently serving as the battalion fire direction officer with 5th Battalion, 25th Field Artillery at Fort Polk, La.

THE FCoE COMMANDER'S BOOKSHELF

I view these pillars in leadership development efforts. The titles provided will provoke critical thinking about Professional Soldiering and the unique role of the land power; analysis and reflection on the past and the future; and a deep understanding of the Army and the future of the profession of arms in the 21st Century.

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MICHAEL LEWIS

LEADERS EAT LAST
SIMON SINEK

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THE CLASSIC KOREAN WAR HISTORY
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MILESTONES
SAYYID QUTH

THE EMPIRE OF THE SUMMER MOON
S.C. GWYNE

THE STARFISH AND THE SPIDER:
THE UNSTOPPABLE POWER OF LEADERLESS ORGANIZATIONS
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LEADERSHIP SECRETS OF COLIN POWELL
OREN HARAI

ADAPT: WHY SUCCESS ALWAYS STARTS WITH FAILURE
TIM HARFORD

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WILLIAM H. MCNEILL

THINKING, FAST & SLOW
DANIEL KAHNEMAN

WINNING
JACK WELCH

THE CAROLINA WAY
DEAN SMITH

LEADING UP: HOW TO LEAD YOUR BOSS SO YOU BOTH WIN
MICHAEL USEEM

THE FCoE COMMANDER'S BOOKSHELF

THE MILITARY ART: This is the theory and practice of preparing and conducting military actions on land, at sea and within the global aerospace. It is also theorized that its primary function was to attain victory of one's adversary with the least expenditure of forces, resources and time.

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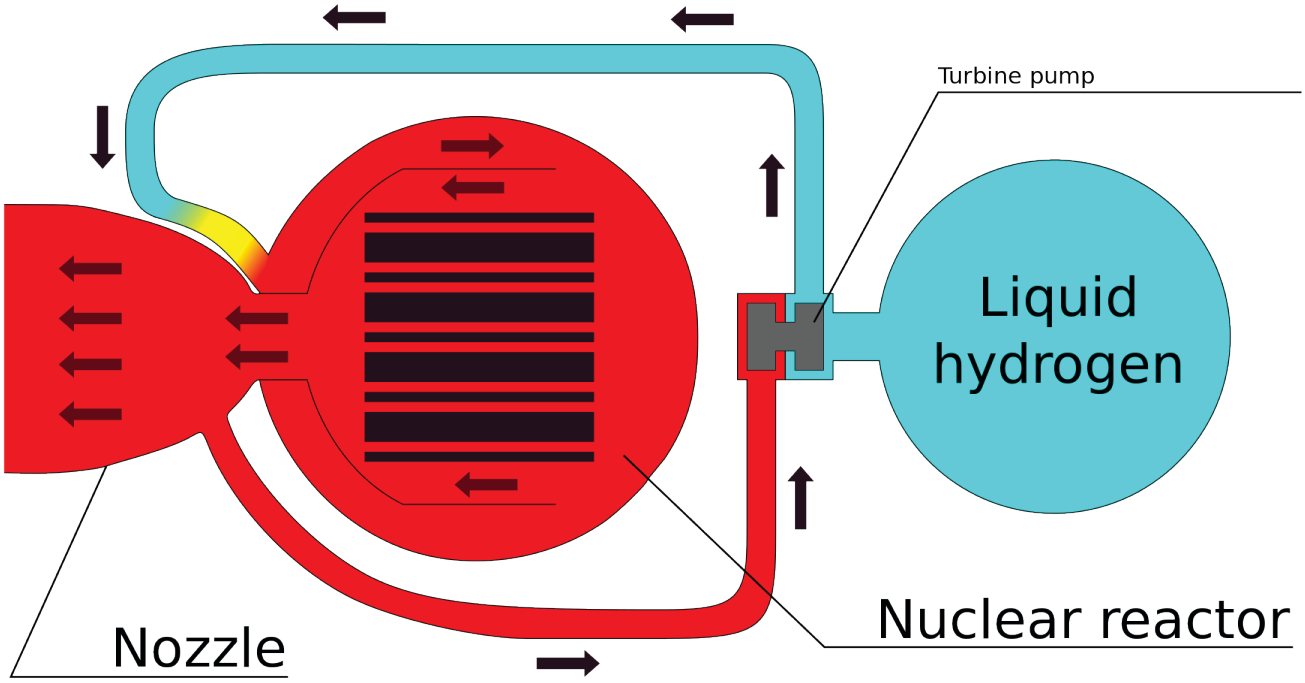


A simple diagram of a nuclear thermal rocket system. (Courtesy illustration)

Moscow's hypersonic misadventure

A crash course in nuclear thermal rockets

By Capt. Peter Mitchell

At around 10 a.m. Moscow time on Aug. 8, 2019, four of the Comprehensive Nuclear-Test-Ban Treaty Organization's seismic/acoustic monitoring stations in Norway, Sweden and Finland reported an explosion in Nyonoksa, Northern Russia.[1] Contradictory reports promptly followed. First, the city of Severodvinsk – a major shipbuilding hub on the Arctic Ocean and about 40 km from the reported explosion – reported a radiation spike. Local pharmacies reportedly saw a run on iodine tablets. The Russian military denied this, even as videos began leaking out showing medical personnel responding to the incident in hazmat suits and ambulances shielded with plastic tarps transporting wounded to be treated for radiation burns.[2] In a same-day official statement, Moscow said the explosion was caused by a liquid-fuel propulsion system. Two days later on Aug. 10, an official statement from the state nuclear energy agency, Rosatom confirmed five of its specialists died in the blast, and identified them as employees of the all-Russian Scientific Research Institute of Experimental Physics (VNIIEF).[3] Arms control expert Jeffrey Lewis with the Center for Nonproliferation Studies laid out a compelling case on Twitter that the mysterious test explosion was related to development of an experimental hypersonic cruise missile, the 9M730 Burevestnik. VNIIEF was identified in 2018 by Russian broadsheet Kommersant as the design house for the Burevestnik propulsion system.

Now, on to the rocket science. The Rosatom statement also said that the explosion took place during the test of an "isotopic power source" within or mounted to a "liquid propulsion system." This is not a description of a scramjet (compression/combustion in supersonic airflow), which is the technology utilized in the hypersonic Boeing X-51 Waverider. What this actually sounds like is a nuclear thermal rocket (NTR), a technology first

1 *https://twitter.com/ctbto_alerts/status/1160130156922642433?s=21*
2 *https://www.defensenews.com/global/europe/2019/08/13/an-explosion-a-spike-in-radiation-evacuation-preparations-what-exactly-happened-in-russia/*
3 *https://www.businessinsider.com/russian-missile-disaster-shows-signs-nuke-reactor-blew-up-experts-2019-8*

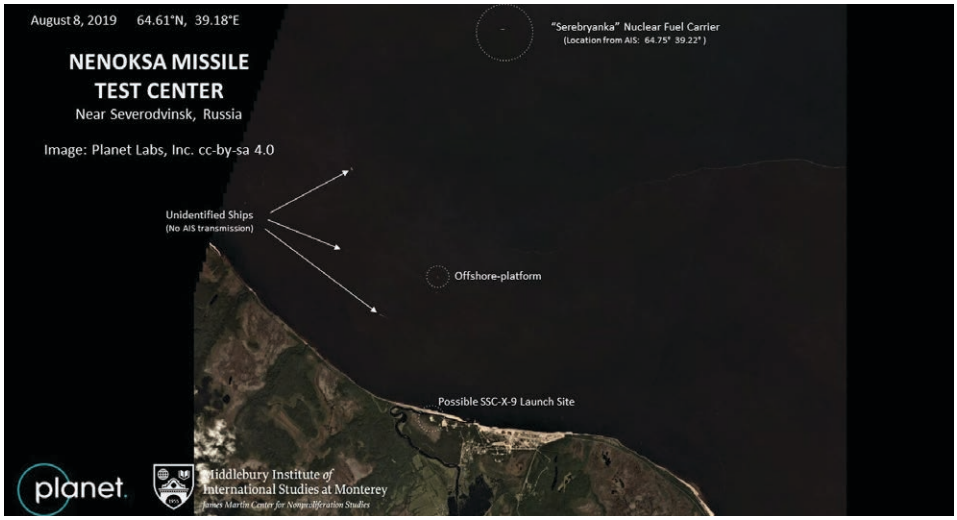
developed from 1955-1973 under the U.S. Atomic Energy Commission (AEC) as Project Rover. NTRs are low-thrust/high-specific impulse motors that work on hydrogen fuel, a convenient and plentiful fuel acting without an oxidizer. For example, the giant boosters for the space shuttle program used slurried hydrogen fuel reacting with oxygen as the oxidizer (this is what's called a high-thrust/low specific impulse motor) in a giant controlled explosion. An NTR, on the other hand, does away with the oxidizer and instead uses the heat of a fission reactor (Phoebus-1 used a graphite-moderated uranium reactor) to heat the hydrogen up to about 2000°K and rapidly expand it through a nozzle. This allows the motor to be more economical with its fuel, perfect for a long-range hypersonic cruise missile like the Burevestnik. There are issues however, with the NTR that were discovered during our testing in the 1960s. The most obvious problem that presented itself was exposing a nuclear reactor to superheated hydrogen. Hydrogen is an extremely reactive element even when gaseous at room temperature (if you don't believe me watch the video of the Hindenburg crash). When hydrogen is superheated to 2000°K, it reacts with the graphite moderator rods "like hot water on a sugar cube" and flashes it to methane (CH_4) potentially causing a runaway nuclear reaction. The Project Rover team solved this particular problem by coating the hydrogen flow lines with inert niodium-carbide. An experiment at Jackass Flat, Nev., showed that the resulting release of radiation from a supercritical Phoebus-1 would have caused fatalities out to nearly 200 meters.[4] The concerns from nuclear contamination and the cancelation of the NASA-led Mars landing led to Project Rover being shut down in 1973.

So, why were the Russians working on such a dangerous motor? The vague statements from Moscow do not shed much light on the subject. The Russians had their own NTR project RD-0410 from around 1965 through the 1980s that was shelved during the post-Cold War drawdown. Perhaps VNIIEF was attempting to knock the dust off testing the NTR for the Burevestnik cruise missile in their feverish quest for the hypersonic Holy Grail. An NTR-powered cruise missile would have considerably longer range and much greater speed than a turbofan-powered equivalent like the Tomahawk. The lapsing of the limitations placed by the Anti-Ballistic Missile Treaty this year will continue to motivate the construction of cruise and ballistic missiles with ever-increasing range and speed to defeat missile defense systems. For now, however, it appears that NTR experimenting has been put on hold since the accident. The town of Nyonoksa just outside the test site was ordered to be evacuated on Aug. 13, only to have the evacuation order canceled the next day.[5] This indicates that no further nuclear thermal rocket testing will occur there for quite some time.

Author's note: For further reading please see "Ignition! An Informal History of Liquid Rocket Propellants" by Dr. John D. Clark.

Capt. Peter Mitchell is an Air Defense Artillery officer currently serving as Headquarters Detachment commander of the Fires Center of Excellence, Fort Sill, Okla.

Images of the Nenoksa Missile Test Center, Russia, before (top) and after (bottom). (Courtesy photos)



4 *https://fas.org/sgp/othergov/doe/lanl/docs1/la-3449.pdf*

5 *https://www.themoscowtimes.com/2019/08/13/what-we-know-about-russias-mysterious-rocket-explosion-so-far-a66817*

RIVERINE ARTILLERY IN THE 21ST CENTURY

By Lt. Col. Shawn Talmadge, Maj. Jonathan Fair and Capt. Daniel Tarrant

The mission of the field artillery is to destroy, defeat, or disrupt the enemy with integrated Fires to enable maneuver commanders to dominate in unified land operations. Field artillery Soldiers accomplish their mission by emplacing their assets in the best location in order to support maneuver forces. Field artillery requires stable platforms in order to provide an accurate unit location to calculate a firing solution and meet the requirements of accurate predictive fire.

THE HISTORY OF RIVERINE ARTILLERY

During the Vietnam War, U.S. forces encountered terrain hostile to artillery operations while fighting in the Mekong Delta. The Mekong Delta is a marshland that, during the conflict, possessed few suitable roads, hundreds of small hamlets as well as thousands of rice paddies. The area also contained several rivers and countless canals. The high water table of the area also made the soil unreliable for artillery occupation due to near-constant moisture and proximity to water sources. When batteries were able to occupy positions, the terrain forced crews to perform inordinate numbers of safety checks, the howitzers also experienced cant during laying and the tubes were difficult to traverse. The terrain and inadequate road system also hampered the ground transportation of howitzers and their subsequent supply and re-supply. The bottom line was that utilizing artillery in the Mekong Delta was a near-nightmare.

In 1966, the 2nd Brigade, 9th Infantry Division

Opposite page: Soldiers, from 1st Battalion, 111th Field Artillery, fire the first round from a M119A3 mounted on an Army Landing Craft. U.S. Army Field Artillery has not performed riverine artillery operations in over 50 years. (Courtesy photo)

Right: Artillery crews prepare their M119A3s and supporting equipment for riverine operations at Camp Lejeune, N.C. (Courtesy photo)

> "In December 1966, the 1st Battalion, 7th Artillery made the first attempt to solve this dilemma by placing its M110A1 howitzers onto Landing Craft, Medium"

along with the U.S. Navy River Assault Flotilla 1, formed a riverine task force in order to bring the fight to the enemy in the Mekong Delta. Initially, fire support was provided solely from fixed locations. However, batteries were unable to maintain adequate tempo and proximity to maneuver. In December 1966, the 1st Battalion, 7th Artillery made the first attempt to solve this dilemma by placing its M110A1 howitzers onto Landing Craft, Medium (LCM-6). Unfortunately, this LCM did not provide a stable platform and its width prevented the howitzers trails to fully extend thus limiting its ability to completely traverse. The 3rd Battalion, 34th Field Artillery Regiment (FAR) then began to utilize barges instead of LCM-6s. The 3-34th FAR welded a base plate to the deck of the vessel allowing the howitzer to traverse a full 6,400 mils. In 1967, the 3-34th FAR, after fielding the M102 howitzer utilized Landing Craft Mechanized, Mark 8s (LCM-8s) in addition to barges. Their methods were effective and riverine artillery became a useful tactic. The successful riverine artillery operations in the Mekong Delta provided maneuver forces with much needed firepower to combat the enemy. After the Vietnam War, riverine artillery was nearly forgotten as the nation prepared to fight a Warsaw Pact enemy across the plains of Europe and as it fought insurgents in Afghanistan and Iraq.

OPERATION GATOR

In 2018, the 11th Transportation (TPT) Battalion, 7th Transportation Brigade (TBX) based out of Fort Eustis, Va., envisioned utilizing riverine artillery as a means to extend Fires into areas denied due to poor terrain thereby presenting the enemy with a new, additional dilemma. The 11th TPT BN contacted the Norfolk, Va., based 1st Battalion, 111th Field Artillery Regiment, 116th Infantry Brigade Combat Team, to assist in the exercise by delivering Fires in support of the Waterborne Artillery Mission. The 11th TPT BN chose the Virginia Army National Guard unit because of its proximity to its headquarters. In January 2019, the 1098th Transportation Detachment, a subordinate unit of the 7th TPT BN, and the 1-111th FAR loaded a M119A3 onto a Landing Craft Mechanized (LCM) vessel at Little Creek, Va. The purpose was to

assist the 1098th TPT Detachment configure their boats to accommodate the M119A3s and to devise a load plan.

On April 25, 2019, 17 Soldiers of the 1-111th FAR participated in a multicomponent live-fire exercise with members of the 11th TPT BN. The exercise was conducted aboard LCM-8 vessels. Throughout the exercise, Soldiers from both battalions collaboratively worked to identify issues, concerns and develop techniques and tactics to deliver Fires using modern artillery and communication systems. The LCM-8 was loaded with the M119A3 and M1097 prime mover along with a standard gun crew and a five Soldier boat crew. A second LCM (Mod 2, command vessel) was loaded with the fire direction center (FDC) Soldiers, M1152 vehicle, and boat crew. A third vessel served as a shuttle between LCMs so the beached boats could remain in place.

The M119A3 was initialized dock side using survey and dry fire verified under digital operations without incident or issues aboard the LCMs. Once underway, it is important to note the gun's Inertial Navigation Unit remained operational for the entire three-day exercise while on the water and traveling over 8 miles away from initialization. The gun fired a charge 3, low angle at target range of 5,100 meters, without the use of a baseplate. Meteorological data was applied throughout the operation. All missions were fired digitally and no degraded techniques were used. The unit expended 20 rounds of high explosive (DODIC C445, 2 Square).

The M119A3 was laid without a baseplate on top of a composite material mat (mobility matting) as it was laid flush on the LCM's deck. Behind the spade, vessel crew placed a composite beam (8" x 8') spanning the width of the LCM secured within the watercraft's bulkheads, the beam included a reinforced seam in the middle of the beam in the area of the spade. The beam was reinforced with steel plates and bolts. Additional sand bags were placed between the beam and spade to absorb shock. Sand bags were also used as wheel chocks as well as powder and dunnage pits.

Reconnaissance was conducted prior to gun placement to verify water and bank conditions in areas where favorable conditions existed. The waterway used for this exercise was a closed section of

intercostal waterway near range G10 at Camp Lejeune to simulate river conditions. Once at the firing point, the chief of the gun and Coxswain carefully coordinated to "stab" the bank along the azimuth of lay. The vessel's steel construction rendered lensatic compasses ineffective, so the vessel's compass (calibrated) was used to initially position the gun along the azimuth of lay. The chief of section was required to convert mils to degrees since the vessel's compass is only annotated in degrees. The Coxswain beached approximately the first third of the vessel on the bank in order to provide a stable firing platform for the gun. Little changes in deflection or gun location were observed while the gun was ready to fire. This method of employment was extremely favorable and rapid since the gun is carried in a firing configuration while on the LCM where, essentially, all that is necessary to fire is beaching the vessel along the azimuth of fire.

The LCM (Mod 2) carrying the FDC initially loitered in the immediate area along the intercostal waterway; however, it was discovered the digital communications traffic between the gun and FDC were consistently disrupted. After a number of additional communications tests and troubleshooting, it was determined that the digital communications may have been disrupted by the changing communications profile created by the loitering vessel's numerous antenna masts and wheelhouse (steel construction). Once the LCM (Mod 2) and FDC were beached and stationary at a distance of 50 meters from the LCM containing the howitzer section, digital communications were maintained without interruption.

At 9 a.m. on April 25, 2019, two check round missions were fired using the gunner's quadrant and were observed safe by the forward observers. Following the check round missions, six (three-round) fire missions were conducted over the course of two hours with no issues. Following all firing missions, the sand bags were removed to inspect the beam supporting the howitzer spade. The beam behind the spade demonstrated the ability to return to its resting position following flex from gun recoil; however, it appears the beam failed to return to its original position (no measurements were made). Considerable deformation was also observed in the beam along with some twisting caused by the recoil.

RECOMMENDATIONS

Riverine artillery tactics can be useful in littoral and riverine environments, especially considering the majority of the globe is covered by navigable waterways. As national security concerns continue to grow in Asia, the Middle East and South America, the ability to extend Fires along navigable waterways provides commanders the ability to deliver Fires in areas currently denied by ground movement. In order for riverine artillery to fully support maneuver

> "On April 25, 2019, 17 Soldiers of the 1st Battalion, 111th Field Artillery Regiment participated in a multicomponent live-fire exercise with members of the 11th Transportation Battalion. ... Soldiers from both battalions collaboratively worked to identify issues, concerns and develop techniques and tactics to deliver Fires using modern artillery and communication systems"

“These issues continued to plague TF GATOR until the LCM transporting the FDC was rendered stationary by beaching the craft. Based on the exercise observations, it appears the changing landing craft and communications profile may be disrupting short range digital communications.”

at maximum range, a number of recommendations are required.

OPERATIONAL NEEDS STATEMENT

The first recommendation is to develop a stable firing platform to support low and high angle and the ability to fire a charge seven. Several options include the use of 8-12 inch thick composite mats that are shaped or molded to accept the M119A3 baseplate and spade attachment. The grove for the spade should allow the trails be articulated by the gun crew to maximize traverse. The matting would also require a system to secure it to the LCM or barge. Another recommendation is to use a beam and while incorporating additional shoring and reinforcement behind the gun's spade. Such a design would require specific attention to design a mechanism to secure the spade to the beam for safety. The final recommendation is to use a firing platform similar to the ones discussed in the January 1968 edition of the Fires Bulletin as well as in the CMH Publication 90-12, Vietnam Studies: Field Artillery (1954-1973). This platform included a wood and steel-boxed platform welded to the boat's deck and filled with sandbags in the areas of the baseplate and spade.

DIGITAL COMMUNICATIONS DISRUPTIONS

The unit also experienced a number of unusual digital communications challenges throughout the operation. These issues continued to plague TF GATOR until the LCM transporting the FDC was rendered stationary by beaching the craft. Based on the exercise observations, it appears the changing landing craft and communications profile may be disrupting short range digital communications. Additional research is recommended in order to verify the cause of the disruption.

METHODS UNDER DEGRADED CONDITIONS

Due to the design of the LCMs, the vessel's port and starboard bulkheads blocked the line-of-sight between the gun and potential aiming circle location. Therefore, it is recommended that a taller Pan-

tel be designed in order to clear the vessel's bulkhead in the event the gun must be laid under degraded operations. In addition, a taller telescope could clear the bulkhead to the left and right sides of the craft.

Lt. Col. Shawn Talmadge serves as commander of 1st Battalion, 111th Field Artillery Regiment, Virginia Army National Guard, headquartered in Norfolk, Va. He deployed as DFSCOORD/chief of Fires with the 29th Infantry Division when the division established Task Force Spartan in support of Operation Spartan Shield based in Kuwait in 2016-2017. Other assignments include fire direction officer, platoon leader, battery commander, deputy commander of the Virginia CERFP, J7 exercise planner, and battalion executive officer.

Maj. Jonathan Fair serves as the battalion S3 for 1st Battalion, 111th Field Artillery Regiment. He deployed as a platoon leader in support of OIF in 2006 and previously served as battery commander, battalion fire direction officer, S3 for a recruiting and retention battalion, and commander of HHC, Maneuver Training Center and Fort Pickett.

Capt. Daniel Tarrant serves as commander, C Battery, 1st Battalion, 111th Field Artillery Regiment in Hampton, Va. He deployed as battalion fire support officer in support of Operation Spartan Shield in 2015-16. Other assignments include company fire support officer, fire direction officer, battalion S1, and battalion S4.

Getting ahead of the threat

A Patriot battalion's journey to modernization

By Capt. Peter Williams

After six months of tireless work and instruction, the 3rd Battalion, 2nd Air Defense Artillery Regiment became the first battalion in the Air Defense Branch to simultaneously complete their forward sustainment maintenance program (FSMP) and post development build (PDB) 8.0 modernization of all Patriot systems within organic facilities during the third quarter of fiscal year 2019. This monumental achievement is a testament to the dedication of the Soldiers of the 3-2nd ADA BN and the supporting civilian agencies.

Planning for this operation began in early November of 2018, before 3-2nd ADA returned from their successful strategic deployment to the U.S. Central Command area of responsibility (AOR). The FSMP process was funded by the Lower Tier Project Office (LTPO) and allotted five Patriot batteries (one Headquarters and Headquarters Battery and four Patriot firing batteries) seven weeks to ensure critical equipment is at -10/-20 standards in an effort to extend the equipment's operational life. Although separate, FSMP and PDB 8.0 modernization are sequential and connected, requiring the successful completion

Soldiers from A Battery, 3rd Battalion, 2nd Air Defense Artillery received a class by Raytheon instructors on the operational hardware upgrades of their radar sets prior to a practical exercise. (Capt. Peter Williams/U.S. Army)

Raytheon contractors performed deep conventional maintenance and reset on an Engagement Control Station within the bay of the 3rd Battalion, 2nd Air Defense Artillery motor pool. (Chief Warrant Officer 3 Lewis Heck/U.S. Army)

of FSMP prior to the commencement of PDB 8.0 modernization. During the FSMP process, five Patriot batteries consisting of a combination of Raytheon civilian contractors, unit level operators and the battalion's intermediate support element committed over 8,000 man hours and executed deep maintenance on major Patriot end items, including radar sets, engagement control stations (ECS), antenna mast groups, and communications relay groups (CRG). Additionally, in support of FSMP operations, the 3-2nd ADA BN's supply support activity managed the reception, turn-in and shipment of over 2,000 parts estimated in value at over $1.5 million. FSMP was executed on schedule and on budget, setting the ground work for the PDB 8.0 upgrades.

Upon the five Patriot batteries' staggered completion of the FSMP, unit equipment was immediately inducted into an intensive 10 week PDB 8.0 Patriot modernization upgrade operation. PDB 8.0 upgrades provided the 3-2nd ADA BN with the most modernized Patriot missile system equipment configuration C3+ operating software and hardware. In summary, these upgrades included the replacement of legacy digital processors in the radar, modern man station upgrades in the ECS and Information Coordination Central (ICC), and Combined Cryptographic Modernization Phase-1 communications hardware upgrades for the ICC/ECS and CRG systems. The execution of the PDB 8.0 upgrades was executed in concert with the TRADOC Capabilities Manager, LTPO, Raytheon and unit-level operators, committing over 7,000 man hours.

Simultaneously occurring during the modernization process, was an eight-week operations and organizational maintenance-focused New Equipment Training (NET) program, managed by both LTPO and Aviation and Missile Command (AMCOM) which was administered by Raytheon instructors. Third-2nd ADA's Patriot equipment operators, communication specialists and logisticians received daily classroom and hands-on instruction with practical exercises confirming Soldiers' understanding of the upgrades and ability to operate and sustain the battalion's newly upgraded equipment.

The lead planner for the operation was the battalion readiness coordinator for 3-2nd ADA BN, Chief

Sgt. Kevin Huey of E Battery, 3rd Battalion, 2nd Air Defense Artillery, installs parts within one of 3-2 ADA's Patriot Radar Sets. (Capt. Peter Williams/U.S. Army)

Warrant Officer 3 Lewis Heck of HHB/3-2nd ADA BN, said "This was the first time both FSMP and modernization were performed simultaneously, and the very first time at home station," highlighting the difficulty of the innovative process. "Despite the complexity, we got it done."

Moreover, while committing 90 percent of the battalion's maintenance facility to FSMP and PDB 8.0 upgrades, the battalion's readiness and maintenance officers developed and executed a dynamic maintenance plan to sustain and maintain the remaining equipment in the battalion. These efforts resulted in successful reception of conventional equipment from deployment and a sustained operational readiness rate of 97 percent.

Another integral component to the completion of the battalion's equipment upgrades was the five-week reset and modernization of its early warning and command and control systems. During this upgrade, battery command posts and tactical control stations received upgraded computer software and hardware, further enhancing battery and battalion early warning capabilities. The 3-2nd ADA BN's own Command, Control, Communication, Computers and Intelligence (C4I) Systems Integrator, Chief Warrant Officer 2 Joseph Frey of HHB, played an invaluable role in this process by single-handedly planning and leading the deep maintenance required to prepare the battalion's battery command posts and tactical control stations for upgrades.

"It had to get done," said Frey. "Our C4I equipment needed to be reset before we started any upgrades, and we were working with limited time." Thanks to the combined efforts of internal and external resources, the 3-2nd ADA BN finished their equipment upgrades in time to test them in a field-training exercise, designed to build confidence in the Soldiers' proficiency with their assigned systems.

The 3-2nd ADA BN achieved yet another first as they tested the functionality of their modernized equipment with a capstone exercise. The objective of capstone was to establish communications and

Soldiers from B Battery, 3rd Battalion, 2nd Air Defense Artillery, received classroom instruction on the capabilities and limitations of Post Development Build 8.0 software. (Capt. Peter Williams/U.S. Army)

data transfer between all four Patriot fire units and the battalion fire direction center through both Patriot and C4I systems. The C4I portion of the exercise, led by Capt. Mario Solis (BN S6), Frey and supported by Raytheon specialists, resulted in the first-ever establishment of V-Lan 10 and Joint Range Extension Application Protocol links using the very high frequency backbone between the ICC and ECS. This capability enabled the passing of the air picture, Mardam-Bey's Internet Relay Chat, Microsoft Outlook data, and other means of data exchange from the battalion tactical operation center to the battery command post. This capability will prove to be an invaluable addition for redundant and expedient mode of transferring data and increasing command and control capabilities throughout the battalion. Overall, the successful execution of the capstone exercise demonstrated the battalion's understanding and ability to operate newly upgraded Patriot equipment.

The home station execution of FSMP and PDB 8.0 modernization on the 3-2nd ADA BN's Patriot equipment enabled its Soldiers to train and fight on the most advanced Patriot equipment available. After a successful validation of the equipment, the battalion has since incorporated the new operating procedures into their training for future certifications.

While the execution of the FSMP and PDB 8.0 was the battalion's decisive operation, several shaping operations were occurring in concert, from individual and crew serve weapons ranges, to warrior tasks and battle drills, to sustain and build individual and crew readiness. The battalion effectively built relationships with civilian stakeholders and developed and communicated a comprehensive Patriot modernization plan to the lowest level. The successful execution of the battalion's FSMP and PDB 8.0 modernization is a testament to the dedication of supporting civilian agencies and the Soldiers of the 3-2nd ADA BN.

Capt. Peter Williams graduated from the United States Military Academy and commissioned through the same school in the Air Defense Artillery branch. Williams holds a bachelor's in Computer Science. He deployed for Operation Spartan Shield, United Arab Emirates in 2016, and Operation Inherent Resolve, United Arab Emirates/Southeast Asia in 2018.

An armored humvee cruises along a dirt road near the White Sands Missile Range in southern New Mexico during the Roving Sands exercise, March 2018. (Joe Lacdan/U.S. Army)

The 1-7th ADA Battalion's preparation for Roving Sands 2019

By Command Sgt. Maj. Robert Walker

In April 2018, 1st Battalion, 7th Air Defense Artillery was preparing for redeployment from the Central Command area of responsibility (AOR) after a nine-month deployment to Jordan and the United Arab Emirates. The hot topic around the Air Defense Artillery branch and 32nd Army Air and Missile Defense Command were the struggles and challenges the participating units endured during the execution of Roving Sands 2018. The 32nd AAMDC reinstated this important training event that requires air defense artillery units to support the maneuver force and defend the land component commanders' critical assets. This requires units to adopt an expeditionary mindset and be able to shoot, move tactically and survive on the battlefield. As the *Panther* Battalion prepared for redeployment from CENTCOM, the leadership knew that their next challenge would likely be its participation in Roving Sands 2019n (RS19). The first and most important task the leadership identified was changing the culture and the mentality of the Soldiers and leaders throughout the battalion. It was no secret that the next mission set required an expeditionary and tactical mindset.

Undoubtedly, the Soldiers proved they had a winning attitude when they swept the 108th Air Defense Artillery Brigade Officer, Noncommissioned Officer (NCO) and Soldier of the year awards in early summer of 2018. Likewise, the Supply Support Activity (SSA) received numerous accolades and recognition for winning the Forces Command Supply Excellence Award. This winning attitude translated to achieving results not only in garrison but also in a tactical environment. Unit pride became the foundation of the Soldiers continued motivation.

Create a structure

The battalion leadership developed an aggressive but achievable plan to prepare for its deployment to Roving Sands 19. There were various challenges that impeded the planning process but none of them overshadowed the fact that majority of its modified table of organization and equipment (MTOE) and Patriot equipment would not immediately be available for training due to its scheduled modernization at Letterkenny Army Depot. Nonetheless, the battalion leadership developed a robust plan that included a leaders' field training exercise (FTX), battalion FTX supporting the 108th cumulative training exercise (CTE), battalion's final collective training exercise and various battery field training exercises and certifications. This aggressive plan allowed the battalion to accomplish all their required training objectives. The battalion also executed multiple communication exercises and deployment readiness exercises to validate its ability to mission command and to deploy.

The battalion strictly enforced and implemented Warrior Wednesdays as it provided NCOs and leaders valuable time to train Soldiers on critical individual tasks. Subsequently, leadership implemented a directive that all military movements throughout the *Spartan Brigade* footprint will be tactically focused and executed as such. All movements to ranges were considered tactical movements with crew-serve weapons, radios loaded, joint battle command-platforms (JBC-Ps) and mission command systems operational. The Soldiers were able to incorporate tactical convoy operations to a range where they were then challenged with personnel on the battlefield (hostile and friendly) or identifying and sending up an unexploded ordinance report. Additionally, all Patriot Table VIII certifications were required to have continuous force protection and security and were not authorized to be administrative in nature. Furthermore, all tactical vehicle movements were tracked at the staff duty desk via JBC-P tactical operations center (TOC) kit and FM communications. These standards became the structure that enabled units to think and operate tactically.

Develop a theme (CRAWL)

Early on, the leaders' FTX was not a very popular training event. Nonetheless, this training exercise was executed 90 days after redeployment and set the foundation and solidified team building, expectations and a shared understanding for the long journey to come. This training exercise involved all NCOs, platoon leaders and other senior leadership in the organization to relearn perishable skills, familiarize themselves with Soldier common tasks, and focus on troop leading procedures. In the end, all these leaders executed tasks their Soldiers needed to be familiar with in order to survive, fight and win on the battlefield. This included digging fighting positions, loading cryptographic into radios, pulling security/guard duty, executing tactical convoys, casualty evacuation (CASEVAC) operations, land navigation and field maintenance. After a nine-month deployment from CENTCOM, this provided leaders the opportunity to not only refresh but also gain knowledge and build confidence. Likewise, it provided a realistic appraisal of where the organization stood in regard to executing expeditionary operations. Leaders began incorporating the lessons learned from this event to revamp their warrior time training schedules and strategies. The exercise also identified some unique and important skillsets that were needed in regard to mission command systems. A few of the major lessons identified and actioned were the unit sent an NCO to the Digital Master Gunner Course at Fort Leavenworth and numerous Soldiers to the JPC-Ps and Command Post of the Future (CPOF) operator and maintainer courses located at Fort Bragg, N.C.

Practice is preparation (WALK)

Upon the conclusion of the leaders' FTX, the battalion immediately started preparations for their first collective training event in support of the 108th ADA Brigade during their CTE. The battalion staff conducted a thorough military decision-making process and developed and produced a solid plan. The battalion took full advantage of this training opportunity and employed all their communications equipment and mission command systems. The battalion SSA validated the use of a Forward Issue and Turn in Point which allows units to have continuous support in a field environment. The continuation of this practice during RS19 proved to be extremely beneficial and was noted as the best practice.

At the battery/company level, units were focused on survivability and tactically displacing to various locations on the battlefield. Early on, familiarization with crew-serve weapons and their integration and emplacement as part of their base defense designs challenged some units. This challenge was later rectified when units started actively searching for observations and fields of fire, key or decisive terrain, obstacles

cover and concealment and avenues of approach and properly identifying their sectors and creating sector sketches. The leadership employed a small opposing force (OPFOR) in order to create a tough realistic training event allowing units to rehearse reaction to contact, CASEVAC and reporting procedures. The highlight of this exercise was incorporating two UH-60 rotary wing assets into the training exercise. This allowed Soldiers to communicate a 9-Line Medical evacuation request directly to the aircraft and prepare and move casualties off the battlefield. Lastly, one of the key lessons learned from this training event was that FM communications were not reliable as a primary means of communication across great distances. The mission command platforms (JBC-Ps) became vital to maintaining lines of communication and mission command throughout the duration of the exercise. Field discipline, basic Soldiers skills and field maintenance were notable areas that improved throughout the operation.

Hard work is good practice (RUN)

The battalion FTX was the culminating training event that prepared the battalion for RS19. This was the final rehearsal to validate the battalion's warrior fighting readiness capability prior to its deployment to Atropia, which was the fictional country our unit was fighting in for RS19. The battalion staff worked tirelessly to ensure this training event was tough, realistic and well-planned. To enhance the realistic training effect, the battalion staff was able to resource a basic combat load of ammunition for all individual and crew-serve weapons. Likewise, they acquired smoke, artillery simulators and training claymore mine kits from the Training and Audiovisual Support Center. Additionally, the battalion was approved for aviation support from the 82nd Combined Arms Battalion for the latter half of the training event. The battalion internally resourced a well-trained and motivated OPFOR and designated civilians on the battlefield that were managed by the battalion command sergeant major. This allowed the battalion leadership the opportunity to assess proficiency and conduct quality after-action reviews after key events. The battalion TOC and firing batteries were stressed throughout the duration of the exercise and were required to tactically displace multiple times in day and night time conditions. Additionally, they received small arms contact along routes and had to react to contact and recover vehicles and personnel. There were a few key tactics, techniques and procedures that were adopted based on lessons learned during this training event. The standardization of the individual sleeping tents allowed units more flexibility and saved time when displacing sites and saved critical space in Light Medium Tactical Vehicles. The next key takeaway was the importance of training in limited visibility with night vision goggles. This takes time, patience and continuous practice. The battalion validated its ability to shoot through tough air battles and a persistent OPFOR; move by displacing to an alternate and supplementary battle positions in support of the land component commander's critical asset list; and communicate by maximizing the use of its full suite of communications assets to include FM, JBC-P, CPOF, Tampa Microwave Satellite Terminal and Combined Cryptographic Modernization Phase-1 capability. All this ensured the *Panther* Battalion was the most lethal, disciplined, confident and competent force during Roving Sands 2019.

Roving Sands 2019 - aka #killthedonovians

In conclusion, this training experience was a great evaluation and assessment of the battalions overall warfighting readiness capability. The unit movement operations alone enabled the battalion to assess its ability to deploy with all of its assigned MTOE equipment. The battalion-level FTXs provided senior leadership the feedback necessary to better identify which skills and resources required improvement.

Lastly, field discipline, basic Soldier skills and a tactical mindset were critical to mission accomplishment. The execution of tough, realistic and well-resourced training enabled the battalion to prepare to assume its mission as part of the Global Reaction Force (GRF). Surprisingly, it wasn't long before all the hard work would pay off. Within a few months after the battalion redeployed from Roving Sands, the battalion deployed a battery within days of notification in support of the GRF. The battalion followed soon after and implemented the lessons learned and experiences learned during the last year of aggressive training and preparation. Today, the *Panther* Battalion remains postured to defend critical assets in the CENTCOM AOR and lives by their motto "Fear No Encounter"!

Command Sgt. Maj. Robert Walker is currently serving as the battalion command sergeant major of 1st Battalion, 7th ADA. His other duty positions have included operations sergeant major 108th ADA Brigade, operations sergeant major of 2nd Battalion, 44th ADA, first sergeant of Alpha Battery, 2nd Battalion, 44th ADA, first sergeant of Delta Battery, 3rd Battalion, 2nd ADA, S3 Operations NCOIC of 31st ADA Brigade, first sergeant of Bravo Battery, 2nd Battalion, 6th ADA, Advanced Individual Training platoon sergeant of Bravo Battery, 2-6th ADA, G3 Operations NCO 32nd AAMDC, Avenger/Stinger Team Observer/Controller Joint Readiness Training Center, squad leader D Battery, 5th Battalion, 5th ADA, team leader ADA battery, 2nd Armored Calvary Regiment, and team leader A Battery, 3-4th ADAR (Airborne).

Exercise participants and the Warrior Preparation Center (WPC) staff of Spartan Shield 19-9 pose for a group photo on the WPC campus in Einsiedlerhof, Germany. (Courtesy photo/WPC)

European Spartan Shield Exercise expands air-ground integration for air defense readiness

By Capt. Josef "Polo" Danczuk

For one week in late September, Army Patriot forces stationed in Germany partnered with an Air Force Control and Reporting Center (CRC) crew to simulate providing Integrated Air and Missile Defense (IAMD) against a near-peer adversary. Hosted by the United States Air Force Europe Warrior Preparation Center (WPC) in Einsiedlerhof, Germany, the Spartan Shield series of exercises has been running continuously since early 2018, providing a realistic opportunity via simulation and threat models for Army Patriot forces to train with an Air Force CRC crew.

The exercise is set against a near-peer adversary with a large number of aircraft, missile and ground threats. These include enemy fighters, unmanned aerial systems (UAS), tactical ballistic missiles (TBMs), cruise missiles, anti-radiation missiles (ARMs), surface-to-air missiles, electronic warfare assets and more. "Spartan Shield is the WPC's exercise to push forward on integrating the air portion of the IAMD mission set," said Michael "Junior" Taylor, regarding the exercise series. He served as the WPC exercise director for Spartan Shield 19-9. "Battlespace Command and Control Center CRC simulation, Reconfigurable Table Top Trainer Patriot Simulator, and Joint Terminal Attack Controller (JTAC) Dome were integrated with WPC subject matter experts flying aircraft and missile simulations." The WPC also provided Tactical Data Link 16 for link integration training and a host of communications equipment to mirror the tactical equipment.

Spartan Shield 19-9 took the Army-Air Force integration one step further. In past iterations, the exercise consisted of Patriot

battery and battalion-level operators from the 5th Battalion, 7th Air Defense Artillery Regiment stationed in Baumholder, Germany. These operators fall under the control of ADA brigade air defense artillery fire control officers (ADAFCOs), currently provided by the rotational Army National Guard Brigade Mission Command Element. The Florida Army National Guard's 164th ADA Brigade is stationed on that rotation in Ansbach, Germany, and their ADAFCO teams participated in the exercise. The WPC also coordinated a CRC crew from the Air National Guard, in this case the 128th Aircraft Control Squadron (ACS) from Wisconsin. As it was, bringing these partners together with the dynamic and challenging integration that the WPC provides allowed for challenging and meaningful training for all levels involved.

However, for the first time, Spartan Shield 19-9 incorporated Tactical Air Control Party (TACP) members from the 2nd Air Support Operations Squadron (ASOS), stationed with the U.S. Army Europe's 2nd Cavalry Regiment in Vilseck, Germany. TACPs are responsible for providing tactical command and control of airpower assets for terminal attack control. In laymen's terms, they are liaisons between U.S. ground forces and the air assets assigned to support friendly combat operations, such as airstrikes, surveillance, and, as needed, coordinating with friendly surface-to-surface Fires. Their inclusion provided a realistic, dynamic and challenging new facet to Spartan Shield, requiring the CRC crew to coordinate with the TACPs for aircraft control. Furthermore, from a mission planning perspective, the crews needed to determine how best to establish contracts for operations, communications procedures and plan airspace management to ensure aircraft were properly and safely controlled.

To kick off Spartan Shield 19-9, the WPC hosted all participants for in-processing and tours of the facilities. This also allowed the training audience an opportunity to familiarize themselves with the simulation devices and configurations that they would use for execution. Then, each unit provided an academic overview of their respective weapons system, roles, responsibilities and capabilities. That led into a road to war brief to introduce the audience to the scenario and a full day of mission planning, during which the operators had to establish contracts, define airspace control measures, rehearse procedures, and implement an airspace control order, air tasking order and special instructions. Execution of Spartan Shield 19-9 lasted four days with daily intelligence and mission briefings, the actual scenario, and daily debriefs for the crews and WPC personnel to review the results of the day's action.

For 5-7th ADA, the Patriot system operators had to contend with a number of challenging situations during the scenarios, requiring quick thinking and flexibility with the weapons system. In addition to hostile TBM attacks, the crews fought hostile ARMs, cruise missiles, enemy aircraft and UAS, oftentimes with a combination of these arriving at the same time, a possible and challenging adversary tactic. Furthermore, they had to fight through equipment faults, communication equipment outages, and adjust the radar and launcher targeting lines in response to enemy wide-azimuth attacks against defended assets.

"Spartan Shield 19-9 opened my eyes to the multiple layers that operate in unison to sustain and maintain air superiority and asset protection against a multitude of emerging and adaptive threats," said Chief Warrant Officer 2 Marcus Jackson, an air and missile defense tactician with 5-7th ADA. He serves as the Crew 1 tactical director in the Patriot Battalion Headquarters' Information and Coordination Central (ICC). "The ability to understand the processes that are in play above our level greatly increased our capacity to gauge why certain actions take longer than expected and what we can do within our areas of responsibility to increase the efficiency of each tactical exchange of information."

The 164th ADA Brigade ADAFCO teams were similarly tested in controlling the battalion and coordinating with the 128th ACS CRC crew. For the ADAFCOs, this was one of their first opportunities to train in such an environment after assuming mission in theater in early August. The crews were essential to reporting Patriot system status to the CRC crew, deconflicting all Patriot engagements, and assigning Fires.

Maj. Richard "Burro" Smothers is the senior ADAFCO for the 164th ADA Brigade Mission Command Element in Germany and shared his thoughts on the exercise. "I found Spartan Shield 19-9 to be a great exercise for various reasons. As it was executed, it was a great opportunity for Army National Guard, Air National Guard, as well as Air Force and Army Active component teams to collaborate, mission plan and share knowledge." For the 164th ADA Brigade, Spartan Shield 19-9 was also historic. "Additionally, it allowed my ADAFCO teams to integrate with a Patriot ICC and an Air Force CRC crew as complete teams for the first time in the 164th ADA Brigade's history," said Smothers.

For the 128th ACS from the Wisconsin Air National Guard, the exercise was an opportunity to take their regular training from home station, apply it to a European Command scenario, and integrate with joint partners. Spartan Shield 19-9 provided the venue for the crew's operators to train for certifications, either for the very first time or for new crew positions within the CRC.

"The environment and exercise hosted by the WPC was the perfect venue for 128th ACS to refine the way we not only execute as a CRC, but also build skills in the

Mission crews receive the daily intelligence and mission briefing prior to executing the day's scenario (Courtesy photo/Warrior Preparation Center)

joint environment," Capt. Cedar "Sage" Hamilton said of the exercise. "The mixed experience level within our crew was a challenge, but everyone left the exercise as better operators. We have been briefing for years that the world in which we train and operate truly must be joint for us to maintain our role of superiority, be that in the air, on the ground or in space."

Executing JTAC operations while contending with an IAMD fight was largely uncharted territory for the 2nd ASOS training audience. Spartan Shield 19-9 provided a near-peer scenario in which the TACPs could not assume friendly air superiority. In fact, it required the planning of multiple contingencies with the expectation that the airspace would be contested, communications systems would be inoperable, and that the enemy threat would be greater in number and complexity. The TACPs and their simulated friendly Army ground forces fought against enemy UAS, ground tanks and armored vehicles, enemy TBM Transporter-Erector-Launchers (TELs), and indirect Fires.

The integration of 2nd ASOS provided a unique new dimension to the joint air-ground fight. The TACPs could feed information to the CRC and Patriot crews, such as if they observed a cruise missile in flight or TBM TELs readying to fire or recently fired. They could also provide information about expected friendly rocket launches, munitions that the Patriot radar could detect and track. By providing a heads-up to such friendly and enemy actions, routed through the Air Support Operations Center Gateway, 2nd ASOS was able to contribute to the IAMD fight by providing early warning, reducing confusion on the friendly situation, and allowing the Patriot system to posture for new and changing threats.

"This trip was very successful and fruitful," said Master Sgt. Robert "Foot" Olson, JTAC instructor, of the 2nd ASOS. "Throughout the weeks, we more than met our objectives. We saw how vital the ground entities play in a full-spectrum war, and how TACPs can help shape the battlefield to reach strategic, operational and tactical levels of warfare."

Spartan Shield 19-9 enabled the successful integration of 5-7th ADA Patriot forces, 164th ADA Brigade ADAFCO teams, 128th ACS CRC crews, and 2nd ASOS TACP members. Personnel from all the units mentioned how much they valued the training opportunity and looked forward to the future. Hamilton of the 128th ACS said "Through mission planning and executing alongside the ADAFCOs and JTACS, we were able to develop contracts throughout the week and really hone in on areas to focus for future CRC training efforts." From 5-7th ADA, Jackson observed, "the shared knowledge gained will surely support future collaboration through mutual understanding of our partners as we defend the skies together."

Speaking of future collaboration, Smothers, the 164th ADA Brigade ADAFCO, was already looking forward. "The Spartan Shield exercise showed it has even greater capabilities and could be adapted to encompass more elements of a joint IAMD system. It could also serve as a means for the rotational ADA Brigade Mission Command Element to train using their equipment while practicing and refining their staff operations and battle drills."

Spartan Shield 19-9 achieved its mission of providing a training venue for IAMD forces in Europe to build and improve their combat readiness. The training audience met their individual training objectives and achieved the combined goal of putting the integrated in IAMD. These operators will now go back to their units with enhanced knowledge of how to operate in concert with their U.S. partners and the experience of executing operations in a dynamic, realistic environment. This allows them to stand ready to execute their respective missions with maximum lethality if ever called upon.

Capt. Josef "Polo" Danczuk is a tactical director in Headquarters and Headquarters Battery, 5th Battalion, 7th Air Defense Artillery, stationed in Baumholder, Germany. He served as the 5-7th ADA exercise controller for Spartan Shield 19-9. He is a graduate of the Patriot Top Gun and Air Defense Artillery Fire Control Officer Courses.

NEW 20/20 Vision

Beginning January 2020, the Fires Bulletin will transition into two publications in order to provide each branch with a more focused platform for communications. The publications are identified as the *Air Defense Artillery Journal* and the *Field Artillery Professional Bulletin*.

This is your professional magazine; contributions from various individual sources tend to stimulate thought, encourage new ideas, and generally promote conversations to benefit the Fires profession.

We look forward to continuing our work with past authors, and of course, all current readers are encouraged to share their professional knowledge and experiences by submitting articles to their respective publication. To locate new submission guidelines, themes and to place an article for review, please find contact info below:

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Our mission is to promote a free and open dialogue for the artillery branches.

Fires strong,
Jamie Southerland
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