ARMOR

Forging the Thunderbolt's Foundation: Doctrinal Updates to Tank Platoon and Scout Platoon Manuals

Departments

Features

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CHIEF OF ARMOR'S HATCH

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At its best, our doctrine gives us ways to think about and explain how we fight. For sure, our doctrine is just a starting point: our manuals are never intended to limit the initiative, flexibility, and adaptation that is required to fight and win on the battlefield. Still, it's important from time to time to remind ourselves of the importance of reading, understanding, and talking with our teammates about doctrine.

I suppose that my own relationship with our doctrine has changed over the years. It might be that I had a preference to learn by doing versus reading a book to guide how I thought about training and fighting. It might be that I valued my training experiences and intuition over anything that I could read in a manual. And it might be that I found reading doctrine to be less interesting than reading something else or doing other things. I only offer you these thoughts to acknowledge that this kind of thinking could be out there in the force. Maybe yes, maybe no.

Over time, I've come to value our doctrine more and more for three reasons. First, our doctrine is usually the best starting point if you want to learn something new, see how to do a task or operation, or review something that you think you already know. Doctrine is authoritative – it will be more correct than something you might find on the internet. Second, our doctrine can serve as a useful reference point as we talk about and teach each other about fighting. Our manuals provide a common language and a common set of ideas that can help us when we develop unit SOPs, conduct AARs, and bring on new teammates to our formations.

Finally, our fighting manuals contain the tactics, techniques, and procedures *that actually work* in training and combat. In a sense, our doctrine reflects the lessons we have learned by combat in the past and then applies this to how we will train and fight today (and in the future). When it comes to fighting, certain things just work (for example, movement techniques like bounding overwatch). Doctrine lays all of this out for us, allows us to start with a baseline way of thinking and doing, and then postures us to fight with initiative and flexibility. Doctrine makes us ready to adapt (and try new things) in training and combat. To sum it up, doctrine – if we use it – can serve as our common azimuth to learn, to teach, and to train to fight and win.

We think the new tank platoon manual helps us do the kind of work described in the preceding paragraph. ATP 3-20.15, *Tank Platoon*, is a fighting manual that describes what the formation is (how it's organized), what the formation is for (it's fundamental purpose), and what the formation does (how it fights). The following is a summary of the key changes and adaptations in the manual:

- **Armor Fundamentals:** a discrete list of tasks that allow you to fight effectively.

- **The Wingman Concept:** outlines the logic for why this is an effective fighting technique for mounted formations.

- **Close with and Destroy the Enemy:** descriptive language to describe how to fight.

- **Counter-UAS Tactics and Techniques:** ways that we can employ our current capabilities to defeat the UAS threat.

- **Electromagnetic Warfare:** ways we can employ our current capabilities to operate in a contested electromagnetic spectrum battlefield.

- **Platoon Battle Drills:** establishes an authoritative set of tank platoon battle drills that allow the platoon to survive first contact, develop the situation, and generate options for the commander.

Finally, I want to highlight that we will publish two manuals by Summer 2026: ATP 3-20.98, *Scout Platoon*, and ATP 3-20.96, *Cavalry Squadron*. Last published in 2019, the Scout Platoon Manual will focus on describing how to fight in today's operational environment and the ways it operates with a cavalry troop and a combined arms battalion. Last published in 2016, the new Cavalry Squadron Manual will anchor on the formation's role to inform the main body, protect the main body, and fight for the main body. We're excited about both of these manuals.

We appreciate all that you do to drive readiness and develop leaders across the Armor Force. If there's anything the Armor School can do to support you, just holler.

Forge the Thunderbolt!

FROM THE GUNNER'S SEAT

CSM Ryan W. Roush
Command Sergeant Major
U.S. Army Armor School

Taking Charge of *Your* Career

Throughout my career, I've had the opportunity to engage with young NCOs across our armored force. A common theme in those conversations is young NCOs seeking to understand and shape their career path. These young leaders are trying to take charge and own their careers; however, many do not fully understand what tools are available, where to find those tools, or how to interpret them. Our young leaders seek to understand what they must do to continue being promoted and to serve in positions of higher responsibility within our Army. Often my advice is that there is no one path to success — there are many paths. What led me to success may not always be the same as someone else. My hope is that this article will reach as many of our young NCOs as possible and serve as a guide or template for leaders counseling their young NCOs on their careers and when conducting LPDs across their formations.

I think the most crucial thing a young NCO can do is perform well, above their peers, and demonstrate potential for the next level, regardless of what assignment they are in. To promote ahead of peers, you must clearly separate yourself. Separating yourself and showing dedication to continuous growth can be done in many ways, such as completing military or civilian education, obtaining the Experts Skills Badge, or being selected for the Sergeant Audie Murphy Club.

Key development (KD) time—serving in leadership positions and leading our Soldiers— remains one of the most crucial components for NCO development. It is my belief that the more successful, highly enumerated KD time an NCO has, the better. A NCO's performance in these positions is critical and holds the most weight when assessing potential. This is reflected in promotion rates as seen in the evaluation board results and becomes evident when those young leaders take the next step in their careers and serve in positions of increased responsibility. NCOs should strive to remain in leadership positions—in front of and lead our Soldiers—as much as possible. In many cases, an NCO may only get the opportunity to serve in leadership positions for a minimum time due to YMAVs and the enlisted market cycle, and they will move to a broadening assignment. These broadening assignments are key to development while ensuring that NCOs relevant to the tactical fight bring that experience into those assignments. This does not hinder your career; however, you must also perform in these assignments. After completing a broadening assignment, NCOs must fight to get back to an operational assignment—once again leading Soldiers.

DA PAM 600-25 and the NCO Career Development Model for CMF 19 serve as the primary professional development guides for our NCOs as they progress through their career paths. It is important to understand that these documents do not serve as a checklist or step-by-step instructions but instead outline the full spectrum of opportunities an NCO can anticipate for a successful career. The Career Development Model shows a correlation between training, education, and experience over time that synchronizes to foster development. There are many ways to achieve success; there is no one-size-fits-all. All leaders in our formations should be familiar with these documents.

Another helpful tool—and one of the most important—is the board AAR published by the Office of the Chief of Armor (OCOA). OCOA analyzes the results of every evaluation board for CMF 19 and produces a summary AAR for the force. In this process, they analyze the data and provide a clear snapshot of what that board deemed important. This AAR provides data points such as: Time in Service (TIS), Time in Grade (TIG), * average KD time for NCOs selected as "Most Qualified" which broadening assignments were favored during that cycle. It also identifies trends in professional military education, including completion of specialized schools such as Master Gunner, Cavalry Leaders Course, Battle Staff, and other advanced or functional training that boards consistently view as indicators of technical expertise and leadership potential.

Two distinct positions that support NCO career progression are the OCOA

Proponent Career Management NCOs at Fort Benning Georgia and the HRC Armor Branch Talent Managers at Fort Knox Kentucky. Their roles are often misunderstood across the force. Career Management NCOs update DA PAM 600-25, prepare the board AARs, and support leader development across the formation. Talent Managers handle routine personnel actions such as YMAV adjustments, stabilizations, and other assignment-related functions. Think of the relationship as "what" versus "how." If you want to discuss "what" you should do next, then the Career Management NCOs are there to assist you. Once you understand what you should pursue, the Talent Managers assist you in executing the actions necessary to get there or the "how". Both positions operate in coordination with each other and exist to assist.

Utilizing all the tools and resources along with mentorship from your leader you will be armed to take charge and own your career. Remember, no one is more concerned with your career than you are.

Forge the Thunderbolt!

Links

DA PAM 600-25 and NCO Evaluation Board Supplement:

https://www.army.mil/G-1#org-g-1-re-sources

Office of the Chief of Armor contact and Evaluation AARs:

https://www.benning.army.mil/Armor/OCOA/

HRC Armor Branch Talent Managers (DS Login required)

https://www.hrc.army.mil/content/Armor%20Branch%20POCs

FROM THE BORESIGHT LINE

Engagements in Undulating Terrain

> "*The primary mission of armor units is to close with and destroy the enemy. Tank units perform this mission by a penetration or envelopment of the enemy position, following the exploitation and pursuit of the defeated enemy forces. Even in a defensive situation, tanks are used offensively as the principal element of the counterattack force or mobile reserve. In either situation, the mission is accomplished by employing firepower and maneuver.*"[1]
>
> *- Headquarters, Department of the Army, 1961*

by 1SG Michael Stephens

Currently, the U.S. Army focuses training for armor vehicle crews on operations in open terrain. However, given the diverse nature of potential battlefields, it is crucial to adapt these training and operational paradigms to address challenges posed by undulating terrain effectively. Crews must exercise adaptability, conduct terrain analysis, conduct training and preparation, and be experts when using their equipment and technology. Effective coordination among vehicle crews involves clear communication, understanding of roles and responsibilities, and constant vigilance. Each crew member should contribute to the collective understanding of the situation by monitoring their surroundings, communicating relevant information, and staying informed about the overall mission objectives and potential threats. The ability of maneuver platform crews to effectively operate and succeed in diverse types of terrain is paramount.

Dividing the battlefield into sectors or quadrants assists with quicker target detection and engagement, and undulating terrain often naturally lends itself to this approach. By dividing the battlefield into sectors or quadrants, crews can systematically scan each area for potential threats. This organized approach helps streamline the process of target detection, ensuring that the crew does not overlook any areas and that they can quickly identify enemy positions or movements within their assigned sector. Once a target is detected, crews can focus their attention and firepower on engaging threats within their designated sector. This allows for more efficient target engagement, as crews can prioritize and engage threats based on their proximity and level of threat. Undulating terrain often features natural landmarks or terrain features that naturally divide the battlefield into quadrants or sectors. Hills, ridgelines, valleys, and other prominent features can serve as boundaries between sectors, making it easier for crews to establish their sectors of responsibility and maintain awareness of their surroundings. By dividing the battlefield into sectors, crews operating in undulating terrain can enhance their ability to detect, engage, and neutralize threats effectively while maintaining situational awareness and control over their assigned area of operations. This organized approach maximizes the crew's combat effectiveness and contributes to the mission's success.

Armor vehicle platform crews must be adaptable to diverse types of terrain. Whether it is the open expanse of a desert or a rugged, undulating landscape, crews need to adjust their tactics, techniques, and procedures to navigate and engage effectively. Understanding the specific challenges and opportunities presented by different terrain is essential. In open terrain, like deserts, visibility may be high, but cover and concealment are limited. In

undulating terrain, natural features may provide cover but restrict movement and line of sight. Crews must analyze the terrain to exploit its features while mitigating its challenges.

Crews must undergo rigorous training in various terrain to build proficiency. This includes understanding how different terrains affect vehicle mobility, line of sight, and firing positions. Training simulations and exercises in diverse environments help crews develop the skills needed to succeed in any scenario. The dynamics of warfare change significantly in restricted terrain, such as urban environments, dense forests, or undulating terrain. The crews' maneuverability is limited, visibility is often obscured, and reaction times are compressed. Under such conditions, the traditional role of the tank commander expands to encompass more collaborative decision-making and delegation of tasks among the crew. Each crew member needs to be proficient in their primary role and understand the broader context of the platform's capabilities and limitations. Communication within the crew becomes even more critical as they must coordinate actions swiftly and efficiently. Anticipation of enemy movements becomes paramount in such scenarios. The crew must constantly assess the environment, gather intelligence, and predict potential threats. Success in restricted terrain hinges on the cohesion and expertise of the entire tank crew, working together as a synchronized team to overcome the challenges posed by the environment and the enemy.[2]

Knowing the limitations of the platform's fire control system and compensating for them is crucial for vehicle commanders. When engaging targets above or below the vehicle's plane, the angle of sight changes, affecting the ballistic solution calculated by the fire control system. Since the system may not adjust for these angles, vehicle commanders must rely on standard sight adjustments to ensure accurate firing, especially when in a defensive posture. However, operators must ensure that the inputs are as correct as possible to maximize the effectiveness of the ballistic solution. By making simple manual adjustments, commanders can increase the likelihood of hitting

Figure 1. U.S. Soldiers assigned to 3rd Battalion, 8th Cavalry Regiment, review boresight procedures for an M1A2 Abrams tank at Bemowo Piskie Training Area, Poland, Oct. 15, 2025. *(U.S. Army National Guard photo by PFC Andre Gremillion Jr.)*

the target with subsequent rounds.

Platform capabilities and limitations also significantly affect a crew's ability to fight and win in undulating terrain. Understanding gun/sight offsets is crucial for the successful engagement of targets when the target is located above or below the firing platform's position. By properly adjusting the gun or sight angle, crews can compensate for factors such as target distance, elevation changes, and ballistic characteristics of the projectile, increasing the likelihood of hitting the target. The crew's ability to apply correct standard sight adjustments, adjusting one half or one target form above the target depending on elevation difference, will ensure the highest probability of first-round hit when engaging a target above or below their firing position. These adjustments allow the crew to adapt to dynamic and complex combat

situations and engage targets accurately across different ranges and terrains.

Engagements in restricted terrain such as urban environments or dense forests often occur at closer ranges compared to open terrain battles. Because such environments limit visibility and maneuverability, crews are required to engage targets at shorter distances. The restricted space and limited fields of fire make it difficult to engage targets at long ranges. Instead, combatants may face adversaries at ranges well below what might be considered normal battle sight ranges. In these situations, tactics and weapon employment must adapt accordingly. Short-range engagement techniques and rapid target acquisition become essential. Furthermore, situational awareness and understanding of the terrain become necessary for survival. Crews must anticipate potential ambush

points, chokepoints, and avenues of approach, adjusting their movements and positioning to maximize cover and minimize exposure. Training in realistic and simulated environments can help prepare soldiers for engagements in restricted terrain, ensuring they are proficient in the unique challenges presented by such environments and capable of effectively engaging targets at close ranges while maintaining control and situational awareness.

Target scanning and acquisition techniques must be adapted and refined when operating in undulating terrain compared to open terrain. The gunner must be able to engage targets in three power using the day sight or thermal imaging system (TIS) channels.[3] The day sight, equipped with a gunner's primary sight (GPS), provides the gunner with clear visibility and target identification capabilities in daylight conditions. It offers high-resolution imagery and facilitates precise aiming and engagement of targets, particularly in well-lit environments. The thermal channel, integrated into the sight system, enables the gunner to detect and engage targets based on their heat signatures. Thermal imaging can penetrate darkness, some smoke, and

camouflage. This capability is valuable in low-light conditions, at night, or in environments with limited visibility.

Operating in three power, the gunner possesses a versatile magnification level that facilitates effective target identification and engagement, particularly for troop targets, while maintaining situational awareness of surrounding areas. This enhances overall situational awareness and allows for rapid response to emerging threats or changes in the battlefield environment. The three-power magnification level strikes a balance between magnification and field of view, providing the gunner with a wide enough view to maintain awareness of the broader battlefield while still enabling precise target engagement. This flexibility allows for quick transitions between engaging troop targets and addressing other threats as needed. After a gunner has acquired a threat signature in the wide field of view, three power, they will switch to a narrow field of view, 10x or greater magnification, to conduct a detailed search of that area. Once the target has been located, the gunner can engage and destroy the threat in either field of view. After the engagement has been completed, the gunner will revert

to a wide field of view to continue scanning for additional threats on the battlefield.

Through rigorous training focused on fighting in undulating terrain against an enemy seeking to exploit the terrain advantages, armor vehicle crews will become well-versed in the platforms' capabilities and limitations and become experts in terrain and situational analysis. Each crew member will become proficient in providing information and communication on the battlefield pertinent to the crew's survival. In restricted terrain, the mobility and firepower provided by armored platforms can still be crucial. While the maneuverability of armored forces might be limited compared to more open terrain, their protection and firepower capabilities often outweigh these limitations with a well-trained crew.

First Sergeant Michael D. Stephens currently serves as the Troop First Sergeant for M Troop, 3rd Squadron, 16th Cavalry Regiment, 316th Cavalry Brigade, Fort Benning, Georgia, following roles as an Abrams Master Gunner Senior Instructor and Gunnery Team Chief within the same unit. Prior to this, he served as the Brigade Master Gunner for Headquarters and Headquarters Troop, 2nd Armored Brigade Combat Team, 1st Infantry Division, Fort Riley, Kansas, and as a Platoon Sergeant with C Company, 1st Battalion, 18th Infantry Regiment, also at Fort Riley. 1SG Stephens' military education includes the Master Leader Course, Maneuver-Senior Leader Course, Abrams Master Gunner Course, and Army Recruiter Course, and he is recognized with the Meritorious Service Medal and the Master Gunner Identification Badge.

Notes

1 Headquarters, Department of the Army, *FM 17-12 Tank Gunnery* (April 1961).

2 S. Krivitsky, *"The Three to Six Second Advantage: Tank Combat in Restricted Terrain,"* April 1, 1997.

3 Headquarters, Department of the Army, *FM 3-20.12 Tank Gunnery (Abrams)* (August 2005).

JOIN THE TANKS

U.S. ARMY ARMOR FORCE
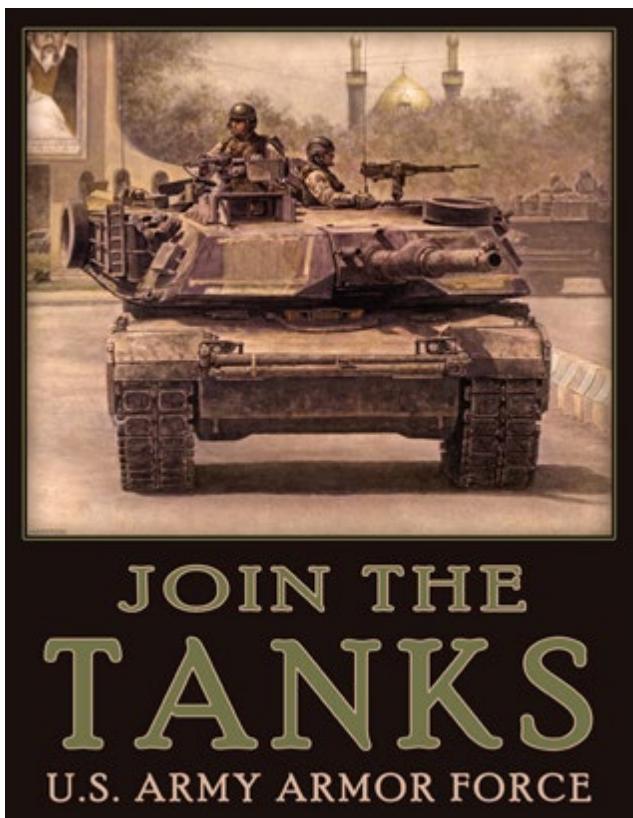
FROM THE COMBAT TRAINING CENTERS

ASK OUTLAW
A Perspective on Rotational Training

ROCK PAINTING IS PERMITTED AT PAINTED ROCKS ONLY ALL REQUESTS MUST BE SUBMITTED THROUGH CHIEF, G-3 TRAINING DIV. 380-4360 IAW NTC REG. 350-3

Photo by David Vergun
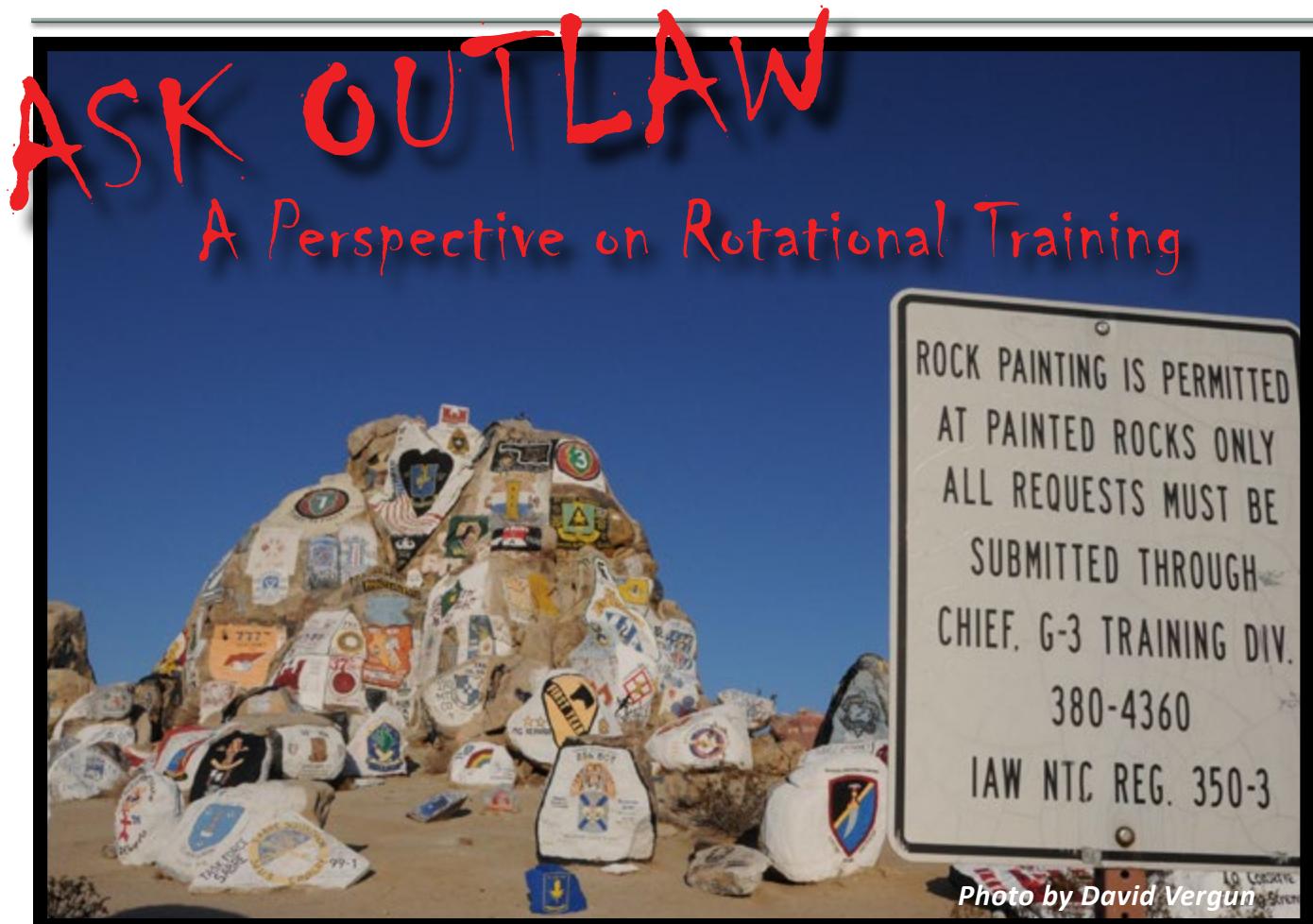
by COL Ian J. Lauer

Every commander understands the gravity of a rotation to the National Training Center (NTC). It is a defining experience for both the unit and its commanders. NTC rotations reveal character and impose generational lessons in an often-unforgiving way. As a commander, you often bounce between excitement for the opportunity to employ your unit in a purely tactical capacity and the apprehension associated with external assessments. You consider how to leverage personal experiences in the High Mojave to develop a train-up that is tailored to reduce the friction you expect. Every commander is also anchored by the sobering thought that there will never

be enough time to train everything. However, any unit that has left it all on the field, no matter how battered or bruised, returns from "the box" comprehensively trained. For a short period, a unit regenerating combat power in the sands of Fort Irwin can, without hyperbole, call itself the most lethal brigade combat team (BCT) in the world.

As the Commander of Operations Group (COG), I have had the privilege of watching cohorts of the U.S. Army's most talented leaders rotate through Fort Irwin and experience the journey. In doing so, I have validated some assumptions, invalidated others, and have continued to learn as a warfighting professional. In this article, I intend to describe the NTC experience in terms of the training environment,

its limitations and opportunities, and finally offer some insights in an earnest desire to empower commanders with confidence. Confidence grounded, not in how to win against the opposing force (OPFOR), but in how to optimize the training experience. My perspective below is grounded in the humility that comes from personally sharing the experience of commanding during an NTC rotation. I have been, as many of you will be, what President Roosevelt famously called, "The Man in the Arena". As such, my comments are informed by what I wish I would have known as a rotational unit commander, and by what I have observed as the COG.

Your rotational training experience at NTC will present three challenges that no other training event can replicate.

First, you will fight as a BCT operating within a division in contact. Putting an entire brigade in the field reveals under-appreciated, interdependent systems and processes. It reprioritizes efforts in unexpected ways. Second, the training environment forces BCTs to establish and maintain tempo over time and space. The NTC experience is not synonymous with BCT situational training exercises (STX). Advantages, opportunities, and vulnerabilities are fleeting. Finally, BCTs are challenged to transition under persistent contact. With ubiquitous sensors and dynamic, free-thinking subordinate commanders, the OPFOR will challenge a BCT's ability to gain and maintain the initiative. Commanders must continuously assess their position by considering who is reacting to whom. Rotational units can consider these three challenges in advance of a rotation but will not collectively appreciate them until they are in rotation.

The NTC experience is, at best, an approximation of the rigors of large-scale combat operations. To achieve realistic training, we must assess the limitations of the training environment. To some degree, rotational designs deliberately over-emphasize acute threat capabilities, while other enduring aspects of combat are under-replicated. The training scenario does not force commanders to consider the psychological effects of maneuver warfare amplified by proximity at the tactical level. There are unpredictable performance modifiers for dislocated units. It is also improbable that an enemy force would be content to exploit penetration with a small force not likely to survive an enduring combat situation. Likewise, neither the multiple integrated laser engagement system (MILES) nor the combat vehicle tactical engagement simulation system (CVTESS) can effectively replicate the suppressive effects of our weapon systems. Consequently, units are presented with a false picture of maneuver that is disconnected from its definition of the combination of fire and movement. As a training enterprise, we must recognize these limitations and, where possible, ensure that we apply reason when attributing cause and effect.

While an important caveat, the imperfect training environment does not diminish the proven results of combat training center (CTC) training. CTCs are factories for brigade-level readiness and are indispensable to aligning the performance standards to expected levels of proficiency. NTC founders like GEN Donn Starry promoted the CTC model to provide institutional mechanisms for validating doctrine, readiness, and modern combat concepts. While operational imperatives will always define the relative value of those aims, such as the need to generate forces for deployment or our current efforts towards transformation in contact, what does not change is the NTC experience. The crucible of replicated ground combat will strain systems, expose unpreparedness, and highlight leader qualities that are best suited to

Figure 1. First Team Troopers assigned to 1st Battalion, 8th Cavalry Regiment, 2nd Armored Combat Brigadee, 1st Cavalry Division, maneuver an M1A2 SEPV3 during rotation 26-02 at the National Training Center, Fort Irwin, California, Nov. 4, 2025. *(U.S. Army photo by SPC Julian A. Winston)*

thriving in our future wars.

Operations Group, the driving mechanism behind the NTC experience, serves as both the mirror that enables a unit to see itself and as the lens through which senior trainers can objectively assess their unit's readiness. Ultimately, it is senior leaders who are accountable for evaluating and reporting on readiness. As Operations Group, we expand our aperture beyond rotational unit proficiency to include validating doctrine and experimentation as our founders intended. Commanders often look to Operations Group to provide trends in an effort to preclude common mistakes. The pursuit of trends reversal, however, can be an endless task condemning the force to a cycle of frustration or worse, a misappropriation of organizational efforts if we do not apply rigor to the qualification of those trends.

Accordingly, Operations Group distinguishes observations into three categories. These categories were developed collaboratively through engagements with former commanders of operations groups across the CTCs. The first are binary observations, by which an observer-coach can draw a proximate cause of an effect to a causal agent. The unit either did or did not do something and, consequently, something happened. These observations are easy to highlight and often verifiable by data through which we can influence unit behavior. Non-binary observations are the second type. These are observations related to those tasks that, by virtue of either the complexity of modern combat or the Clausewitzian "fog and friction of war", are just hard to do well. We have all heard the observer-coach ask, "do we have shared understanding?". Of course, this is difficult to measure and rife with subjectivity and external influences. From these observations, observer-coaches are obligated to identify associated best practices or tactics, techniques, and procedures (TTPs) that, through experimentation, have demonstrated capacity to mitigate or alleviate challenges. Finally, the third category of observations are gaps, both doctrinal gaps and capabilities gaps. These are problems that a brigade is not trained to or does not

have the organic capacity to solve. These observations are critical for informing the efforts of the institution or the larger transformation enterprise.

The brigade combined arms rehearsal is a perfect case study for all three types of observations. I can easily generate data that shows that when a unit does a rehearsal, they are more likely to achieve the purpose of their mission. A true cause and effect verified by objectives secured or enemy units destroyed in execution. The format of the rehearsal is a target-rich environment for non-binary observations on how to maximize shared understanding. The ability to execute a tactical rehearsal in a contested brigade area of operations is challenged by countless gaps. From the dearth of robust counter-UAS (C-UAS) capabilities to mitigate detection and targeting to the lack of assured upper-tactical internet capacity or a doctrinal framework

through which drive a distributed rehearsal. Distinguishing between our observation types is critical to enabling the larger Army to define what the problems are and apply doctrine, organization, training, material, leadership and education, personnel, and facilities (DOTMLPF) solutions to address them.

I recognize, however, that none of the perspectives above enable a commander to prepare for a CTC rotation in a tangible way. While important for contextual purposes, our BCT commanders are, and should be, hungry to win. They are driven to succeed and incentivized to demonstrate the collective proficiencies that their unit has achieved. My goal is to provide commanders at all BCT and below echelons with a point for entry for driving CTC preparation. At the heart of the NTC experience is a qualification of what it means to win. It is an expediency to provide an answer that

Figure 2. SPC Tiedis Lucero, a small unmanned aircraft system operator assigned to 1st Battalion, 8th Cavalry Regiment, 2nd Armored Combat Brigade, 1st Cavalry Division, surveils potential threats during night flight operations. *(U.S. Army photo by SPC Julian A. Winston)*

Figure 3. Soldiers with the Royal Saudi Land Forces (RSLF) conduct defensive operations at the National Training Center during Rotation 26-02 at Fort Irwin, Calif., Nov. 5, 2025. *(U.S. Army photo by SSG Devon Jones)*

ultimately centers on "beating Blackhorse". I would go further by stating that it is a disservice to our formations and to our responsibilities as commanders. The OPFOR is only a feature of a training environment that, by virtue of its ever-changing conditions, enables a BCT to achieve mission-essential task (MET) proficiency. It would be absurd to assume that the competitive spirit through which many commanders have achieved success does not play a significant role in driving training. However, achieving success against the OPFOR is highly contingent and often a loss or win is predicted by a variety of factors unrelated to collective proficiency. Winning is a state of mind, and while beating the OPFOR is a tangible indicator, it is a flawed metric of training proficiency. It resonates well at the company and below where victory is often a measure in blinking "whoopie lights", but professionals,

whether on the sidelines of a football field or in caffeine-fueled command posts, must always sand down the veneer of competition to assess true strengths and weaknesses.

First and most importantly, units that do well focus on the fundamentals. Fight the temptation to "game" your rotation. Often, this results in poor execution of mission-essential tasks against an enemy that is inoculated against surprises by experience. There are no secret avenues of approach or divergence from the division's directed plan that will achieve anything beyond a temporary advantage, and often, it results in a loss of mission-focus and maneuver opportunity. This is not to say that generating options and creating multiple dilemmas in time, space, and force, is not critical. Rather, avoid gimmicks and perceived loopholes and focus on doing the

fundamentals well. Defining those fundamentals is a difficult proposition, however, there are several that I have observed that I assess are most salient.

More than any other population, NTC trains commanders. In a typical rotation, commanders will develop both in terms of the method and means of driving operations. First, commanders who dialogue in risk, informed by staff estimates, often achieve the most coordinated application of combat power. That requires that commanders establish dialogue as a codified practice structured by expected operational outcomes. It can, and should at times, be transactional as subordinate commanders describe their desired outcome in terms of risk and higher commanders assume, defer, mitigate, or dismiss that risk. Risk cannot be the exclusive domain of commanders.

Figure 4. U.S Soldiers assigned to 2nd Battalion, 7th Cavalry Regiment, 3rd Armored Brigade Combat Team, 1st Cavalry Division posture a Bradley fighting vehicle for an attack on an objective during Rotation 25-06 at the National Training Center, Fort Irwin, Calif., March 31, 2025. *(U.S. Army photo by CPL Nathaniel Garrett)*

Commanders often outpace staffs that focus on refining warfighting products and planning processes that are not dynamic enough to adjust to the constantly changing operational environment. Staffs must inform that risk rather than defer to a commander's almost certain overmatch in experience. Staffs that play their role as a commander's "hive" brain and allow commanders the cognitive maneuver space to understand and appreciate the situation, see themselves, the enemy, the terrain, and apply risk to decision-making benefit the entire organization. Commander and staff engagement that transcends the day-to-day updates and business of the BCT in garrison is essential to this end. Take the time to work through how you visualize and dialogue best with your staff and subordinate commanders during your train-up. BCT commanders must establish commander informed dialogue as a primary means to drive operations.

On more than one occasion, small groups of well-trained Soldiers have had outsized impacts on the outcome of a battle. It is possible that a poorly executed BCT plan can be saved by lethal crews that hit what they are aiming at, use terrain to move tactically, and apply direct and indirect fires to achieve maneuver. The Armored Force Fundamentals for ABCTs are a responsible place to start as commanders design training events. Rotational units usually arrive with some version of a daily execution checklist that conforms to the DA Big Ten. Enforcement of routine things done routinely cannot practically start in "the box." NCOs must carry them forward from a home-station train-up.

Commanders that arrive with a starting point have the advantage of shifting from a known point. This entails defining "how we fight", not necessarily as a codified standard operating procedure (SOP), but as an initial orientation with shared understanding of purpose. Ultimately, the rhythm of the battle is a cycle of arraying forces, deploying to a position of advantage, delivering effects, exploiting or consolidating, and re-arraying forces. Commanders are often reticent to commit to a particular method of warfighting, perceiving that it will deny options. I argue that doctrine, our METs, and our table of organization and equipment (TOE) provide us with all the necessary tools to establish a baseline approach to fighting as a BCT. Regardless of the type of fighting arena, a fighter has a stance, validated through observation and hard knocks. Do not shy away from assigning primary responsibilities that may improve a unit's performance. This may be as simple as identifying a company as the habitual reserve or may be more comprehensive such as assigning one unit to focus on military operations in urban terrain, another to serve as the primary breaching force, or another to serve as the assaulting force. These do not necessitate employment but, instead, streamline planning. At a minimum, BCTs should arrive at their NTC rotations with planned SOPs with a clear method for execution of the rapid decision-marking and synchronization process (RDSP); a validated PACE plan exercised during home-station training; and expectations and formats for minimum fighting products that you have designated.

As stated, I argue that "gaming" your scenario is unhelpful at best. However, I strongly recommend wargaming your warfighting approach through either a

table-top exercise or in a simulated environment. First, this validates your team's shared understanding of the BCT warfighting approach. Second, it provides commanders and staffs at all levels with invaluable insight into how the commanders think, communicate, and approach risk. An often-repeated platitude is that the rotational unit fails to present multiple dilemmas to the enemy. While broadly valid, take caution to superficial and predictable application of an approach that may drive towards fixing the brigade along multiple axes of attack. BCTs will often see this as an admonition against sequential action and consequently seek to engage the enemy in multiple objectives simultaneously. While potentially impacting the OPFOR's commitment of mobile combat power, advantages are more likely offset by the diffusion of combat power. Rather, establish an operational framework with a weighted main effort and nested supporting efforts. An approach to warfighting is most successful when seeking opportunities for overmatch. As an example, find opportunities to make one-battalion problems into two-battalion problems. Wargaming scenarios help bring to light the conditions that must exist to effectively achieve that overmatch.

Finally, a simple rule for developing a home-station train-up prior to an NTC rotation is to validate everything that you can. If you expect a system to work, validate it. As an example, distributed logistics has emerged as a battlefield imperative and defining a sustainment warfighting function starting point means addressing this problem in a more meaningful way than conceptual planning. Whether by a nodal distribution of the brigade support area (BSA) or a more aggressive distribution of commodities, if it is not exercised at home-station and validated, it is not likely to perform as expected. This is not to discourage experimentation at NTC, but rather to temper expectations and drive training that commanders may otherwise defer to the rotation. Commanders cannot approach the home-station training by dogmatically adhering to a gated training strategy. The most impactful training a unit can do for NTC is battalion-level maneuver at home-station. This is, by all measures, a tall order and may require units to execute battalion-level tasks without subordinate-level proficiencies. However, the opportunity this presents to exercise all battalion systems in a competitive environment will enable rotational training units to focus on BCT competencies sooner.

Regardless of training readiness, no rotational training unit should seek an NTC experience that is free from friction. At NTC, the after-action review (AAR) is the coin of the realm, but it is a poor substitute for experiential learning and self-reflection. The NTC AAR is little more than a scene setter to enable a unit to execute its own comprehensive AAR program, at echelon, by both warfighting and integrating functions. A successful unit at NTC is audacious in its preparations, humble and hungry in execution, and highly self-critical in its assessments. At NTC, a rotational unit leaves with a contextualized understanding of their readiness and a way ahead for enhanced training. That they are, if only until the next rotation, the most trained and lethal brigade combat team in the world.

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Figure 5. A Bradley Crewman with the 1st Battalion, 635th Armored Regiment, Kansas Army National Guard, prepares to conduct a movement to contact maneuver at the National Training Center, Fort Irwin, California, June 6, 2021. *(Mississippi National Guard Photo by Cadet Jarvis Mace)*

Forging the Thunderbolt's Foundation:

Doctrinal Updates To Tank And Scout Platoon Manuals
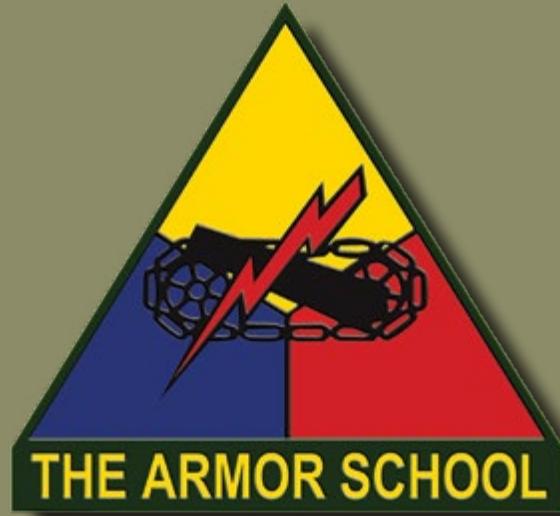
by LTC Mitchell Payne

The Armor Branch exists to close with and destroy enemy forces using fire, maneuver, and shock effect, or to repel an assault by fire and counterattack. The Armor Branch is the combat arm of decision, because no other organization in the U.S. Army has the lethal combination of firepower, mobility, survivability, and situational awareness. Armor leaders have always been aggressive, decisive, and disciplined – we balance tactical acumen with our ability to understand how to maintain and sustain our formations. Above all

else, Armor leaders are a team. From day one, we operate in crews, wingmen, sections, platoons, and as a part of the combined arms team to close with and destroy enemy forces. We trust in the tactical prowess and initiative of our crews, our wingmen, and our combined arms team to accomplish our mission.

The mission of the Armor Branch reflects the unchanging nature of warfare – warfare has always been and will always remain a brutal contest of wills between two opposing forces. We impose our will on the enemy at a decisive place and time through fire and

maneuver. But while the nature of warfare remains unchanged, the character of warfare adapts to emergent technologies and threats. Senior leaders in the Armor Branch are responsible to provide junior leaders doctrinal guidance that matches the changing character of warfare.

One of those changes – the Army's recent restructuring – allows most of the Armor community to focus their doctrine, training, experience within the Army's most lethal fighting force: the armored brigade combat team (ABCT). In this vein, the U.S. Army Armor School updated two foundational doctrinal publications: Army Techniques Publication (ATP) 3-20.15, *Tank Platoon*, and ATP 3-20.98, *Scout Platoon*. These two publications serve as sister publications, complementing one another and offering guidance to leaders across the entire Armor Branch.

ATP 3-20.15: Tank Platoon

The Army Publishing Directorate published the final version of ATP 3-20.15 in 2025 and supersedes the December 2019 version. The updated manual features several critical updates which add clarity to the previous version, with a notable shift away from counterinsurgency (COIN) to large-scale combat operations (LSCO) and multiple updates to align with our current doctrine. The manual is organized into six chapters: 1) Organization, 2) Planning

Figure 1. M1A2 Abrams tank conducts operations at the National Training Center. *(U.S. Army photo)*

and Preparing for Operations, 3) Offense, 4) Defense, 5) Tactical Enabling Tasks and Activities, and 6) Sustainment. Within each chapter, sections have been reorganized into a more logical flow, starting with a discussion on big picture concepts, subsequent planning considerations, and culminating in practical guidance on how to execute operations.

Of note, the updated manual introduces the Armor Force Fundamentals to the Armor Branch doctrine. The new doctrine defines fundamentals as a defined set of tasks or actions that allow a formation to fight effectively. The codification of the Armor Force Fundamentals, at echelon, provides a foundation for combat-ready formations, and helps all leaders build lethality, efficiency, and flexibility. Given the rapid pace of combat in LSCO, focusing on the blocking and tackling of armored maneuver warfare results in disciplined formations who can fight and win in any circumstance. When senior leaders articulate a need to "train the fundamentals," the Armor community now has a common language that clarifies what those fundamentals are by formation type and echelon.

The other critical highlight to this doctrine is the clarity offered to junior leaders through the codification of nine appendices. This updated manual also consolidates the tank platoon battle drills in one doctrinal location for ease of reference for junior Armor officers and noncommissioned officers (NCOs).

These changes are not merely cosmetic – they are rooted in the fundamental role of the tank platoon. Starting in Chapter one, and re-emphasized throughout the entire document, is the reminder that the mission of the tank platoon is the same mission as that of the Armor Branch. The tank platoon exists to close with and destroy the enemy forces using fire, maneuver, and shock effects, or to repel an assault by fire and counterattack. Everything that the tank platoon does is rooted in that existential purpose – they fundamentally exist to close with and destroy the enemy.

Figure 2. An M2 Bradley Fighting Vehicle provides overwatch at the National Training Center. *(U.S. Army photo)*

Changes to ATP 3-20.15

- Reinforces the tank platoon's primary mission: To close with and destroy the enemy.
- Adds Armor Fundamentals in Chapter one.
- LSCO Focus.
- Consolidates tank platoon battle drills in Appendix F.
- Adds doctrine on counter-unmanned aircraft systems (C-UAS) and electromagnetic warfare (EW).
- Expands discussion of maintenance repair flow.
- Includes and consolidates multiple topics in Appendices.
- Uses specific "how to" language meant to coach young Armor leaders.

ATP 3-20.98: Scout Platoon

Just as tank platoons and scout platoons work together to achieve a decisive effect on the battlefield, the scout platoon manual serves as a complimentary publication to the tank platoon manual and offers guidance to Armor leaders. The ATP-3-20.98 is currently under final revision and is anticipated to be published in summer 2026. This updated manual will also show a notable shift away from COIN to LSCO operations and aligns with current doctrine. This manual is similarly organized into six chapters: 1) The Scout Platoon, 2) Operational Planning and Preparation, 3) Reconnaissance, 4) Security, 5) Other Enabling Operations, and 6) Sustainment. For the sake of clarity and brevity, this manual will also include ten appendices, covering topics such as direct and indirect fire planning, enabler and UAS integration, urban operations, communications planning, and reports. For the first time in doctrine, this manual will also consolidate and describe scout platoon battle drills, to offer clarity and ease of reference for junior Armor leaders.

This manual also outlines the Armor Force Fundamentals, articulating critical tasks and fundamental daily tasks that are common to all Armor formations, while delineating specific scout platoon fundamentals unique to scout organizations and differentiated from tank platoon tasks. This manual also clarifies roles and responsibilities with a specific focus on the differences between a 6x36 cavalry squadron scout platoon and a 3x5 combined arms battalion scout platoon. Like the updates in the tank platoon manual, the sustainment chapter in the scout platoon manual will expand the discussion of maintenance repair flow, giving junior leaders a better perspective and understanding of their role in maintenance and sustainment.

More importantly, however, the updates to this manual reflect the

changing role of the scout platoon in LSCO. Throughout the Global War on Terrorism (GWOT), scout platoons were almost entirely focused on reconnaissance operations. This was encapsulated in doctrine with the phrase that scouts were the "eyes and ears" of the commander. With the changing character of warfare, the ubiquitous presence of small-unmanned aircraft systems (s-UAS) and future integration of artificial intelligence (AI) will inevitably augment reconnaissance operations in the future. While reconnaissance will always remain a fundamental mission and capability of scout platoons, the focus on LSCO necessitates greater emphasis on security, counter reconnaissance, and support to maneuver forces for the scout platoon. In LSCO the scout platoon must be able to fight and survive before it can provide information or decision space for the commander, making the scout platoon unique in its mission set as both a maneuver force as well as a force specially trained for reconnaissance and security operations.

Changes to ATP 3-20.98

- Clarifies the scout platoon's primary mission: To support maneuver operations through reconnaissance and security.
- Adds Armor Fundamentals in Chapter one.
- LSCO Focus.
- Consolidates scout platoon battle drills in Appendix F.
- Adds doctrine on C-UAS and EW.
- Expands discussion of maintenance

repair flow.

- Includes and consolidates multiple topics in Appendices.

Conclusion

These updated manuals are intended to be a handrail for junior leaders. Armor leaders – lieutenants in particular – are different from other branches. All Armor leaders must be masters of maneuver warfare. It is in our DNA to be aggressive, decisive, and tactical masters of maneuver warfare. We differ from our infantry brethren in that we move faster, hit harder producing greater shock effect. While fires and aviation provide greater firepower and mobility, they lack the survivability and tenacity of an armored formation. Not only do we fight as a part of a combined arms team, Armor leaders uniquely understand the importance of our sustainment teammates.

These doctrinal updates are not just an attempt to blow the dust off old doctrine – they are a complete rewrite that grounds our doctrine in our identity as maneuver warfighters. These manual updates are both a guiderail for junior leaders – officers and NCOs – to understand their role in the tank and scout platoons, as well as a means for leaders to identify training gaps in their formations. As Armor leaders read through these manuals, they should be evaluating their formations on their ability to accomplish these critical tasks and adjusting their training to mitigate any identified gaps.

Future conflict against a near-peer threat will be characterized by a lethality unseen in previous conflicts.

Already we see the impact of emergent technologies and multi-domain operations in Ukraine, Israel, Iran, and other areas of conflict around the globe. Armor leaders must prepare themselves and their formations – both physically and mentally – for the rigors of combat. These manuals offer a starting point for Armor leaders today as we train for tomorrow.

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Figure 3. Cavalry Scout gunners from the 116th Cavalry Brigade Combat Team of the Idaho National Guard prepare to conduct gunnery qualification runs. *(Idaho Army National Guard photo by Thomas Alvarez)*

MDMP & Risk

by MAJ Brett Barton

"Sir, this is our problem statement. Please let me know when you're done reading it so I can click next slide," our battalion executive officer said in a bored voice. Then, we watched his face go pale and his eyes widen. What followed was a blistering attack on our professionalism by the commander. I experienced this as a junior staff officer, not once but twice, with different commanders, both times bewildered why anyone could possibly care about a problem statement. However, what the commanders realized, and the staffs failed to understand is that the military decision-making process (MDMP) is primarily an exercise in mitigating risk during military operations, and a unit that fails to mitigate risks is likely to experience operational failure and get Soldiers killed.

Staffs tend to approach each of the subsets in the MDMP as their own things, divorced from all the other subsets, when they should instead be conducting all MDMP as part of the same risk-mitigation strategy. In truth, the problem statement is almost the same as both the initial risk estimate and the course of action (COA) evaluation criteria, all created during the mission analysis step of MDMP, just in different formats. The initial risk estimate is a list of the most important risks to the mission and risks to the force, which will be mitigated during COA development and beyond. The problem statement is the same risks in a narrative format used to focus the staff during mission analysis. The COA evaluation criteria is a list of the same risks again in a different format but refined to focus more narrowly on determining which is the best plan during COA comparison. All three products should be created in tandem by the same people as part of the same process. Critical assumptions help drive the process, and the finished order contains the commander's intent and a decision support matrix directly derived from these products. By focusing on risk throughout MDMP, the staff can craft a plan to mitigate potential hazards that can kill Soldiers and fail the mission.

Critical Assumptions

To identify risks and create these products, start by identifying your critical assumptions in relation to mission variables. Very often, staffs just list many things that are "likely to be true" that the staff does not know the answer to yet. Think of it this way – the critical assumptions is a curated list of the most important assumptions and is one of your most important MDMP planning products, much like your commander's critical information requirements (CCIR) is a list of the most important information requirements (IRs) during operations. Critical assumptions, per doctrine, are likely to be true, necessary for continued planning, and things the staff should attempt to turn into facts through requests for information (RFI) or the information collection (IC) plan. I would add one more criterion to this list: the staff should only list assumptions that

provide a challenge or an opportunity. Challenges would make the plan much harder, such as an enemy reserve arriving before a hasty defense is prepared. Opportunities are assumptions that, if false, would enable you to have a much greater ability to accomplish the commander's intent than expected. An example of an opportunity would be exploiting a faster-than-expected seizure of terrain to enable you to continue the attack far into the enemy's rear. Assumptions that are neither challenges nor opportunities should generally not be listed, since they are unlikely to be useful or necessary for continued planning.

Ideally, representatives of all warfighting functions will create useful critical assumptions in their running estimates and then compile them in a single list. An example is below:

Proposed Problem Statement

Once the critical assumptions are identified, the staff can work on the problem statement. The standard approach

Figure 1. Example critical assumptions list

Mission Variables	Common Considerations	Examples
Mission	- Generally not applicable (just submit an RFI)	- N/A
Enemy	- Most Dangerous COA (MDCOA) - Enemy assets in the area of interest that are low probability	- The enemy will not conduct a maneuver defense (MDCOA) - The enemy will not use chemical weapons - The enemy will not use CAS in our AO
Terrain and Weather	- Terrain and weather will allow friendly forces to take desired actions - Terrain and weather will not allow enemy forces to do something unexpected	- Bridges on RTE POTASSIUM will support mechanized forces - Marshy terrain will prevent an enemy counterattack from the north between AA5 and AA6 - Wind conditions will allow U.S. Forces to operate rotary wing aviation - Cloud cover will prevent enemy UAS use
Troops Available	- Adjacent units will successfully complete their missions - Enablers will be available when expected - Allied Forces will have enough combat power for subsequent missions	- 4/10 CAV will defeat enemy reconnaissance elements south of PL PURPLE - A TRP 4/10 CAV will have at least 80% combat power when TACON to 1–68 AR in phase II - 1–28 IN will fix enemy on OBJ RUBY - CAS, IDF, and rotary wing aviation will be available when specified
Time	- Friendly actions will be available when expected - The enemy will not act faster then expected	- The breach will take no longer than 20 minutes - The DTG reserve (641 BTG) will take 30 minutes to counterattack after the breach - The OSC reserve (644 BTG) will take 3 hours to counterattack after 641 BTG is defeated
Civil Considerations	- Political, military, economic, social, information, infrastructure (PMESII) supports friendly forces and does not hinder enemy	- The cellular network will remain inoperable - The Prazina Gang will not interfere with friendly operations - Refugees will not hinder friendly movements along RTE POTASSIUM

Figure 2. Soldiers from 1st Battalion, 9th Cavalry Regiment, 2nd Armored Brigade Combat Team, 1st Cavalry Division perform an update in the Tactical Operation Center at Fort Cavazos Texas, April 10, 2025. *(U.S. Army photo by Scott Darling)*

is to expand out each of the mission variables into a gigantic run-on sentence, including both important and irrelevant factors. That's not helpful, and you should instead think how "you've done a hundred operations like this before, why are you so worried this time?" What should follow is not a description of "fighting in wooded terrain" that is "defended by a mechanized enemy." The U.S. Army trains for that fight. How is this mission different, and how do you avoid getting killed?

While ATP 5-0.2-1, *Staff Reference Guide Volume 1*, states that the "the problem statement is presented as a declarative sentence," there is nothing wrong with splitting it into two sentences if it improves clarity to your audience. However, I would strongly discourage a long list of bullet points or multiple paragraphs, because "if everything is a priority, nothing is a priority."

Crafting a useful problem statement requires comparing the current situation to the desired end state to list issues that impede success. It helps to look at the commander's visualization, guidance, and your commander's intent. Chances are, your battalion commander already discussed the operation with the brigade commander, and your guidance is focused directly on their visualization of risks. Look also at your mission variables. What about the mission, enemy, terrain, time, troops available, or civil considerations (METT-TC) will make you fail? The goal is not to include all aspects of METT-TC in the problem statement, since the important parts will get buried under extraneous information, but rather to try to look at the problem from every direction. Next, look at your critical assumptions. Are any of them issues that, if not true, would cause your operation to result in failure? And finally, just ask yourself how you would explain the issue informally to a friend or mentor about why the mission is difficult to plan and could fail. In the end, you should have a list of between two

and five greatest risks, which, when consolidated, should make your problem statement.

"1-68 Armor must seize OBJ Sapphire with enough momentum to convince the 61st DTG Commander that we are III Corps' main effort, causing the enemy to commit the DTG Reserve (641 BTG). We must maintain tempo in canalized terrain where the enemy knows we are coming, synchronize our forces to breach a complex obstacle with a limited number of assets, and then establish a hasty defense against a battalion-sized counterattack from the northeast within only thirty minutes after starting the breach and retain enough combat power so that we can establish a deliberate defense oriented northwest against another brigade-sized counterattack within three hours."

Initial Risk Estimate

The initial risk estimate identifies hazards during mission analysis and

Title	Definition	Unit of Measure	Benchmark	Formula
Tempo	Amount of time between PL PURPLE and PL BIRCH	Time in minutes	45 minutes	>45 minutes is an advantage <45 minutes is a disadvantage
Synchronization	Ability to achieve force ratio through maneuver, files, and effects at the breach	Force Ratio	3:1	>3:1 ratio is an advantage <3:1 ratio is a disadvantage
Redundancy	At least one redundant breaching asset within 10 minutes travel time of the breach	Number of breaching assets	One additional breach asset	>1 asset is an advantage <No additional assets is a disadvantage
Security	Establishing a hasty defense before the arrival of a possible DTG reserve (641 BTG) counterattack	Time in minutes	30 minutes after the breach	>30 minutes is an advantage <30 minutes is a disadvantage
Combat Power	Retaining enough combat power to defeat the OSC reserve (644 BTG) counterattack	Combat Power	80% combat power in the deliberate defense	>80% combat power is an advantage <80% combat power is a disadvantage

Figure 3: Example COA evaluation criteria

mitigates those risks during COA development. Your initial risks to the mission and the force in the problem statement may not match the initial risk estimate exactly, since the products are focused on the staff and the plan, respectively. However, if the risks are not very similar, then the staff clearly created both products in a vacuum, spending extra effort and accomplishing little. To create a good product, examine your critical assumptions, commander's intent, and use your problem statement. Example:

- Loss of tempo before the breach.
- Failure to breach due to a lack of synchronization or redundancy.
- Not establishing a hasty defense

before the 641 BTG counterattack (DTG Reserve) from the northeast.

- Not having enough combat power to establish a deliberate defense against the 644 BTG (OSC Reserve) counterattack from the northwest.

Proposed COA Evaluation Criteria

The COA evaluation criteria are not used until later in MDMP, during the COA comparison step. However, this product is created during the mission analysis step to avoid bias. To create the COA evaluation criteria, look at the principles of war, offense, defense, joint operations, reconnaissance, security, and so on. Also, consider using

warfighting functions as topics. Generally, your COA evaluation criteria should mirror your initial risk estimate, though it will need to be refined to be measurable – for example, are you most concerned with the tempo between PL FIR and MAPLE, or, PL PURPLE and BIRCH? Our benchmarks should be defined in terms of risk, such that failure to achieve the specified metric significantly decreases the chance of success. For example, if you expect the enemy reserve to arrive in 30 minutes, your benchmark should probably be 30 minutes for establishing a hasty defense. Of course, too much risk results in a COA failing to be acceptable, feasible, or suitable, forcing staffs to reject it outright. MDMP

Figure 4: Example commander's intent

should generally require between two and five COA evaluation criteria.

Proposed Commander's Intent

Like the other products, the commander's intent is created to reduce risk. During the planning process, it focuses the staff on what is important to the commander and should be nested at echelon. During execution, subordinate commanders may have to use it to make rapid decisions when the operation does not unfold as planned. A course of action that does not fit within the commander's intent is considered unsuitable.

Commander's intent consists of three parts: the broad purpose, key tasks, and end state. The broad purpose explains why the mission is being conducted. To develop a good broad purpose, look at the mission statements of higher units – how does our purpose nest within theirs? Another way to easily develop the broad purpose is to imagine writing a letter to service members' families on why they risked their lives in this operation.

Key tasks should generally not be tied to the preferred course of action, such as specific named objectives, routes, etc. If a bridge is destroyed, the enemy is in an unexpected location, or the

planned mission is otherwise impossible to do, what should subordinate commanders do instead? As a historical example, consider the airborne operations in conjunction with D-Day. Very few units landed in their desired drop zones, but they did an excellent job of blocking enemy approaches to Utah Beach, capturing causeway exits off the beaches, and establishing crossings over the Douve River at Carentan.

The end state should likewise not be tied to a specific course of action, instead explaining how the enemy is affected and how United States forces are postured in relation to terrain in a more general way. Please note that "minimize collateral damage" is not an acceptable end state, because no one can agree on its meaning. Should United States forces refuse to return fire on enemy forces in urban areas for fear of killing civilians? Can United States forces destroy bridges and roads to prevent an enemy counterattack? Is it acceptable to destroy mosques, power plants, or dams if there is a military necessity? "Minimize collateral damage" is so broad as to be meaningless. A good commander's intent should be clear, concise to make it easy to memorize, and should ensure shared understanding.

Decision Support Matrix

The other major risk-related product created during MDMP is the decision support matrix (DSM). This is easily created if the staff uses two products. First, prominently post the critical assumptions identified earlier during the mission analysis step of MDMP. Second, the staff should prominently post the "*Five Common Command Decisions*" as enumerated by then-COL Thomas Feltey and CPT Matthew Mattingly in Armor Magazine, Fall 2017.

• Change of Task Organization.

• Change of Unit Boundary.

• Commit Reserve.

• Transition Phases.

• Execute a Branch Plan or Sequel.

At the end of each "turn" of the wargame, the staff should review each of the assumptions to see if any are currently relevant. Please note that the decision points (DP) will be different at each echelon. Also, a "trigger" is something that happens when certain conditions are met, without the need for additional analysis and is part of the main plan. A decision point, on the other hand, is a deviation from the main plan. Some examples of how these DPs could be identified are shown in the DSM below. Note that

Relevant Critical Assumption	Decision Support Matrix				
	DP	NAI	PIR (IF)	FFIR (AND/OR)	THEN (DECISION)
Bridges on RTE POTASSIUM will support mechanized Forces	1	101-103, 106	PIR-1 RTE POTASSIUM not trafficable	FFIR-1 1-68 AR over 70% combat power FFIR-2 Loss of no more than 1 breach asset	Branch Plan – Use RTE LITHIUM
4/10 Cavalry will defeat enemy reconnaissance elements south of PL PURPLE					No DP – Lead element will fight through CSOPs (add a BPT task to the order)
The enemy will not use chemical weapons					No DP – continue to breach (verify that decontamination and detection plans are thorough)
N/A (derived from 5 common decisions and analysis of combat power during wargame)	2A	107-108	PIR-3 Locations / Composition of Obstacles PIR-4 Sutibility of SBF Position	FFIR-1 1-68 AR over 70% combat power FFIR-2 Loss of no more than 1 breach asset	Commit Reserve to breach force
N/A (derived from 5 common decisions and analysis of combat power during wargame)	2B	108	PIR-2 Enemy is conducting an area defense PIR-3 Locations / Composition of Obstacles	FFIR-1 Company Less than 70% combat power	Commit Reserve to Assault 1
DTG Reserve (641 BTG) will take 30 minutes to counterattack after the breach	3	109	PIR-5 Location of Enemy DTG Reserve	FFIR-1 Company Less than 70% combat power	Transition to Hasty Defense

Figure 5: Example decision support matrix

the column on the far left (relevant critical assumption) is added to show how a staff uses critical assumptions in the wargame to help derive decision points. It should not be a part of the published DSM. Some of the critical assumptions, when evaluated, will not result in a decision point but will instead prompt the staff to add details to the plan.

Conclusion

An effective staff identifies as many risks as possible during mission analysis by identifying critical assumptions and using the commander's guidance and higher commander's intent to create the proposed problem statement, initial risk estimate, and proposed COA evaluation criteria. Those products, plus the approved commander's intent, are used to create a viable course of action that can mitigate risks. Course of action analysis does more than just synchronize the plan – it is the step where all risks are analyzed in a methodical way to identify decision points and add details to make the plan robust enough to overcome foreseeable risks. No plan survives contact with the enemy, but a plan made with a deliberate focus on risk can be rapidly adapted to achieve the mission with less chance of failure or unnecessary losses.

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From the ARMOR Art Archives

"Movement to Contact"

Armor In a Space-Contested Environment:
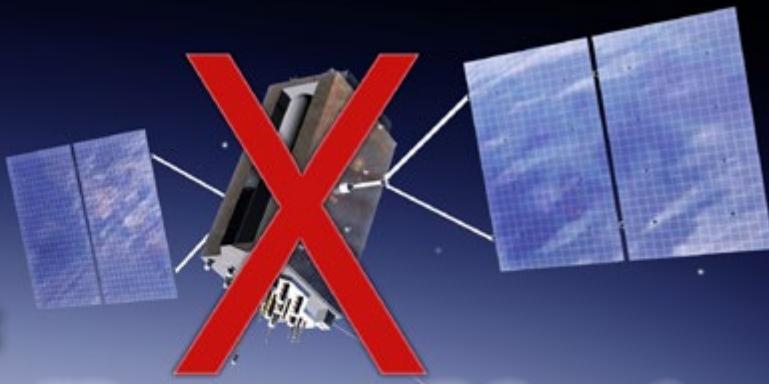
Reclaiming the Maneuver Advantage

by MAJ Heidi Beemer

Imagine a battlefield shrouded not in smoke and fog but in silence. A silence not of peace but of disruption. No satellite communication connecting commanders to their troops. No early warning systems detecting incoming threats. No Global Positioning System (GPS) guiding logistics, maneuver, or precision munitions. This scenario is not science fiction - it is a real possibility in future large-scale combat operations (LSCO). For decades, the U.S. Army has enjoyed near-uncontested access to space, a critical advantage underpinning our success in global conflicts. That advantage is rapidly eroding. Potential adversaries are actively developing capabilities to disrupt, degrade, and deny our access to space based assets, transforming the "silent battlefield" into a strategic vulnerability. For future Army warfighters, understanding the space domain, not just as a technical realm but as an integral component of every maneuver, is no longer optional. Understanding how to fight against a near-peer space-enabled adversary is imperative to our success and, potentially, our survival.

At the National Training Center (NTC), we are unwilling to accept a future where our divisions and brigade combat teams (BCTs) are unprepared to face a near-peer space enabled adversary. Senior space officers continuously dedicate time and effort to develop future warfighters who are prepared for this new landscape. This paper will examine the growing threat to our space based capabilities utilized by the BCT, outline how Army leaders can adapt the training and procedures of their formations to mitigate these risks, and highlight the importance of integrating space considerations into all aspects of planning and execution. We will focus on deliberate actions by the maneuver commander, their staff, and the space subject matter experts (SMEs), ensuring their formations are prepared for the inevitable degraded space operational environment (OE).

The Evolving Threat & Why It Matters

Reliance on space is not a weakness in itself, it is a consequence of the incredible advantages it provides. GPS offers precise navigation and targeting and enables massing. Satellite communications (SATCOM) enable secure and reliable command and control across vast distances. Space based intelligence, surveillance, and reconnaissance (ISR) offers critical situational awareness, answers to commander's priority questions, and battle damage assessment. However, this reliance creates a single point of failure. Adversaries recognize this vulnerability and have developed counter-space capabilities, including jamming, spoofing, and cyberattacks.

These are not hypothetical threats. We have seen evidence of adversaries employing electromagnetic warfare (EW) tactics to jam and spoof GPS signals during exercises and real-world events. The potential for more sophisticated attacks is growing rapidly, and our adversaries are learning and adapting to operate in a space degraded environment. Successfully disrupting the status quo during LSCO could impede our ability to maneuver, communicate, maintain situational awareness, protect, and sustain the force, effectively negating many of our current technological advantages that are critical for carrying out many of the characteristics of offense, defense, and transition.

The Army Combined Arms Center (CAC) Handbook, "*Operating in a Denied, Degraded, and Disrupted Space Operational Environment (D3SOE),*" published in 2018, is filled with observations from combat training centers (CTCs) that reacted to a space degraded environment.[1] After years of observation, the CAC encourages commanders and staffs to be more aware of encryption shortfalls, apathetic electromagnetic interference (EMI) reporting standards, and the lack of awareness of space threats. In comparison, all nine final rotational after action reviews (AARs) from BCTs at NTC in 2024 had nearly identical recommendations. Progress towards addressing these shortfalls has come up short in the last seven years. Even units completing a NTC rotation in back-to-back years often repeated the same mistakes, demonstrating a lack of emphasis from command teams across the formation. The status quo can no longer be accepted. Deliberate changes are required to prepare for the realities of the future battlefield.

Figure 1. Bravo Company (Bandits), 11th Cyber Battalion, culminated months of home-station training with participation in NTC rotation 25-03. *(U.S. Army photo by Steven Stover)*

Trying Something Different

In preparation for their rotation to NTC, the 1st Cavalry Division (1CD) wanted to break the pattern and ensure they were prepared for their rotation in the spring of 2025. The Greywolf BCT returned to the box after a ten-month turnaround. Field grade officers in the operations, intel, and signal sections were set on improving their performance. One area where they fell short the first time was their ability to fight in and through the space degraded environment. The team proactively sought resources to better prepare themselves for the next fight.

Before heading to NTC for their planning conference, Greywolf contacted the Army Space Training Division (ASTD), a Space and Missile Defense Command Center of Excellence directorate. This division (DIV) is the Army's lead for developing, coordinating, and executing space training and education. The Greywolf S3 asked specifically for additional space instruction during their planning conference. In December 2024, two space officers from NTC, senior space trainer, myself (Space Ghost), and the resident OPFOR space officer (Space Horse) joined forces with ASTD home-station and CTC specific space trainers to deliver an hour-and-a-half instruction focused on

the real-world threats posed by our enemies to senior staff officers across the BCT. The conversation quickly migrated towards the OE replicated by Blackhorse, controlled by the Operations Group, and the tangible procedures maneuver units could employ to combat the enemy effects, preserve combat power, and survive in a space degraded environment created at NTC. The group left with a better understanding of integrating space into their planning process. They were excited to implement the troop procedures and protective measures they learned to defeat Blackhorse later that spring.

Motivated by their initial training and armed with a will to win, Greywolf brigade (BDE) and the 1CD Space Support Element (SSE) coordinated ASTD's support during their January combined arms live-fire exercise (CALFEX) validation, the culminating exercise before heading to NTC. The space section invited me to visit Fort Hood and observe Greywolf's training firsthand. My trip's goal was to better understand the evolution of home-station space training to help shape the OE at NTC, and to find the right balance of parity to appropriately challenge units prepared for NTC's complex and dynamic environment within the scenario design.

The plan was for ASTD trainers to provide GPS jamming effects during the

final company situational training exercise (STX) lanes preceding the live fire. The task for companies was to conduct a breach during a period of darkness. Once I arrived in Texas, the BCT had already run a few training iterations. Initial observations made by the ASTD trainers suggested the duration of the lane was too short for the company leadership to notice the disruption of GPS on their Joint Battle Command-Platforms (JBC-Ps). After consultation, the plan evolved to have the ASTD trainers, and the division space officers conduct individual training with the team leaders and above in the assembly area before they started the lane. Before the training, the ASTD trainers turned on their jammers and demonstrated the direct effects of GPS jamming on the troop's Defense Advanced GPS Receivers (DAGRs) and JBC-Ps. The ASTD trainers also explained the use of the jammer finder app on the DAGR and its use in finding enemy jammers. Overall, the company leadership was engaged in the training and was excited to take tangible action to defeat Blackhorse, their future adversary. With the SSE's presence and engagement, the team provided local expertise that directly supported a better understanding of the OE expected in future conflict.

My visit to Fort Hood was short, but the value was immense. While interacting with the 1CD SSE, I witnessed firsthand the team's dedication to their subordinate units. The team meticulously crafted a training glide path for Greywolf, outlining a proper crawl, walk, run strategy to develop their awareness and procedures when encountering the threat posed by a space degraded environment. What was unique about this staff section's approach was how well they leveraged outside resources to ensure their unit was ready for the final test on the national level. Inviting dedicated assets like ASTD to support training and finding creative solutions like inviting an NTC observer controller/trainer (OC/T) to assist with training provided both exposure and emphasis to the nature of the OE.

As an outside observer who routinely interacts with all echelons, I am often provided excuses as to why

subordinate training takes the back seat to ongoing division or corps priorities. Space cadre and 3Y space trained Soldiers are frequently relied on to inform the BCTs and below on tactical space operations. When ASTD CTC trainers and OC/Ts interact with these formations at NTC, we routinely encounter Soldiers unaware of the threats of a space degraded environment and the individual and collective tasks required to survive and thrive in this environment. However, 1CD SSE subverted this narrative, and the Greywolf BDE validated the effectiveness of this training strategy by achieving excellent results at NTC a few months later.

Greywolf Excels: Lessons in Action

All that was left was for Greywolf to perform at NTC during rotation 25-06. As a result of the dedicated space training integrated into preexisting exercises, Greywolf delivered one of the best performances of the last several years in maintaining primary, alternate, contingency, and emergency (PACE) communications. During the ten days of force-on-force (FoF),

Blackhorse conducted 108 hours of EMI across frequency modulation (FM), JBC-P, and GPS, affecting all main command posts across the area of operation (AO). The brigade continuously reacted and reported EMI in the form of FM, JBC-P, and GPS jamming. Halfway into the battle, during a battle assessment radio call, the Commander of Operations Group (COG) remarked that Greywolf was excelling at managing PACE and that Blackhorse needed to continue to find new creative ways to challenge the training unit with 11th ACR's jamming plan. Generally, at this point in the rotation, the senior trainers determine if the effects of jamming are preventing the training unit from meeting their training objectives. For Greywolf, the COG sought ways to continue pushing the BCT, and the training unit continued to react and adapt to the degraded environment.

There were several ways that Greywolf excelled in this contested environment. First, they demonstrated a rapid adoption of key loading procedures. Units repeatedly reported completing this task after initial training, and spot checks confirmed successful implementation, indicating effective training

Figure 2. Blackhorse observation post conducts GPS and JBC-P disruption in the Southern Corridor against 3/1CD on D+1. *(Photo by MAJ Ryan Genard)*

delivery and a clear understanding of the critical importance of encryption in protecting communications and navigation systems. Greywolf implemented a JBC-P validation lane during reception, staging, onward movement, and integration (RSOI) requiring all vehicles to validate JBC-P and DAGR communications security (COMSEC), with a dedicated BDE S6 team. These reports were tracked in the daily commander's update brief to ensure that subordinates met task requirements from the RSOI operations order (OPORD).

The unit also demonstrated increasing familiarity with jammer detection tools. The consistent use of the DAGR jammer finder application during FoF and the units' ability to understand its function were significant positives. Company-grade leaders across the brigade demonstrated an understanding of using their DAGR to confirm interference and gain directional information. This suggests a growing capability within units to assess and respond to EW threats independently which resulted in further tipping and cueing at the BDE level, which resulted in jammers being located and destroyed through the targeting process several times during the rotation.

Successfully navigating a communication PACE plan is always challenging for units during training. Greywolf comfortably demonstrated the ability to recognize interference on JBC-P, the unit's alternative communication method, and the BCT protected primary communication. The BCT even mobilized retransmission (RETRANS) to ensure FM communications were not affected when the main command post received direct jamming effects.

Lastly, the BDE consistently emphasized reporting and situational awareness. A strong positive was the repeated discussion of reporting procedures for suspected EMI. Even when initial reports were inaccurate, the emphasis on reporting itself is crucial. Battalions reported jamming effects to the BCT S6 sections. They even ensured adjacent battalions were notified of the jamming environment, demonstrating a growing awareness of the importance of collective intelligence gathering and the need to share information to counter EW threats effectively. Signals
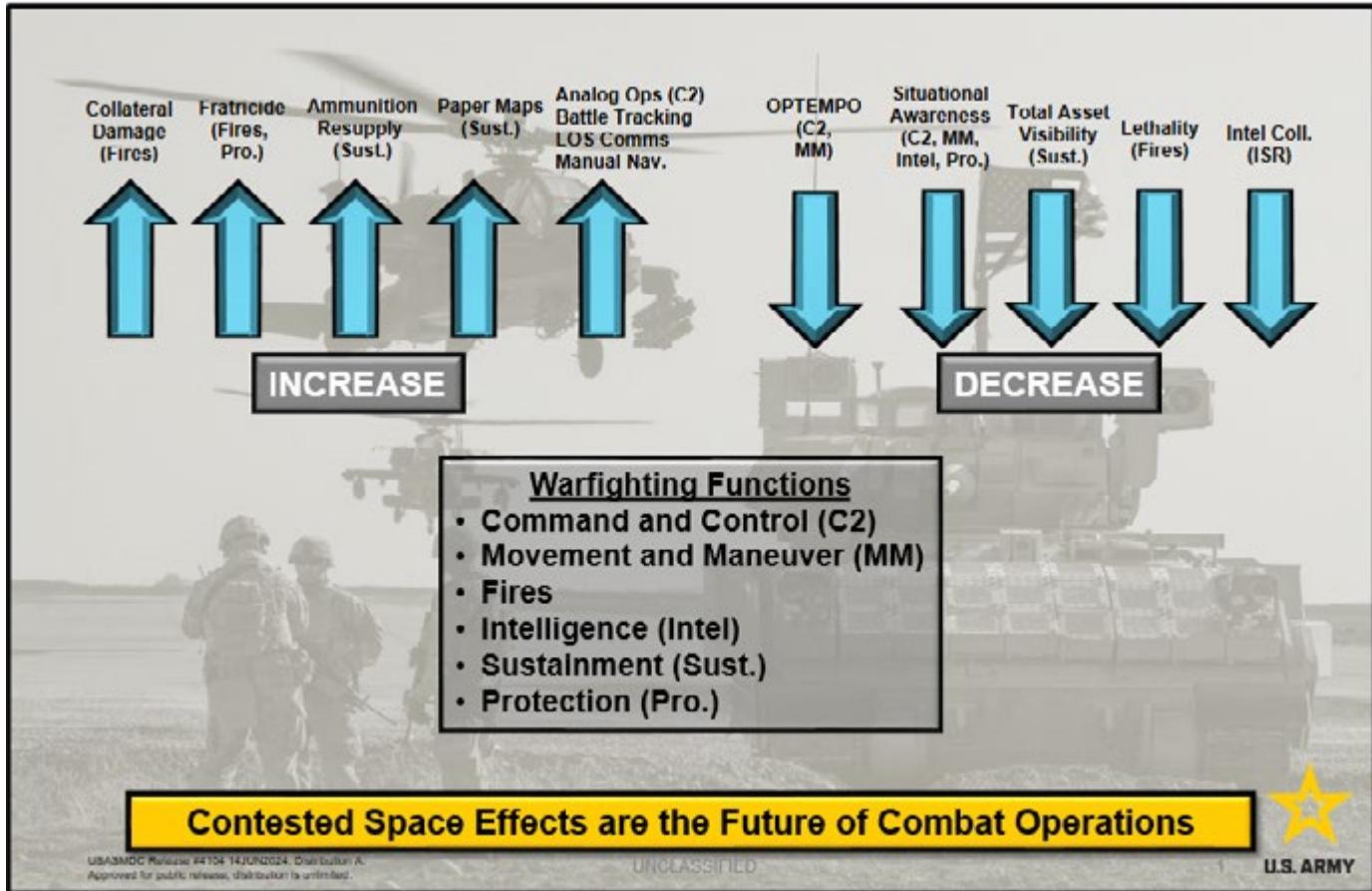
Figure 3. Space planning considerations for MDMP. *(Graphic from Army Space Training Division)*

intelligence (SIGINT) Soldiers were identifying jammers using a specialized geospatial data visualization application, stimulated by the NTC foundry using integrated broadcast service (IBS) exercise layers to locate jammers on the battlefield in near real-time. By the last battle period, the EW platoons effectively targeted equipment on the high-payoff target list and removed them from the battlefield.

Throughout the rotation, 1CD SSE also created situational awareness products to support Greywolf. Space officers analyzed satellite overflight information, providing optimal times to conduct larger movements and critical events without detection. They also conducted navigation warfare analysis, examining the effects of satellite geometry on GPS-guided munitions and mapping and characterizing jammers using live data from several GPS and geospatial analysis tools. They utilized yet another GPS interference and navigation tool to model these effects on the environment and determine impacts on maneuver units and patterns of life from

the Blackhorse EW teams. All of this was done from Fort Hood, TX, producing products within 24-48 hours, and showing how DIV SSEs can support their subordinate units in near real-time during national training exercises.

Overall, the BCT demonstrated a consistent willingness to engage in training on GPS and SATCOM interference and implement mitigation strategies. Troops were eager to listen, knowledgeable, and actively working to load keys and utilize tools like the DAGR jammer finder, suggesting a strong unit culture of preparedness and a recognition of the evolving EW landscape.

Continuing Success

The lessons learned from 1CD should be heard and replicated across the Army. The goal is not to add new training modules but to integrate space considerations into existing training exercises through the OE. This approach, "adapt, don't add," is crucial to minimizing additional time requirements and maximizing the impact of training. Units should find ways to implement

recommendations faster to improve overall effectiveness in a space degraded environment. There are specific tasks that should be accomplished by commanders, staff, and space SMEs before CTC rotations and deployments to ensure tactical formations are prepared for the environment they will inevitably face.

Recommendations for Commanders

The Army's formations require leadership and prioritization to improve understanding and proper reaction to a space degraded environment. Senior noncommissioned officers (NCOs) are also critical in executing these priorities across the formation and championing these causes to effect change. The following should be considered by command teams:

Educate unit's roles in multi-domain operations. As part of the imperatives outlined in field manual (FM) 3-0, *Operations*, ensure your units are protecting against constant observation,

which includes surveillance within the electromagnetic spectrum (EMS).[3] Noise and light discipline are no longer enough. Units need to understand the EMS footprint they are emitting and ways that adversaries are using space to observe friendly forces. Commanders must emphasize protection as tactical formations are tasked with survivability and being ready to fight. Electromagnetic considerations such as radio silence, minimizing transmission time, and utilizing terrain masking all should be integrated into individual and collective training to better understand how degraded space affects the tenets of multi-domain operations (MDO), agility, convergence, endurance, and depth. Emphasis should also be placed on redundancy in communication, as well as the execution of mission command.

Mandate and verify encryption discipline. Issue a clear command policy requiring encryption of all navigation and communication systems during training and operations. Navigation encryption is only required once a year. Encryption is the single best way to combat the effects of terrestrial jammers, yet it is rarely prioritized or executed. Incorporate this action into yearly training and/or maintenance plans to ensure compliance. Command teams must verify encryption as part of pre-deployment communications exercise (COMMEX).

Prioritize Realistic Training Scenarios. The Army's current training methodologies often assume unfettered access to space. This needs to change. You must actively request and support scenarios that simulate GPS and SATCOM denial to allow your formations to see it themselves and work through a dynamic and complex environment while executing their mission-specific tasks. NCOs and Soldiers need an understanding of jamming, spoofing, and the EMS. This can be done by incorporating reaction to EMI and use of the DAGR jammer finder app in individual training, Soldier of the Month boards and expert badge training events.

Emphasize Alternate Communication and Navigation methods. Ensure all units are proficient in utilizing their communication and navigation PACE plan. Conduct regular drills to practice switching between methods. Commanders must become comfortable providing clear and concise guidance, task and purpose, and utilizing mission command with subordinate commanders. Units should remain proficient with redundant digital and analog products for when disruptions do occur. NCOs and Soldiers need dedicated training and proficiency in methods independent of GPS and SATCOM. This includes map reading, land navigation (using compass and terrain association), analog graphics production, analog communication (field phones, runners, visual signals), and understanding of radio frequency (RF) propagation.

Recommendations for Staff Planning

The future of combat is guaranteed to stress the BDE staff in ways not yet seen. Nine forms of contact and continuous observations require deliberately including space in the planning processes to ensure integration across warfighting functions (WfF). Staff should consider the following:

Coordinate with DIV SSE. Proactively coordinate with the DIV SSE to understand their capabilities and limitations and ensure seamless support during rotations or deployments. Request and coordinate for training across WfF framed in terms of success in

Figure 3. Bravo Company, 1-12 Compnay Commander CPT Donovan Canaday conducts GPS degraded familiarization training with the Army Space Training Division at Fort Hood in January 2025. *(Photo by CPT Kyle Geiser)*

Figure 4. U.S. Army SSG Russell L. Kojo representing TRADOC, operates the Defense Advanced GPS Receiver during the Urban Warfare Orienteering Course in the U.S. Army Best Warrior Competition on Fort Lee, Va., Oct. 20, 2010. *(U.S. Army photo by SPC Venessa Hernandez)*

defeating opposing force (OPFOR) to get subordinate units excited for the training.

Integrate Space Effects into Deliberate Planning. Across WfF, incorporate potential space degradation scenarios into all phases of the military decision-making process (MDMP). This should include wargaming the effects of GPS denial, SATCOM loss, and ISR disruption, and all WfF should be considered. In lieu of an Annex N to Base Orders, space considerations should be included throughout the OPORD.

Update SOPs for Space Degradation. Revise standard operating procedures (SOPs) to address procedures for operating in a space degraded environment. Include guidance on alternate navigation methods, communication protocols, and reporting procedures for EMI both up to higher and laterally to adjacent units.

Demand Pre-Deployment Data Preparation and Ensure Equipment is on Hand. Require EW/SIGINT personnel to prepare for deployment or training with pre-processed data, strike warnings, and access to relevant intelligence tools. The cyber-electromagnetic activities (CEMA) cell needs to have access to a Secret Internet Protocol Router Network (SIPR) token and be comfortable with real-world SIPR tools.

Ensure crosstalk between staff sections to ensure the signal section is bringing the Global Broadcasting System (GBS) for use by the intelligence section.

Schedule Regular MIST Training. Integrate Multi-INT Spatial-Temporal (MIST) tool suite training into the unit's training calendar, ensuring all relevant personnel receive recurring updates and proficiency training. Ensure all appropriate personnel [17E, 35 series, battlefield information collection and exploitation system (BICE)] receive training on interpreting and utilizing real-time jamming data within Fusion Analysis and Development Effort (FADE)/MIST, and leaders can quickly and efficiently disseminate key findings to stakeholders. Leveraging SIGINT is a force multiplier for maneuver formation. Units that do well in this intel function often do well at CTCs.

Recommendations for SSE/Space Professionals

DIV requirements are the necessary priority for every DIV SSE. However, there remains a deliberate requirement to focus on enabling the BDE.

Advocate for Realistic Training. Advocate for more realistic GPS/SATCOM denial scenarios during CTC rotations and other training exercises. Integrate

ASTD into training events early, which allows the team to provide training resources and expertise. Ensure formations are prepared for training events by encrypting positioning, navigation, and timing (PNT)-enabled devices and coordinating times for hands-on exposure before effects are integrated into collective training.

Develop Unit-Specific Space Risk Assessments. Conduct unit-specific space risk assessments to identify vulnerabilities and develop tailored mitigation plans that the BDE can action across WfF. Ensure space is integrated across staff sections and help units understand the specific risks they are taking. The CEMA section is your space liaison officer (LNO) on the ground in the BCT; leverage this section to speak on behalf of the space domain to the BDE leadership and staff.

Pre-Rotation Unit Briefings. Conduct comprehensive pre-rotation briefings for incoming units, covering potential space threats, mitigation strategies, and available support resources. Focus on actions at the individual level and include mitigation techniques to help the unit win. Leverage 3Y Space Cadre within the formation to support training efforts and proficiency.

Participate with training unit in real-time. Utilize the exercise data disseminated by asset via integrated broadcast service (IBS) to follow the fight on FADE/MIST, GPS Operational Analysis Tool (GOAT), and the National Reconnaissance Office (NRO) tool Bodhi. In coordination with the CTC SSEs, find opportunities to practice developing and disseminating space threats analysis and products to your organic units throughout the rotation. Fighting with your organic higher headquarters will always be more beneficial than reporting to a constructive high command (HICOM).

Looking Ahead: Preparing for the Future Conflict

The threat to space based assets will only grow in the coming years. As we look towards the next fight, the Army must prioritize the development of resilient systems and adaptable training methodologies. A shift in mindset is

required – from assuming unfettered access to space to preparing for a contested environment.

All DIVs have a requirement to ensure their subordinates are ready to execute in a D3SOE. Space officers at NTC have worked diligently to implement both the Army Space Training Strategy and the Army Electromagnetic Warfare Strategy in our own training plan.[4] We started with our own home station responsibilities, ensuring space and EW effects are taught at OC/T Academy for both permanent party and guest OC/Ts. We have started to provide visualization of EW effects on our combat training center - instrumentation system (CTC-IS) battle tracking system, so the COG and all OC/Ts are made aware of the impacts of the contested environment. This procedural change has ensured the rotational training unit (RTU) is provided world class coaching on how to properly react to live EMI. We have also strengthened partnerships with DIV and corps SSEs to ensure that staff are able to support their subordinate units at NTC and pass along lessons learned to further develop their units for future operations.

Training centers owe their training audience an environment that is increasingly complex and dynamic, forcing units to continually adjust their tactics, techniques, and procedures, ultimately improving their ability to operate effectively and survive in a space degraded environment. Continued efforts from our team have ensured that a D3SOE environment continues to be accurately replicated here at NTC. With support and emphasis from the NTC Commanding General, we have also incorporated an MDO range to help introduce BCTs to a disrupted environment and allow them to see the effects on the equipment and PACE before beginning FoF. We have also worked closely with Blackhorse EW to ensure our planned effects during the rotation are at parity with the capability of the RTU and increase in complexity over the three phases of FoF and providing a crawl, walk, run training environment. Our team is looking ahead to procure sensors and emitters to further develop our ability to replicate a degraded environment across the training area to provide a less static jamming environment and allow our training audience a better opportunity to see themselves in the EMS. A predictable jamming environment fosters complacency; a dynamic one breeds resilience and innovation.

The lessons learned from NTC rotations are invaluable. They demonstrate that the Army is progressing in raising awareness of space vulnerabilities and improving encryption practices. The silent battlefield may be a reality, but the Army can maintain its advantage and prevail with proactive preparation and a resilient commitment. There is clearly still work to be done, but our ability to operate effectively and decisively even when the skies are silent will shape our future.

Major Heidi Beemer is the Senior Space Operations Officer at the National Training Center at Fort Irwin, CA, call sign Space Ghost. She was commissioned through the Virginia Military Institute ROTC program as a Chemical Defense Officer. MAJ Beemer deployed with the 1st Calvary Divisions Sustainment Brigade to Bagram, AF in support of Operation Resolute Support. She commanded the 181st Hazard Response Company of the 48th Chemical Brigade at Fort Hood, TX from 2017-2019. She has two master's degrees, the first from Embry Riddle Aeronautical University Worldwide in aeronautics, concentration in space studies, and the second from the Naval Postgraduate School in space systems operations. She served as an assistant professor of physics at the United States Military Academy from 2021-2023. MAJ Beemer accepted a functional area transfer to Space Operations in 2023. She is enthusiastic about promoting tactical Space and helping brigade combat teams prepare to fight in a Space degraded environment in future conflict.

Notes

1 Manning, J. R., and J. P. Nielson. Tactical Staff Considerations for Winning in a D3SOE. Fort Leavenworth, KS: U.S. Army Combined Arms Center, 2024. https://www.army.mil/e2/c/downloads/704611.pdf.

2 Department of the Army. FM 3-0, Operations. March 2025. Army Publishing Directorate.

3 United States Army. Army Space Training Strategy. U.S. Army Space and Missile Defense Command, 2024.

4 United States Army. Army Electromagnetic Warfare Strategy. Department of the Army Office of the Deputy Chief of Sat G-3/5/7, 2025.

LINE OF DEPARTURE
CONNECTING U.S. ARMY PROFESSIONALS TO THE BEST PROFESSIONAL WRITING

FIGHTING AUTONOMY WITH AUTONOMY

by MAJ James T. Casey

A Possible Future

SGT Cunningham climbed to the top of vehicle Bravo 1-2 to relieve the Tank Commander (TC), SSG Rodriguez, from his position pulling security. The crew had just finished their morning preventative maintenance checks and services (PMCS). "I'll be back in around an hour. We're going to run a company rehearsal," SSG Rodriguez said. SGT Cunningham settled into the TC's hatch and checked the M2 .50, the Common Remotely Operated Weapon Station (CROWS) system and the Commander's Independent Thermal Viewer (CITV) auto scan settings. The tank was running in silent watch mode. The CITV was scanning for dismounted and vehicle threats to the tank's front, while the CROWS automatically scanned high and low for targets using both thermal and day sights. The platoon was oriented east as a part of the battalion's hasty defensive position.

PFC Williams re-checked his M240 loader's machine gun and then continued to scan for threats while he tore open a packet from a meal-ready-to-eat (MRE). Several drones sped from the rear to the forward passage of lines (FPOL) point north of SGT Cunningham's position. PFC Williams flinched when he saw them but recognized the FPOL point where the drones paused momentarily before continuing east skimming the ground. He watched as they popped up to a higher altitude and dispersed, continuing to hunt for the enemy to the east. *All of this was easier back when the unmanned aerial vehicles (UAV) were only on our side*, SGT Cunningham thought to himself.

SGT Cunningham reached for his leftover coffee. As he raised his paper cup, the CROWS screen beeped a low warning tone twice. His eyes snapped to the screen, and he saw an orange targeting reticle around several drones on the screen that were alternately moving toward the battalion's defensive position and then loitering in midair.

On Bravo 3-1, SGT Bradshaw's hand flew to the CROWS's joystick. His CROWS had also beeped a warning tone while the M2 .50 machine gun snapped from its previous search pattern towards the drones that Bravo 1-2 had spotted. He could push the override button to take control in case the CROWS made a bad decision, but he wasn't sure what to do yet. He briefly wondered if the CROWS had spotted the friendly drones heading east to scout, but as he noticed the plot on the map for the Joint Battle Command-Platform (JBC-P), he realized that these drones were in the wrong position. The CROWS beeped a higher warning tone five times in rapid succession and the targeting reticle around the drones turned red by itself as the CROWS quickly decided the drones were a threat. A heartbeat later, the CROWS started firing the M2. SGT Bradshaw keyed the net and announced, "Blue 1 golf, contact red air east, out!"

LT Brown nearly jumped out of his skin as the 12 tanks and Bradleys on the company's line started firing their M2 .50 machine guns and Bushmasters near simultaneously. The collective shooting had started before a radio call had even come in. The company's vehicles were so well camouflaged and interspersed with decoys that he only spotted them because of the light erupting from the weapons firing. The company's leaders, who had been gathering for a fragmentary order (FRAGO) and a rehearsal, began sprinting towards their own vehicles. 1SG Taylor's crew had already started breaking down the camo net around the company command post as LT Brown lowered himself into his own TC's hatch. His driver started the tank as he connected his helmet's intercom system to the tank and scanned the CROWS and JBC-P screens. Dozens of drones were populated on the map and his CROWS had spotted them, but his M2 wasn't firing. The CROWS knew that his tank was behind several friendly positions, so instead of firing over the top of the company's defensive line it continued to scan beyond the current targets in case these drones were a feint. He decided against keying the radio to alert the rest of the battalion, not wanting to add to the company's electromagnetic signature.

Back at the battalion tactical command post, SPC Smith saw on his battlefield computer that there were scores of drones populating along the battalion's front. So far, they hadn't concentrated on any particular area. "Contact red air, 1 click east of the forward line of own troops (FLOT)," he told the S3. MAJ Jones toggled the other battlefield computer to see air target tracks in addition to friendly positions and the spotted enemy ground positions that the battalion's first flight of drones had started to identify. The enemy drones' positions on the screen started to tick from bright red to black. The

CROWS systems and Bradleys' targeting systems were automatically marking them as destroyed as they observed the explosions and debris. There were no calls over the radio, part of the battalion's electromagnetic (EM) control plan. He decided to wait a couple minutes before triggering the deception plan: unmanned radios dispersed around unoccupied areas that would broadcast randomly, simulating radio transmissions responding to the current drone attack.

On Bravo 3-1, SGT Bradshaw watched as the M2's tracer rounds arched towards the drones on the screen. The combined fire from the M2s and Bradley's Bushmasters airburst in a seemingly random pattern, creating an anti-aircraft artillery effect that bracketed the drones with devastating results. The drones that had hovered trying to spot the company's defensive positions were the first to explode in midair and then tumble towards the earth. The second wave of drones had sped toward the company's positions trying to spot a tank to swarm before they were targeted. These drones made it a little closer but were destroyed hundreds of meters away from the company's battle positions. Nearly as fast as the automated weapons had started firing, they stopped simultaneously. Less than 2 minutes had passed since the first CROWS spotted a drone and silently passed the target to all the other weapon systems in the company. SGT Bradshaw watched as his CROWS started scanning again in its previous pattern. "I'm coming up, start the tank!" shouted LT Thompson. SGT Bradshaw slipped into the gunner's station while the driver pressed the ignition. LT Thompson slipped on his own crewman's helmet and directed the driver to move to the alternate battle position. The platoon had rehearsed this reaction to drone contact, so no radio transmissions were necessary. The platoon leader moved his hatch to the open-protected position and visually confirmed that the other tanks were moving. They needed to move quickly towards the alternate battle positions to avoid any potential artillery that the destroyed enemy drones would have been able to cue before they fell.

Enabling Maneuver in a Drone Swarm Environment

To survive long enough to fight and win, U.S. Army formations – down to the platoon level and including non-maneuver units – require the ability to counter the unmanned aircraft system (UAS) threat found on the modern battlefield. This capability must be organic, leveraging weapon systems already employed and enhanced through the integration of existing technologies. Currently employed air defense systems and the headline grabbing solutions currently in development are inadequate to the requirement. Instead of pipe dream platform acquisition programs, the Army should leverage improved software and artificial intelligence (AI) to more effectively employ the sensors and weapons it has already fielded across the formation while implementing some modest upgrades to hardware and weapons systems where possible. Finally, countering the mass precision threat will require continued evolution in how leaders from divisions to squads think about security, survivability, and deception.

Observations from Nagorno-Karabakh, Ukraine, and Israel's multi-front war show that remote-piloted UAS has evolved to AI-enabled drone capabilities. There is evidence that some drones can autonomously identify target types, prioritize high payoff targets, and pass the locations to other nearby drones that drop munitions or intentionally crash into the target to detonate a payload.[1] The technology for edge computing is here.[2] Any machine with a computer and a sensor can be programed to evaluate its environment and interpret it. It can also instantly communicate with nearby machines that are networked together. A common language and data storage schema enables cross-machine communication. The kill web is getting shorter and more redundant, with multiple machines capable of spotting and prioritizing targets for nearby weapons.[3] The result is a threat capable of massing precision air-to-ground munitions against U.S. forces. Even if the U.S. Army hadn't previously divested itself of integrated short range air defense (SHORAD) capabilities, the new threat is smaller, nimbler, and more precise than previous generations' air threats were. Our previous way of thinking about air defense – that dedicated air defense batteries provide distributed protection when task organized to brigades and battalions – is obsolete. The situation is akin to a century ago when aircraft first started to menace ground forces, and we need to rapidly innovate to defeat the threat.

Units can't rely on external assets for

Figure 1. Alpha Battery, 5th Battalion, 4th Air Defense Artillery Regiment, conducts certifications for the M-SHORAD system Feb. 9 at Grafenwoehr. *(U.S. Army photos by PFC Yesenia Cadavid)*

internal short range air defense or counter-small unmanned aerial systems (C-sUAS). Avengers aren't a good C-sUAS platform. Carrying only eight Stinger missiles, each missile is more expensive than the sUAS that it would destroy. Even if every Avenger were replaced with a powerful and cost-effective C-sUAS laser weapon system capable of rapid fire, there wouldn't be enough Avenger batteries to provide adequate protection to the whole maneuver force, much less other vulnerable support and service support units in the close and rear areas.

Similarly, other SHORAD systems in development are not fielded in adequate numbers to protect the entire maneuver force. There are new capabilities, such as the Maneuver-Short Range Air Defense (M-SHORAD) Stout, which are excellent ideas, but there are not enough to provide coverage to all units. Unless these systems are produced in quantities sufficient to add to all maneuver and support units, these systems will not provide adequate drone defense protection to U.S. forces. Even if they were produced in sufficient quantities, these systems would require either growth in the authorized strength of the Army to crew the system or else repurposing of existing strength which would limit these Soldiers' use in their current roles. SHORAD units will have to focus only on larger long-range drones while each ground unit will need the capability to protect itself against small tactical drones.

Other radar-based detection systems, a form of active detection, are more of a liability than a help. Devices that add to a unit's electromagnetic signature make it too easy for an adversary to target friendly positions. While radar can spot airborne systems much farther away than the naked eye, it also makes it very easy for a properly equipped adversary to find radar across the battlefield and target it with standoff munitions. Soldiers and leaders need to remember that radar is like a spotlight – you can see someone using a spotlight much farther away than the spotlight user can identify you. Additionally, once radar is destroyed from enemy targeting, radar-dependent air defense weapons are effectively neutralized. Strategic and operational level air defense units should continue to be part of the Army's air defense solution, but maneuver and support units need passive detection systems instead of active detection systems so that they can minimize their electromagnetic signature on the battlefield.

Currently fielded bespoke C-sUAS systems are not practical for maneuver units. C-sUAS systems already fielded, such as the Drone Buster and Smart Shooter, aren't useful in all situations. The Drone Buster defeats a specific type of UAS that is remotely piloted via radio link. However, with the recent proliferation of UAS with fiber optic links to controllers, the Drone Buster will lose relevance. Drone Buster will also not work against autonomous preprogramed systems that don't rely on radio links to ground stations. Systems such as the Smart Shooter, an optic that can be mounted to ordinary rifles that control a shot's timing to improve round-on-target probability, are ingenious but primarily useful against solitary or small groups of mostly

Figure 2. 1st Cavalry Division Troopers assigned to 8th Brigade Engineer Battalion, 2nd Armored Brigade Combat Team, train with a drone during Pegasus Forge, on Fort Hood, Texas, Aug. 6, 2025. *(U.S. Army Photo by SPC David Dumas)*

stationary drones. These sights are also limited by the max effective range of the small arms weapons on which they're mounted.[4]

Some systems currently under development or already employed, such as the Mobile-Acquisition, Cueing and Effector system from Northrop Grumman, aren't realistic for most units.[5] These systems are designed or improvised from stationary systems that protect static bases. Even when mounted on a truck, adding these systems to maneuver units would require manpower to operate and employ – manpower that is already needed for their current combat role. Mounting these systems on existing vehicles is infeasible, as Army vehicle platforms are already laden with weapons systems and communications equipment far beyond the initial design specifications of the platforms. What units need is a versatile weapon system that alleviates a burden instead of adding to it.

Other C-sUAS laser weapon systems currently in development are likewise not suitable for rapid deployment. While these systems are intriguing, they have several limiting factors including electricity generation and difficulty in focusing beams through dust particles in austere environments. They are comparatively fragile compared to currently fielded weapon systems such as machine guns.

What maneuver and support units require, then, is a UAS and drone defense weapon system that uses existing or rapidly deployable technology paired with weapon systems and equipment already in the Army's inventory. This solution needs to either decrease the task burden of Soldiers in combat or at least not add to it.

In line with GEN Rainey's thoughts on Continuous Transformation, we need to make immediate integrations of emerging technology where possible, upgrade these systems over time, and develop concept-driven solutions for long-term adaptation.[6] These AI-driven remote weapon stations will leverage image recognition and an intuitive user interface to enable autonomous search and destroy capabilities that are networked to all other remote weapon systems in the vicinity to mass fires

against UAS and drones that threaten ground units. These passive detection systems will also feed targeting information into the air defense network's common operating picture, enabling air defense units to successfully identify, cue, engage and destroy higher-altitude attack and surveillance UAS without relying primarily on increasingly vulnerable active detection radar systems to identify threats.

The currently deployed CROWS already have most of the raw materials necessary to counter the UAS threat. CROWS has both day and thermal imaging cameras. These cameras are passive detection devices that operate without generating electromagnetic signatures and are therefore more useful for units attempting to minimize their own detectable presence on the battlefield. CROWS are also paired with laser range finders that help a system calculate the precise relative location and ballistic solution necessary to accurately engage moving targets near the max effective range of the weapon system. Finally, CROWS are frequently mounted on vehicles that also have a battlefield computer installed, which enables rapid communication of targets to units both near and far away. If integrated properly, these battlefield computers could communicate enemy locations in real time to the common operating picture of tactical intelligence computer systems, air defense network systems, and other ground maneuver units.

The Capability Gap

These currently fielded weapon systems and battlefield computers have a capability gap that does not adequately enable units to defend themselves against drone swarms. Current CROWS require direct crewmember control. This remote-controlled weapon's effectiveness is limited by crewmember skill. Unproficient crewmembers would have no measurable chance of defending against a drone swarm. Even highly proficient crewmembers would struggle to detect, identify, decide to act, and engage dozens of independent drones moving at a speed of over 10-50 miles per hour. Additionally, the "wall of steel" air defense method of multiple crewman-operated machine guns firing at aircraft is limited in effectiveness by the burden of coordinating

among multiple shooters. It takes time and significant effort to simultaneously coordinate multiple machine guns, each with its own vantage point, to bracket a fast-moving aerial target.

Communicating spotted targets on current battlefield computers requires time-consuming manual input from operators who are already manning a weapon system and performing vehicle crew duties. The result is that the operator is forced to choose between communicating digitally or manually engaging a target. This limits the potential of rapidly coordinating massed direct fire against small fast-moving threats. In addition to coordinating massed fires against targets in the immediate vicinity, properly integrated AI can communicate targets to all networked battlefield computers using the data mesh concept.[7] Current battlefield computer software requires a high burden of attention and interface with the crewman. Initiating a simple spot report takes minutes and a lengthy process in a pop-up interface with the option to input a high level of detail. Each field requires the user to click it, use either the on-screen keyboard or the nearby physical keyboard, then submit the report. A user must follow all these steps for each different target spotted, and by the time the report is received by nearby computers the information is minutes old. While this method is faster to communicate reports over the horizon than consolidating and relaying radio reports, this communication method takes more time and attention from the user than it's worth. The user must decide if it's worth losing situational awareness to send reports that will be stale by the time they're received, making the current interface inadequate to the task of rapidly coordinating direct fire engagements. It's a wonder that anyone uses digital reports at all.

Current .50 ammunition could be adequate in engaging airborne threats, but airburst ammunition would be ideal. Ball ammunition will destroy small tactical drones, but machine guns could be more effective at drone defense if it could airburst before reaching the drone, which would improve the chances of hitting and disabling a drone at greater ranges. The Army

Figure 3. U.S. Army Stryker M1127 Reconnaissance Vehicles, assigned to Lightning Platoon, 3rd Squadron, 2nd Cavalry Regiment, are staged to demonstrate anti-UAS capabilities during the static display portion of Project Flytrap 4.0, at Bemowo Piskie Training Area, July 29, 2025. *(U.S. Army Photo by SGT Alejandro Carrasquel)*

currently doesn't have any type of .50 caliber airburst ammunition. This will limit these weapons' effectiveness against drone swarms.

The Capability Needed

Engaging small, fast-moving drone swarms is a job for automation. The technology for computers to analyze images to identify targets already exists. Self-driving vehicles use AI to recognize image inputs and navigate situations. The more these AI systems learn, the better they have become at handling the complex task of driving on streets with other vehicles, obstacles, detours, etc. While they aren't perfect, they highlight the capability of a computer to recognize visual inputs and react appropriately with faster reflexes and more precision than humans are capable. A human on the loop weapon system that can autonomously engage and destroy targets is what is needed to fight autonomous threats that can each move and make decisions faster than humans.[8] Soldiers will still be

needed to supervise engage/don't engage decisions, but the weapon software can be more proficient at target detection, identification, and precise engagement.

Collaboration and communication are another area where software can help Soldiers by automating identification and reporting. Implementing data mesh and data fabric concepts where each sensor or data source can enable real-time updates on all networked computers would eliminate the need for operators to constantly update their machine's common operating picture to incorporate new reports.[9] A battlefield computer that already knows its own coordinates can incorporate the input from a laser range finding system to calculate the location of a moving target. It can then communicate this information nearly instantly to other networked computers which in turn can use the incoming target information to cue their own weapon systems to the correct location. This communication and engagement

method cuts crucial seconds off the time it takes Soldiers to contact each other in separate battle positions to coordinate direct fires. It also eliminates the burden of subordinate echelons constantly reporting moving target locations to demanding higher headquarters who are desperately trying to make sense of their own larger battlespace.

The Army needs to procure and field airburst machine gun ammunition. The ideal ammunition type would fit 7.62mm or .50 caliber machine guns that are already fielded. These calibers' size will likely prevent more sophisticated methods of proximity fuses which explode a set distance from a detected target. However, randomly set timed fuses would still help improve lethality against drone swarms. The Army should procure airburst machine gun ammunition so that all currently fielded crew-served machine guns – even those operated by Soldiers instead of automated remote weapon systems – can increase their lethality

against drone swarms. If 7.62mm and .50 caliber airburst ammunition is technically infeasible, then procuring 30mm machine guns with dual-feed ammunition types should be prioritized during the "deliberate transformation" time horizon. These dual feed weapons could keep airburst ammunition loaded for use against drone swarms or targets behind cover while also keeping armor piercing rounds loaded for use against vehicles and hardened targets. Over the last 100 years, we went from specialized machine gun companies to fielding machine guns in every unit in the Army's inventory so that they can provide for their own defense against enemy troops. Now the Army needs to procure effective C-sUAS machine guns and ammunition so that every unit can defend themselves from this emerging threat.

Implementing these solutions can begin immediately as a part of the Army Transformation Initiative time horizon. Some of these concepts may not even require new procurement contracts.[10] In an April 2025 memo, the Secretary of War called for including "right to repair" in procurement contracts. If the Army is not dependent on contractors to integrate new capabilities into existing equipment, the Army could pull together small teams of Soldiers with the requisite skill sets from within its own ranks to begin experimenting with creating and loading image recognition and target engagement software into CROWS. Alternatively, the Army Software Factory could begin work on upgrading CROWS software. With a relatively small budget, this type of experimentation has the potential to start small, fail early, and innovate rapidly. In the age of generative AI that can write the code for computer programs on demand, we may not need defense contractors to write the code to implement this idea quickly. It may seem crazy to ask Soldiers who learn AI as a hobby to experiment with developing automated weapon systems, but this type of innovation could also set the stage for rapid adaptation in combat. In 1944, SGT Curtis G. Cullin adapted scrap iron from German roadblocks into hedgerow cutters welded to tanks, enabling maneuver forces to outflank German defensive positions in the French countryside.[11] AI, software application layers, and unmanned robotic systems are this century's welding torches and steel: the basic tools to innovate and transform in contact.

Changing How We Think

Finally, countering the mass precision threat will require continued evolution in how leaders from divisions to squads think about security, survivability, and deception. No unit is immune, regardless of how far from the front line their unit is traditionally located. All Soldiers and leaders need to incorporate drone swarm defense into their security planning and execution, because no other unit is coming to their aid to solve the problem for them. There is a tendency for non-maneuver Soldiers to expect that maneuver units will be tasked to provide their security. This thought process allows them to let themselves off the hook for thinking and training seriously for defending themselves. All leaders need to take this threat seriously and adapt their training and operations to prepare.

Survivability planning takes two forms: avoidance and withstanding.[12] Most of this article has focused on overcoming capability gaps that prevent units from adequately defending themselves against drone swarms. The idea is that the Army should provide all units with the ability to withstand (defend against) drone swarm attacks without incurring significant casualties and equipment loss.

Leaders need to train avoidance survivability methods. Headquarters and command posts need to experiment with making themselves smaller and more redundant.[13] Leaders shouldn't wait for the Army to finish redesigning and modifying Tables of Organization. They should start shrinking and dispersing command posts in all tactical exercises immediately. Maneuver echelons should eliminate the practice of motor pool-style assembly areas in the field. Support and service-support units should also train dispersion, camouflage, and concealment since they are not immune to enemy targeting.

Tactical leaders also need to understand and implement aerial passage of lines into operations. As UAS becomes more prevalent on the battlefield, small unit leaders will become complacent with creating routine forward and rearward passage points through their perimeter to allow for their own UAS operations. Routines are observable. If an enemy observer discovers a UAS passage point, the unit may struggle to identify a drone's hostile intentions as it approaches a known passage point until it's too late to engage and destroy the threat. Every unit operating UAS should plan continuously shifting rearward passage points. Ideally, they should identify at least five passage points in their area of operations. Just as challenge and password or number combinations are distributed, the order of switching between rearward passage points should be published daily. Each time a friendly UAS conducts a rear passage of lines (RPOL), the passage point should shift so that an observing enemy cannot exploit an identified passage point in close succession. An alternative to planning continuously shifting rearward passage points for UAS is to treat all UAS as expendable, where each sortie is a one-way trip.

Conclusion

New weapon systems rarely make all previous forms of warfare obsolete; however, the introduction of expendable and highly lethal drone swarms do require the Army to adapt. The tank's death has been widely proclaimed, but critics' eulogies are premature. Just as the introduction of the airplane didn't make ground warfare obsolete, UAS and drone swarms don't make current maneuver forces obsolete. Multi-domain operations require a combined arms approach to warfare. As new threats emerge, we need to rapidly adapt to counter the threat. UAS aren't invulnerable. To effectively enable maneuver, all units need the capability to counter UAS and drone swarms. This capability needs to be fielded in each unit without pulling Soldiers away from other required tasks to crew additional vehicles or bespoke C-sUAS weapon systems. To do this, we need to leverage AI and software applications to alleviate some of the burden from crewmen and more effectively leverage the weapon systems that are already

Figure 4. Mavic 3 Thermal drone performs a test drop with a tennis ball over field to engage and test U.S. Army Soldiers for Mojave Falcon at Fort Hunter Liggett, California on May 31, 2025. *(U.S. Army Reserve photo by SGT Anh Tuan Nguyen)*

fielded as an immediate solution while seeking modest upgrades to hardware and weapon systems in the future.

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Notes

1 Max Hunder, "Ukraine rushes to create AI-enabled war drones," Reuters, July 18, 2024. https://www.reuters.com/technology/artificial-intelligence/ukraine-rushes-create-ai-enabled-war-drones-2024-07-18/

2 Christian Brose, The Kill Chain (United States: Hachette Books, 2020), p 19-20.

3 Milford Beagle, Jason C. Slider, and Matthew R. Arrol, "The Graveyard of Command Posts," Military Review Online Exclusive (March 2023), 9.

4 Nicholas Fiorenza, "UK Procures Smash C-UAS Fire-Control System, Janes, July 15, 2024. https://www.janes.com/osint-insights/defence-news/air/uk-procures-smash-c-uas-fire-control-system

5 Northrop Grumman. 2024. "Counter-Unmanned Aerial Systems (C-UAS)." Accessed August 18, 2025. https://www.northropgrumman.com/what-we-do/land/counter-unmanned-aerial-systems-c-uas.

6 James E. Rainey, "Continuous Transformation – Transformation in Contact", Military Review Online Exclusive (August 2024).

7 Thom Hawkins and Andrew Orechovesky, "Logistics for Data – Getting battlefield data to the right place at the right time: The mess versus the mesh," Army AL&T (Winter 2024 Issue), 64.

8 John Antal defines human on the loop as an autonomous system that can identify and decide to engage targets where the human operator's involvement is activating/deactivating the weapon or terminating an engagement "before unacceptable levels of damage occur." John Antal, 7 Seconds to Die (Oxford, UK: Casemate, 2022), Glossary.

9 Beagle, Slider, and Arrol, pg 9.

10 Pete Hegseth, "Army Transformation and Acquisition Reform," memo dated April 30, 2025.

11 Michael D. Doubler, Busting the Bocage: American Combined Operations in France, 6 June – 31 July 1944 (Combat Studies Institute, Fort Leavenworth, 1988), 34.

12 Headquarters, Department of the Army, Survivability Operations, ATP 3-37.34 (Washington, DC: Department of the Army, April 2018), Chapter 1.

13 Beagle, Slider, and Arrol, "Graveyard of Command Posts", 6.

Training Battalions to Fight and Win in LSCO:

The Importance of Battle Drills, Playbooks, and Home-Station Training

by MAJ Chris Garlick and LTC Dave Devine

The method used by American football teams to call offensive plays changed drastically in the early 2000s. Deemphasizing the huddle, numerous teams experimented with calling plays from the line of scrimmage. This technique, perhaps best exemplified by Peyton Manning and the Indianapolis Colts, allowed the quarterback to deliberately survey the defense and exploit weaknesses by getting the team in the optimal play. This change allowed the Colts to play at an increased tempo compared to offenses that huddled and disadvantaged defenses by not allowing time to make substitutions. Expanding on the no-huddle offense, Coach Chip Kelly and the Oregon Ducks further innovated by calling plays at the line of scrimmage via posterboard signals from the sideline. Rather than deliberately surveying the defense and selecting the perfect play, Kelly rapidly disseminated information to the offense and increased Oregon's offensive tempo, even compared to teams that employed the Colts' technique. Increased tempo exploited weaknesses in the opposing defense as their players could not communicate and ensure common understanding before Oregon started the next play. Inevitably,

Oregon took advantage of defensive mistakes, oftentimes scoring long touchdowns at the expense of a defensive player who was out of position.

Emulating the Oregon Ducks, U.S. Army maneuver battalions can rehearse battle drills and pre-scripted "plays" during home station collective training to increase readiness for the rapid tempo required to fight and win in large-scale combat operations (LSCO). Recently, the U.S. Army has reorganized with the division replacing brigade combat teams as the unit of action.[1] As divisions focus on tactical level operations, planning horizons at lower echelons contract.[2] Gone are the days of counterinsurgency operations whereby battalions, companies, and platoons have days or weeks to plan a raid, humanitarian assistance drops, or other small unit operations.

U.S. Army organizations at the brigade level and below understand this dynamic and have made significant adjustments to increase tempo. Observer controller/trainers (OC/Ts) at the U.S. Army's combat training centers (CTCs)emphasize the importance of issuing timely orders and building flexibility in tactical plans.[3] A best practice highlighted by the Army's Joint Readiness Training Center (JRTC) OC/Ts is brigades adhering to the "1/3-2/3 rule" during a three-day battle period.[4] This

means that a brigade uses only 24 hours to plan and issue an order, giving subordinate echelons the ability to plan and rehearse over 48 hours at echelon before execution. This abbreviated planning timeline is akin to the early Indianapolis Colts no-huddle offense and its ability to utilize available time to survey the defense and call the optimal play at the line of scrimmage.

In this scenario, maneuver battalions are given the time necessary to run their own military decision-making process (MDMP) and implement the optimal plan for the current conditions in the operational environment. Undoubtedly, there are numerous situations in LSCO where this technique is appropriate and enables success. However, even the abbreviated timeline highlighted above does not align with the tempo at which divisions execute operational transitions and issue orders to brigades during warfighter exercises (WFXs) in LSCO scenarios. Therefore, in addition to proficiency in MDMP, maneuver battalions must be trained to execute battle drills when tempo dictates minimal time for preparation and no time to plan.

During WFXs, the changing nature of the operational environment (OE) often leads a division to issue fragmentary orders that drastically change a subordinate brigade's task and

ZONE RECON One Up (Aggies)

Type of Operation		Zone Recon
Focus		Enemy
Tempo		Rapid (or Deliberate)/Forceful
Engagement Criteria		Dismount Sec/Mounted OP
Engagement Criteria	Observation	Maintain Visual Contact
	Indirect (organic)	ISO Dismounted Mvmt
	Indirect (BCT/DIV)	N/A
	Direct	Utilize Dismounted AT & 25mm
	Obstacles	N/A
	Air	N/A
	EW/SIGINT	SIGINT Cues
	Civil-Engagement	N/A
Bypass Criteria		Dsmt OP/Single Light Vics
Bypass Criteria	Observation	Maintain Visual Contact
	Indirect (organic)	ISO Bypass
	Indirect (BCT/DIV)	N/A
	Direct	ISO Bypass
	Obstacles	N/A
	Air	N/A
	EW/SIGINT	SIGINT Cues
	Civil-Engagement	N/A
Disengagement Criteria		MIP in Def/MIC in MTC
Disengagement Criteria	Observation	N/A
	Indirect (organic)	N/A
	Indirect (BCT/DIV)	N/A
	Direct	N/A
	Obstacles	N/A
	Air	N/A
	EW/SIGINT	N/A
	Civil-Engagement	N/A
Displacement Criteria		LITOV or BCT plan transition or RECON LOA

Squadron: (T) – Zone Recon; (P) – Enable BCT DO to destroy
A Troop: (T) – Zone Recon; (P) – Enable BCT DO to destroy
B Troop: (T) – Zone Recon; (P) – Retain FOM
C Troop: (T) – Zone Recon; (P) – Retain FOM
D Company: (T) – Follow & Support; (P) – Retain FOM
Q-50: (T) – Identify POO/POI; (P) – Enable Rapid Counter-fire
JTAC: (T) – Destroy HPTs; (P) – Enable FOM
Avenger Section: (T) – Destroy Enemy Rotary Wing; (P) – Enable FOM
SIGINT PLT: (T) – Conduct Passive Signal Recon; (P) – Identify enemy comp/disposition
EW PLT: (T) – Conduct EW surveillance; (P) – Identify enemy comp/disposition
ERT: (T) – Classify Obstacles; (P) – Enable FOM
PSYOPS: (T) – Conduct Sonic Deception; (P) – Prevent Enemy from massing on BCT DO

Considerations
- Suitable for narrow AoA
- Make contact with the smallest element
- B/C Troops are prepared to bypass to maintain momentum
- Difficult to use D Tank due to distance

CCIR

PIR:
1. Have we ID FSE (MTC) DP 1 or 2?
2. Have we ID CSOP (DEF) DP 1 or 2?
3. Are we in contact with MIC?
4. ID 2 MIC?

FFIR:
1 – Loss of > 6 BFVs in Troop
2 – Loss of 4 Tanks in D Co
3 – Loss of 12 > BFVs

Decision Points:
1. Bypass with C Troop not in contact FALCONS
2. Commit D Tank KNIGHTS
3. Transition to a SEC OPS
4. FPOL CAB NOLES
5. Commit AAA PLT+

Actions:
1. A Troop drives tempo for Squadron
2. B or C Troop conduct bypass if A Troop makes contact and needs time to develop the situation. The remaining Troop follows the bypassing Troop and is prepared to ensure continuous recon by assuming the lead.
3. D Tank keeps a Section with the lead Troop CP to rapidly pull the Tank Co forward with the lead TRP XO and maneuver to thier attack by fire position.
4. Troops identify AoAs to pass D Tank forward and terrain suitable for fighting positions.
5. Task force Scouts follow behind the Squadron to conduct recon handover and pull CABs forward.

Figure 1. An example zone reconnaissance "play" from a current cavalry squadron playbook. *(U.S. Army graphic)*

purpose less than twelve hours before the execution of an operation.[5] Given the simulated environment of a WFX, well-rested and all-knowing brigade staffs can quickly implement changes and ensure common understanding with "pucksters" serving as their subordinate battalion commanders as they are co-located within the same room. These "pucksters" are then immediately ready to execute as they have sole responsibility for maneuvering entire battalions and do not need to ensure common understanding at the company and platoon level.

Undoubtedly, this order dissemination process would be very different on a modern battlefield whereby a brigade had to contend with disparately located subordinate units, contested communications, sleep deprivation, enemy actions, and a litany of other issues. Even the best brigade would be hard-pressed to adhere to the 1/3-2/3 rule and issue a plan in under four hours, a full twenty hours quicker than the JRTC best practice highlighted above. Still, battalions, companies, and platoons would each need to undergo their own planning and orders dissemination process before common understanding of

an optimal plan could be achieved. Instead, it is necessary that maneuver battalions develop a "playbook" and train on battalion-level battle drills or "plays" before experiencing combat. Like the Oregon Ducks posterboard play calls, a maneuver battalion playbook with one-word radio calls for numerous operations would allow battalions to rapidly disseminate a feasible plan and ensure common understanding down to the platoon level. This playbook postures the battalion for success when tempo dictates that near-immediate action is necessary. As stated by GEN George S. Patton there

Figure 2. Recreation of an example deliberate attack "play" from a 1990s era armor battalion playbook. *(U.S. Army Graphic)*
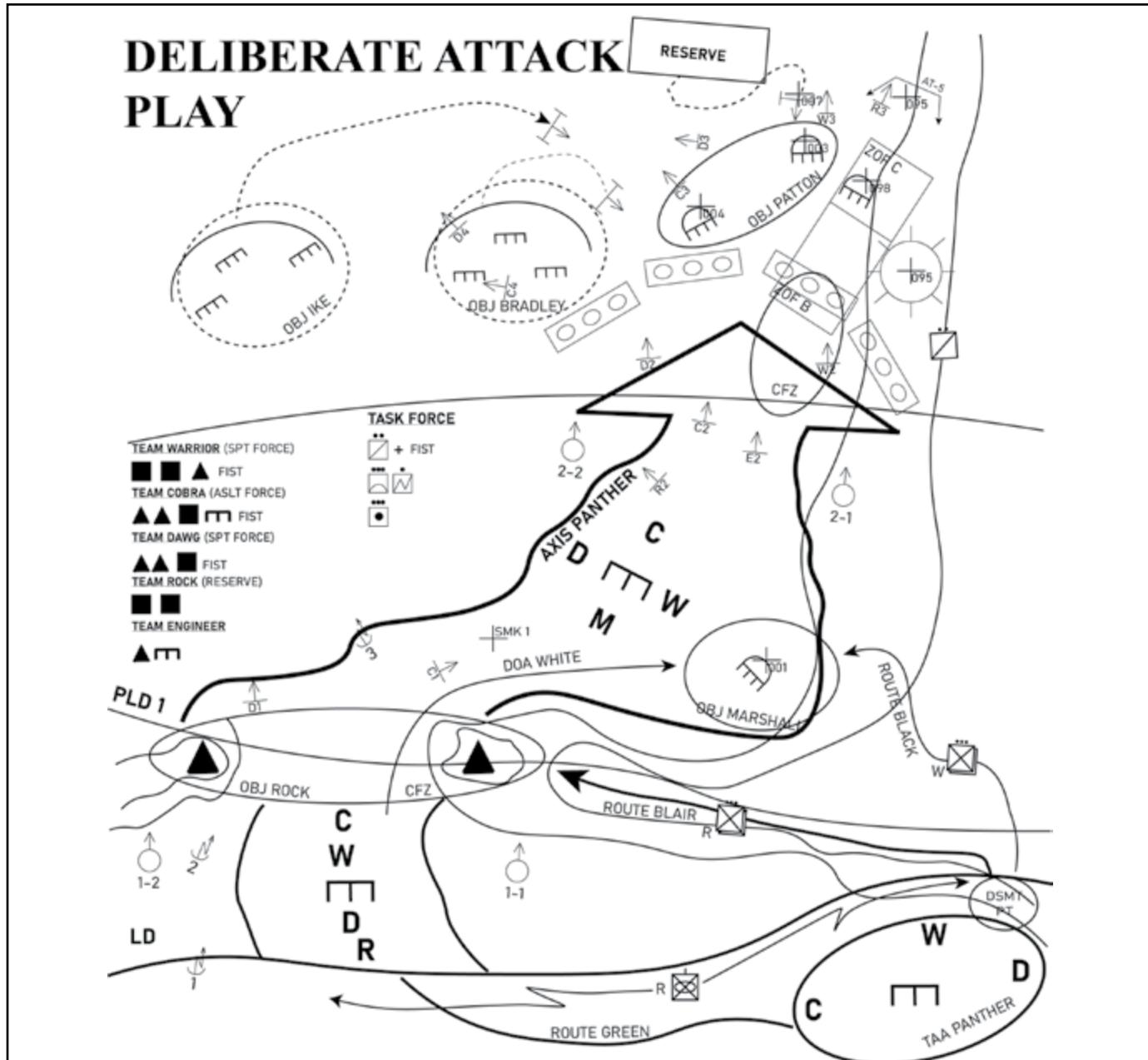
are occasions in LSCO in which, "A good plan violently executed now is better than a perfect plan executed at some indefinite time in the future."

How Can Battalions Do This?

Maneuver battalions must make changes to their home station training plans if they hope to successfully implement battle drills during CTC rotations or war. The first step is to utilize working groups to develop a battalion playbook to illustrate how the battalion organizes and executes its typical mission sets. At a minimum a maneuver battalion playbook should include a "card" or "play" on hasty attack with a flanking maneuver left, hasty attack with a flanking maneuver right, frontal attack, movement to contact, hasty breach, defense of a linear obstacle, and a mobile defense. A cavalry squadron playbook should include "plays" for screen, guard, zone reconnaissance, the reinforcement of a cavalry troop by the tank company, passage of lines, and reconnaissance handover between troops. These working groups must include representatives of all warfighting functions so that each "play" outlines a coherent scheme of intelligence collection, fires, protection, and sustainment in addition to the scheme of maneuver. Once developed, battalion leader professional development (LPDs) can be held to review the product and ensure common understanding of each play down to the platoon level. Leaders must understand that this is not the right way in which the battalion will execute these missions in any scenario, only a template used to ensure immediate common understanding when MDMP is not feasible. Finally, staffs must understand that, in execution, they are still responsible for rapidly distributing updated graphic control measures, fire support control measures, identifying triggers, and producing any other fighting products the commander deems necessary to adapt the "play" to the operational environment in which it will be executed.

It is not enough for battalions to produce and distribute the playbook, they must also put it into practice during training. Time must be dedicated on

DELIBERATE ATTACK PLAY

Phase 1 (Recon And Surveillance)
- Team Rock seizes LD; screens LD
- Scout platoon conducts zone reconnaissance deep, vicinity enemy main battle area
- Team Warrior dismounts move along Route Black to destroy CSOP vicinity OBJ Marshall
- Team Rock dismounts move along Route Blue to destroy OPs vicinity OBJ Rock

Phase 2 (TF Through Choke Point; Destroys CSOP)
- TF moves in column, approaches choke point
- CObra sets C1 orients 001; Warrior moves through choke point along DOA White; Dawg moves through choke point, sets SBF at D1 (orient to protect TF flank)
- Warrior assaults through OBJ Marshall, destroys CSOP; links up with dismounts
- TF resumes movement in TF Diamond

Phase 3 (TF Executes Breach; Destroys MRP at ZOP C)
- Cobra sets at C2; Dawg fights to D2, executes support by fire to suppress/destroy left and center MRPS; warrior fights to W2, executes support by fire to suppress/destroy right MRP at ZOP C and infantry strong point; Team Engineer occupies E2; Rock occupies R2
- Suppression (direct and indirect fires); obscuration; near-side security established; conditions are set for breach
- Team Engineer moves forward to breach at ZOP E
- breach complete
- Cobra moves through breach; continues to assault in order to destroy right MRP at ZOP C; Warrior lifts fires; Dawg shifts fires to left MRP

Phase 4 (TF Completes the Destruction of MRC; O/O Destroys Other MRCs)
- Cobra sets at C3; orients to destroy repositioning MRPs
- Rock moves through breach (picks up Blade PLT); sets at R3, orients to destroy reserve
- Warrior moves through breach; sets at W3, orients to destroy reserve
- Dawg moves through breach; bounds to set at D3, orients to flank MRCs
- O/O Dawg and Cobra bound using C4 and D4 in order to flank MRCs
- Rock and Warrior continue to orient on reserve and AT–5 ambush; prepared to assume the mission to destroy the flank MRCs

Figure 3. Deliberate attack play phased description. *(U.S. Army Graphic)*

the battalion training calendar for multiple companies to rehearse "plays" collectively under the command and control of a battalion command post. Tactical exercises without troops (TEWTs), the close combat tactical trainer (CCTT), and reduced force exercises are outstanding techniques to conduct this training within realistic resourcing constraints. Multiple iterations of situational training exercises (STXs) comprising force-on-force scenarios are invaluable in improving a battalion's ability to succeed on short notice as they allow leaders to make mistakes, learn, and retrain. Ensuring that these events receive the same focus and prioritization as live-fire exercises greatly increases a battalion's capacity for agility and it's ability to react quickly within the bounds of the commander's intent.

What Can Division and Brigade Headquarters do to Enable Success at the Battalion Level?

Battalions cannot develop playbooks in a vacuum as they must be nested within the context of how their brigade and division intends to fight. For example,

an armored or armored strike division that is unlikely to employ more than one infantry battalion in an air assault does not need multiple maneuver battalions prioritizing air assault operations in collective training. Conversely, an armored strike division cannot assume an adequate number of subordinate battalions will master the combined arms breach absent guidance and oversight. Divisions must clearly prioritize and articulate the tasks that subordinate brigades and battalions must be prepared to execute. Brigades must do the same for battalions and companies. This articulation can be done through "how we fight" products and LPDs but must be reinforced through actionable, relevant annual training guidance. Training guidance cannot simply regurgitate all regulatory annual training requirements but must prioritize areas in which subordinate organizations must excel, areas where they must perform to standard, and- most importantly- areas where units can assume risk and remain untrained. Divisions and brigades that simply list all regulatory requirements absent prioritization are pushing risk decisions down to lower levels. Some portion of training will still be omitted

or conducted at a substandard level, but those prioritization decisions will be made by company grade officers and junior noncommissioned officers rather than senior leaders.

Furthermore, divisions and their subordinate brigades must ensure their unit culture inculcates effective and adaptive LSCO-oriented training. In the words of former United States Army Europe and Africa (USAREUR) commander LTG (R) Arthur Collins Jr. – himself no stranger to leading Soldiers during transition periods between wars – "skillful senior commanders can bring their armies into battle under favorable conditions, but it is the small unit leaders who win the battle.[6] All Army organizations perform a host of necessary activities that may degrade from training if not managed appropriately. These activities include- but are not limited to- personnel actions, inspections, promotion boards, supply activities, planned and unplanned maintenance, unit social functions, and community outreach. These requirements exist to ensure a unit remains administratively prepared to perform its mission, therefore senior leaders must consistently message the importance of warfighting. If unit commanders fail to place the appropriate emphasis on high-quality, battle-focused training, then even the most well-developed playbook has little value.

While division and brigade leaders work to establish appropriate training environments, battalion-level leaders must do their part and meet their higher headquarters in the middle. These lower echelon commanders must manage administrative requirements without missing the "forest for the trees" by focusing on what is urgent rather than what is essential. LTG Collins observed that even as far back as the 1970s, many battalion commanders and their staff officers complained about a lack of training time and the crushing weight of excessive training requirements issued by higher headquarters.[7] Yet, in his experience, such units simply suffered from a failure to prioritize resources (especially time) or emphasize appropriate training – these commanders let their training manage them rather than managing their training.[8] With effective playbooks in hand, battalion and company commanders must reinvigorate emphasis on combined arms training through the execution of the STX lanes, TEWT iterations, and other methods described above.

What Other Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTmLPF-P) Changes are Required?

Above the division level, the larger U.S. Army can help facilitate adaptation through additional changes across the DOTmLPF-P spectrum. From a personnel standpoint, much has already been written about the fiscal and family stability benefits of adopting a U.S. Army divisional system that required less permanent change of station.[9] An additional benefit of increased Soldier stability is that it enables battalions to capture lessons learned from collective training and implement standard operating procedures (SOPs) that are understood at echelon. Currently, battalions peak in combat readiness every two years after a CTC rotation;

Figure 4. The Army West Point Black Knights (6-6) defeated the Navy Midshipmen (5-7), 17-11, Dec. 9 in the 124th edition of the Army-Navy Game presented by USAA. *(Photo by Class of 2025 Cadet Eli Wright)*

however, they are rarely able to build on that level of readiness and continue to progress over the following two-year cycle. Instead, massive leader and Soldier turnover means that the battalion must rebuild systems and processes from the ground up. The need to continue to train, qualify, and recertify new crews, sections, and platoons leaves little time to train above the company echelon until the next CTC rotation, thereby restarting the cycle again. Reducing Soldier moves through a divisional system would mitigate this cycle through increased unit familiarity with SOPs, less turnover and training required for additional duties, and more efficient leader onboarding due to post and unit familiarity.

The Combined Arms Doctrine Directorate (CADD) can also assist battalions in revamping collective training plans in its next update to FM 7-0, *Training*. FM 7-0 accurately defines battle drills as, "a collective action where Soldiers and leaders rapidly process information, make decisions, and execute without a deliberate decision-making process." However, its description of lane training indirectly reinforces the notion that battle drills are only executed at the company level and below. Lane training is defined as, "A company and below training technique designed to practice, observe, and evaluate individual tasks, collective tasks, or battle drills. It allows the unit to focus on the critical tasks, allows for consistent and uniform assessments, and maximizes the use of available time." As lane training is the prescribed medium for training battle drills, and, by definition, lane training is not executed at the battalion and brigade level, one can presume that battalions and brigades do not execute battle drills and instead conduct a deliberate decision-making process at the outset of every operation. Furthermore, while FM 7-0 includes several helpful vignettes that describe how units can plan and execute training, nearly every vignette is codified at the platoon or company level. The inclusion of vignettes and techniques to effectively train multiple companies or whole battalions would be a beneficial addition. An example might be lane training where two companies conduct a movement to contact against the battalion's third company,

scout platoon, and mortar platoon. The first element can be controlled by the battalion's main command post while the second element is controlled by the battalion tactical command post or mobile command group. With reduced time committed to planning, the battalion could conduct multiple iterations of lane training in a given day, before flipping sides and repeating the event the next day. Iterative training events like this allow leaders and units to experiment, learn from mistakes, adjust SOPs, and build the trust necessary to execute mission command. Arguably, training of this nature would be more beneficial in combat than the rote progression through smaller echelon live-fire training that most units currently prioritize.

Conclusion

Today's leaders must evolve training methodologies to prepare to win the first battle of the next war. As the operational environment becomes increasingly dynamic, maneuver battalions must be able to adapt and respond with speed and agility. The development of battle drills, playbooks, and rigorous home station training programs can provide a critical foundation for success in this context.

By leveraging these approaches, battalions can foster a culture of initiative, decentralization, and mission command, where units are capable of rapid action to dictate tempo in a changing environment. This, in turn, can enable divisions to seize and maintain the initiative, exploit weaknesses in enemy defenses, and ultimately achieve victory.

As the U.S. Army continues to transform, leaders and trainers must prioritize innovation, creativity, and experimentation in their approach to training and readiness. By doing so, the Army can ensure that its maneuver battalions are equipped with the skills, knowledge, and adaptability necessary to succeed in the most demanding operational environments.

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Notes

1 Pomerleau, M. February 13, 2023. "Division Headquarters Will Now Accompany Brigades to Combat Training Center Rotations." Defense Scoop. Accessed August 18, 2025. https://defensescoop.com/2023/02/13/division-headquarters-will-now-accompany-brigades-to-combat-training-center-rotations/

2 Reed, William, and Jose DeLeon. 2024. "The Agile U.S. Army Division in a Multidomain Environment." Military Review, 39.

3 Lee, James, and Anthony Formica. 2024. "Setting the Conditions for Brigades and Battalions to Succeed in LSCO through Staff Overmatch." The Crucible- The JRTC Experience Podcast, July 17, 2024. https://www.jrtc.army.mil/podcast/.

4 Ibid.

5 Center for Army Lessons Learned. 2024. FY23 Mission Command Training in Large Scale Combat Operations Key Observations. Center for Army Lessons Learned, 13.

6 Collins, A. (1978). Common sense training: A working philosophy for leaders. Presidio Press.

7 Ibid.

8 Ibid.

9 Hurst, J. 2023. "Move Soldiers Less: A Divisional System in the U.S. Army." War on the Rocks, August 30, 2023. Accessed August 18, 2025. https://warontherocks.com/2023/08/move-soldiers-less-a-divisional-system-in-the-u-s-army/

Mission Command Under Fire
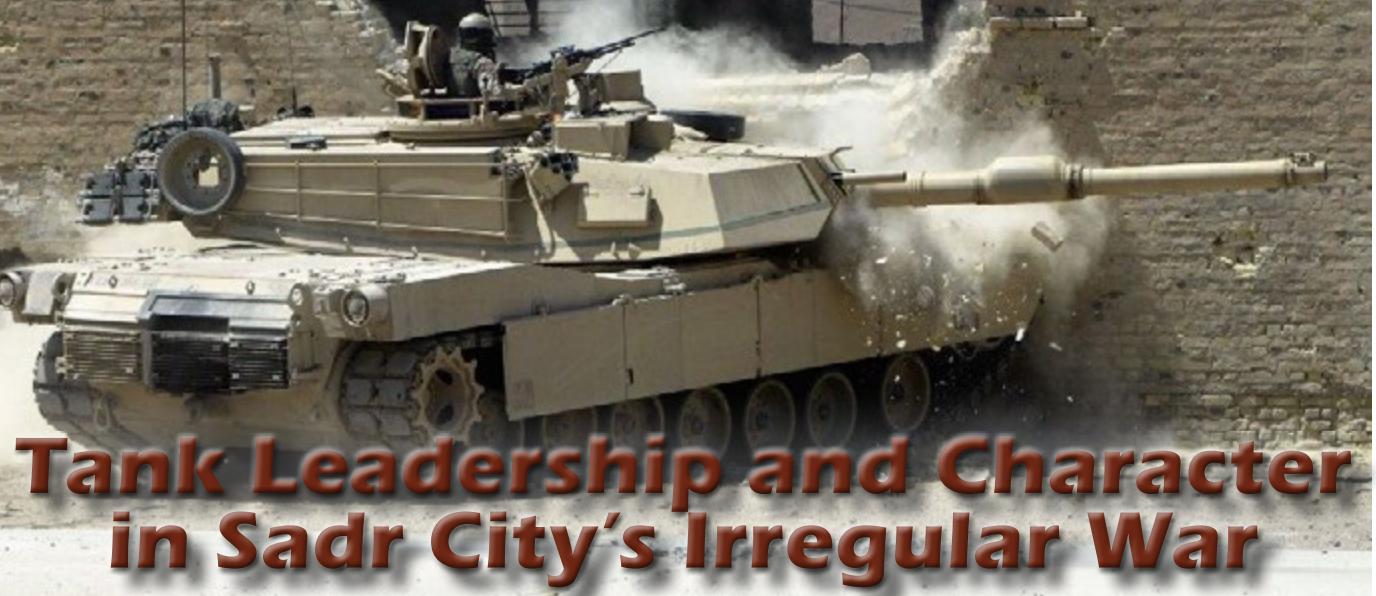
Tank Leadership and Character in Sadr City's Irregular War

by SGM Steve Gonzalez

Tanks rumbled through Sadr City's narrow alleys like unleashed lions in a crowded arena, each turret ready to strike at hidden enemies. Urban warfare, a common form of irregular warfare (IW), drags heavy forces like tanks into dense neighborhoods where insurgents and civilians are often mixed.[1] In these high-risk areas, commanders face threats that change quickly and unpredictably. This article focuses on three key challenges leaders must understand when fighting in IW. First, it explains why mission command principles, specifically mission orders and the commander's intent, are critical for success in IW. Second, it breaks down the challenge of combat stress and the importance of managing it effectively in urban warfare. Third, it explores how IW environments require leaders to adjust their leadership character to maintain moral and ethical control under pressure. This study argues that mission orders, commander's intent, stress management strategies, and the ability to adjust leadership character provided the backbone of successful Armor operations during the Battle of Sadr City.

Battle of Sadr City: Mission Command Principles and IW

Leaders must apply mission command principles with precision and adaptability in IW. IW is defined as the involvement of conflict between state and non-state groups, where both sides compete for control and support of local populations, often in areas where traditional front lines do not exist.[2] These conditions create a combat environment where traditional command-and-control methods are less effective, demanding decentralized decision-making and flexible execution. Mission command principles are designed to empower subordinates to act quickly and effectively in dynamic and uncertain environments. Two of the most important principles are mission orders and the commander's intent. Mission orders provide clear, concise directions on what needs to be accomplished without prescribing exactly how to do it. The commander's intent describes the purpose of the operation and the desired end state, guiding subordinates even if the situation changes or communication is lost.[3]

To understand the value of mission orders and the commander's intent in Sadr City, one must first understand the environment and purpose of the mission. In the spring of 2008, Sadr City had become a sanctuary for Shi'a militias who frequently launched indirect fire attacks into Baghdad's Green Zone. The area was densely populated, heavily fortified by insurgents, and dangerous for U.S. and Iraqi forces. To isolate militia activity and reduce enemy freedom of movement, the U.S. military launched Operation Gold Wall, which involved constructing a wall to divide the city and restrict insurgent mobility. The mission orders tasked tank and infantry elements with protecting engineers as they emplaced T-walls across key streets, while the commander's intent emphasized stabilizing the area with minimal civilian casualties and maintaining forward momentum despite resistance.[4]

An example from this operation shows

Figure 1. An unidentified sniper assigned to the HHC Sniper Section of Task Force 1st Battalion, 6th Infantry Regiment, Task Force Regulars, 2nd Armored Brigade Combat Team, 1st Armored Division, Baumholder, Germany observes an M1A1 Abrams MBT through a spotting scope. *(U.S. Army photo by author)*

how tank platoons assigned to Task Force 1-6 Infantry executed their mission under challenging conditions. When they lost communication with higher headquarters, these tank crews followed their standing orders and internalized the commander's intent to maintain operational momentum. During one engagement, insurgents fired at U.S. forces from behind civilian structures near a wall emplacement zone. The tank crews responded by using precision fire to suppress the threat while protecting the engineers and nearby infantry. Their quick response, even without updated instructions, remained aligned with the mission's broader objective: securing terrain, protecting civilians, and degrading enemy capabilities.[5]

The evidence shows that mission orders allowed junior leaders to respond to threats without waiting for new instructions. In the previous example, tank crews responded directly to enemy fire while engineers worked to emplace barriers, firing their 120mm main guns to suppress the threat and protect their fellow Soldiers. Their response disrupted the attack and allowed the barrier emplacement to continue. The commander's intent helped tank crews stay focused on the bigger mission. Their job was to protect the wall-building teams, avoid harming civilians, and keep control of key areas in Sadr City.[6] In IW, where things change fast and threats can come at any time, having clear goals and trusting Soldiers to make the right decisions is of the utmost importance.[7] These mission command principles helped tank crews stay in the fight and keep moving forward, even when they couldn't communicate with their higher command. Without these principles, the mission might have fallen apart. This example shows why managing combat stress is the next important factor in keeping Soldiers ready, focused, and able to manage their stress in combat.

Combat Stress Management Challenges in IW

Combat stress management is defined as the proactive steps leaders take to recognize, reduce, and recover from the psychological and emotional strain of combat operations.[8] Combat stress in IW differs significantly from stress in conventional warfare. The enemy blends in with civilians, attacks unexpectedly, and creates an environment where the line between

safe and dangerous is never clear, which makes it harder for leaders to decide when and how to act without causing harm or risking the mission. These conditions produce continuous mental pressure, emotional strain, and physical fatigue for Soldiers and leaders alike. If left unaddressed, such stress can lead to impaired judgment, increased risk of misconduct, reduced mission effectiveness, and long-term psychological effects, including combat stress reactions and post-traumatic stress disorder.[9]

One example is the experience of tank crews operating M1 Abrams and mine resistant ambush protected (MRAP) vehicles in Sadr City. Positioned in static overwatch for hours in exposed intersections, these crews endured relentless summer heat, intermittent sniper fire, and the constant threat of improvised explosive devices. During one mission, a tank commander scanned the narrow alleyways from his open hatch as his crew rotated in and out of sleep below, alert to every creak of metal or distant pop of gunfire. The crews provided support to engineers and infantry teams placing T-wall barriers, a task made even more stressful by frequent reports of enemy spotters coordinating indirect fire. On one occasion, a roadside bomb exploded just yards from their position, followed by a brief but intense firefight. Despite exhaustion and limited rest, the crews returned suppressive fire, coordinated a medical evacuation for a wounded Soldier, and resumed overwatch without relief.[10] The evidence shows that prolonged exposure to these conditions began to wear down even the most disciplined crews. Leaders implemented shift rotations, pushed hydration cycles, and conducted routine checks on mental readiness to help Soldiers manage the compounding stress.[11]

Analysis of these efforts reveals that stress, if not addressed, can compromise decision-making, erode trust between Soldiers, and increase the likelihood of post-deployment behavioral health challenges. Prolonged exposure to combat environments like Sadr City has been linked to post-traumatic stress disorder and difficulties reintegrating into civilian life after

deployment.[12] In IW, one wrong move could escalate into a civilian casualty or failed mission. Leaders must be trained to spot the signs of fatigue and intervene early. RAND research supports this, noting that mental readiness and resilience are critical for sustaining combat effectiveness in urban environments.[13] A Soldier who feels supported and understood by leadership is more likely to remain focused and alert. This need for consistent leadership under stress transitions into the next major factor in IW: understanding how stress and unpredictability demand that leaders adapt their character to make sound and ethical decisions under pressure.

Adjusting Leadership Character for IW

IW environments require leaders to adjust the leadership attribute of character to meet complex ethical and operational challenges. According to doctrine, character is defined as the internal identity that guides leaders to act with discipline, respect, and moral courage. These situations test more than tactical skills; leaders need strong morals and courage to make good decisions when under pressure. Enemy combatants within IW often use civilians as shields or fight from protected buildings. This forces leaders into tough situations where quick decisions can affect both the mission and innocent lives. Adjusting character in IW means reinforcing values like discipline, respect, and integrity to ensure actions reflect the Army Ethics and mission objectives.[14]

One example that demonstrates adjusted leadership character occurred during operations in Sadr City, where tank commanders were routinely placed in ethically complex combat scenarios. In one reported instance, during the emplacement of T-walls in contested neighborhoods, insurgents fired at U.S. forces from within buildings that were believed to house civilians. Commanders had to decide whether to return fire immediately, risking civilian casualties, or hold fire and pursue another method. Instead of using immediate high-explosive tank fire, the tank commanders coordinated with dismounted infantry to isolate the building, confirm the presence of a threat, and eliminate it through a controlled precision engagement.[15]

Figure 2. Abrams MBT assigned to C Company, 1st Battalion, 35th Armored Regiment, Task Force Conquerors, 2nd Armored Brigade Combat Team, 1st Armored Division, Baumholder, Germany. *(U.S. Army photo by author)*

The evidence shows that this approach demonstrated restraint and accountability under stress. Instead of reacting with anger or rushing to fire, the commander embraced the Army Values and followed the rules of engagement. This careful decision kept civilians alive, helped the unit earn the trust of local people, and allowed for Operation Gold Wall to keep moving forward without delay.[16] Analysis of this decision shows that leaders need to adjust their character to succeed in IW. Staying calm and doing the right thing, even when under immediate threat, helps leaders make better choices, earn trust from civilians, and stay focused on the mission. In the chaos of IW, the character of the leader becomes a stabilizing force that keeps the mission aligned with ethical and operational priorities.[17]

Conclusion

In summary, mission command principles, especially the use of mission orders and a clearly communicated commander's intent, were critical during IW because they empowered subordinates to take initiative under uncertainty while remaining aligned with the overall mission objectives. Combat stress management was essential during operations in Sadr City. Long hours, extreme heat, and constant threats made it difficult for Soldiers and leaders to stay sharp. If not handled properly, this stress could lower performance and break down trust in the unit. Good leaders kept their Soldiers focused and mentally strong by checking on them, rotating shifts, and encouraging rest when possible. IW also required leaders to adjust how they led. Tank commanders had to show courage and discipline while making quick choices in chaotic and morally difficult situations. They had to fight the enemy while protecting civilians and staying true to Army Values. This study argues that mission orders, commander's intent, stress management strategies, and the ability to adjust leadership character provided the backbone of successful armor operations during the Battle of Sadr City. Just as tanks rumbled through Sadr City's narrow alleys like unleashed lions in a crowded arena, effective leaders charged forward with clarity, resilience, and ethical strength to meet the demands of irregular warfare.

Sergeant Major Steve Gonzalez currently serves as the Brigade Operations Sergeant Major for the 194th Armored Brigade, Fort Benning, Georgia, with a distinguished career including prior assignments as First Sergeant of 1st Battalion, 77th Armored Regiment and 1st Battalion, 29th Infantry Regiment, as well as roles as a Senior Operations NCO at the Pentagon and a Senior Drill Sergeant at Fort Benning. SGM Gonzalez was assigned as a M1 Abrams Tank Gunner and Section Sergeant with the 4th Infantry Division and 1st Armored Division, deploying in support of Operation Iraqi Freedom. SGM Gonzalez holds a bachelor's of science in business administration and a master's of science in emergency and disaster management from Trident University International. SGM Gonzalez is also a graduate of the Sergeants Major Academy (Class 75) and numerous other leadership courses. SGM Gonzalez is a highly decorated Soldier, recognized with the Bronze Star Medal, Army Commendation Medal with Valor, and numerous badges and awards, including foreign honors and recognition as the Fort Benning Volunteer Soldier of the Year in 2013 and 2021.

Notes

1 U.S. Department of Defense. (2010). Irregular warfare: Countering irregular threats joint operating concept (Version 2.0). Joint Chiefs of Staff. https://www.jcs.mil/Portals/36/Documents/Doctrine/concepts/joc_iw_v2.pdf

2 Ibid.

3 Department of the Army. (2019). ADP 6-0: Mission command: Command and control of Army forces. Headquarters, Department of the Army. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN34403-ADP_6-0-000-WEB-3.pdf

4 Johnson, D. E., Markel, M. W., & Shannon, B. A. (2013). The 2008 Battle of Sadr City: Reimagining Urban Combat. RAND Corporation. https://www.rand.org/pubs/research_reports/RR160.html

5 Ibid.

6 Ibid.

7 Department of the Army. (2019). ADP 6-0: Mission command: Command and control of Army forces. Headquarters, Department of the Army. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN34403-ADP_6-0-000-WEB-3.pdf

8 Department of the Army. (2023). ADP 6-22: Army Leadership and the Profession (Change 1). Headquarters, Department of the Army. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN42975-ADP_6-22-002-WEB-8.pdf

9 Helmus, T. C., & Glenn, R. W. (2005). Steeling the Mind: Combat Stress Reactions and Their Implications for Urban Warfare. RAND Corporation. https://www.rand.org/pubs/monographs/MG191.html

10 Johnson, D. E., Markel, M. W., & Shannon, B. A. (2013). The 2008 Battle of Sadr City: Reimagining Urban Combat. RAND Corporation. https://www.rand.org/pubs/research_reports/RR160.html

11 Helmus, T. C., & Glenn, R. W. (2005). Steeling the Mind: Combat Stress Reactions and Their Implications for Urban Warfare. RAND Corporation. https://www.rand.org/pubs/monographs/MG191.html

12 Peterson, A. L., Luethcke, C. A., Borah, E. V., Borah, A. M., & Young-McCaughan, S. (2011). Assessment and Treatment of Combat-Related PTSD in Returning War Veterans. U.S. Army Medical Research and Materiel Command. https://apps.dtic.mil/sti/tr/pdf/ADA558284.pdf

13 Helmus, T. C., & Glenn, R. W. (2005). Steeling the Mind: Combat Stress Reactions and Their Implications for Urban Warfare. RAND Corporation. https://www.rand.org/pubs/monographs/MG191.html

14 Department of the Army. (2023). ADP 6-22: Army Leadership and the Profession (Change 1). Headquarters, Department of the Army. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN42975-ADP_6-22-002-WEB-8.pdf

15 Johnson, D. E., Markel, M. W., & Shannon, B. A. (2013). The 2008 Battle of Sadr City: Reimagining Urban Combat. RAND Corporation. https://www.rand.org/pubs/research_reports/RR160.html

16 Ibid.

17 Department of the Army. (2023). ADP 6-22: Army Leadership and the Profession (Change 1). Headquarters, Department of the Army. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN42975-ADP_6-22-002-WEB-8.pdf

Security Cooperation at the Tactical Level:

Combat Training Center Interoperability with the Brazilian Army

by MAJ Miguel Moyeno and MSG Jaime Cantu

Since 2021, the U.S. Army and the Brazilian Army have conducted combined military exercises as part of Exercise Southern Vanguard (SV), known in Brazil as the Combined Operations and Rotational Exercise (CORE). According to the U.S. Army Center for Army Lessons Learned (CALL), the "U.S. Army South's Southern Vanguard (SV) series of exercises are built to enhance relationships, promote mutual military readiness, improve interoperability, and establish the foundation for lasting integrated deterrence with select partner nations (PNs) in the United States Southern Command (USSOUTHCOM) area of responsibility (AoR)."[1] In all iterations of SV/CORE to date, Brazilian Army infantry units have been paired with a unit from a U.S. Army infantry brigade combat team (IBCT) company. In anticipation of the possibility of the introduction of U.S. Army units from a Stryker brigade combat team (SBCT) or an armored brigade combat team (ABCT) being paired with a Brazilian Army armored unit, this article seeks to first provide an overview of the U.S. Army's security cooperation activities in the Western Hemisphere and more importantly, describe the Brazilian Army's Armored and Cavalry formations to maximize SV/CORE's ability "to enhance interoperability at the tactical level with operational and strategic significance ensuring integrated deterrence" at a U.S. combat training center (CTC).[2]

Although the Indo-Pacific and European theater remains a focus of the United States national security, the U.S. Army remains focused on improving security and stability throughout the Western Hemisphere and seeks to work with partners to "improve security, stability, and interoperability with partnered states and their military forces while deterring non-hemispheric states from intervening in the region". Armor leaders will indirectly and directly spend portions of their career enabling security cooperation through training exercises that promote interoperability and strengthen partnerships. These activities at the tactical level with countries like Brazil make the United States safer, stronger, and more prosperous.

What is Security Cooperation?

The Defense Security Cooperation Agency (DSCA) defines security cooperation (SC) as "comprising of all activities undertaken by the Department of War (DoW) to encourage and enable international partners to work with the United States to achieve strategic objectives. It includes all DoW interactions with foreign defense and security establishments, including all DoW-administered security assistance (SA) programs, that build defense and security relationships; promote specific U.S. security interests, including all international armaments cooperation activities and SA activities; develop allied and friendly military capabilities for self-defense and multinational operations; and provide U.S. forces with peacetime and contingency access to host nations. It is DoW policy that SC is an important tool of national security and foreign policy and is an integral

Figure 1. U.S. Army MAJ Joseph Fontana, an Army Advisor with 3rd Squadron, 1st SFAB discusses mission planning with Brazilian Army partners during a combined arms rehearsal at Joint Readiness Training Center, Fort Polk, LA, Aug. 21, 2024. *(U.S. Army photo by SSG Brahim Douglas)*

element of the DoW mission". Examples of Armor leaders supporting security cooperation activities include participating in the U.S. Army Military Personnel Exchange Program (MPEP), overseas rotational deployments, U.S.-based CTC rotations with partners and allies, and collaborating with partners and allies in professional military education schools (e.g. Armor Basic Officer Leader Course (ABOLC), Maneuver Captain Career Course (MCCC), and the Command and General Staff Course (CGSC).

United States Presence in the Western Hemisphere

According to the Association of the United States Army (AUSA), "the U.S. Army continues to share responsibility for fostering peace and stability in the Western Hemisphere. U.S. Army South (USARSOUTH)—the Army Service Component Command (ASCC) of USSOUTH-COM — conducts and supports multinational operations and security cooperation in this AoR to counter transnational threats and to strengthen regional security in defense of the homeland."[3] USARSOUTH is headquartered at Fort Sam Houston in San Antonio, Texas and supports U.S. national security objectives in the region through proactive engagement and enduring partnerships with 24 counterparts in the AoR. Joint Task Force-Guantanamo Bay (JTF-GTMO) and Joint Task Force-Bravo (JTF-B) are permanently assigned in the AoR and facilitate contingency response, collective response, security capability and readiness in Army forces and partner militaries.[4] Overall, USARSOUTH supports U.S. joint, combined, and interagency operations that increase regional security; supports interagency operations in coordination with U.S. military and U.S. embassy country teams; supports regional humanitarian and civic assistance, disaster relief, and contingency missions; and plans, coordinates and conducts regional search and rescue operations.[5]

The U.S. Army and the Brazilian Army have a partnership that was forged in combat during World War II. During World War II, the Brazilian Expeditionary Force, known in Brazil as the Força

Figure 2. U.S. Army North welcomed a delegation from the Brazilian Army last week to commemorate the 80th anniversary of Operation Encore, a pivotal World War II campaign that cemented the enduring partnership between the United States and Brazil. *(U.S. Army photo by SGT Andrea Kent)*

Expedicionária Brasileira (FEB), nicknamed Cobras Fumantes or "the Smoking Snakes", fought alongside U.S. forces in the Mediterranean Theatre.

U.S. Army and Brazilian Army: Southern Vanguard and Combined Operations Readiness Exercise

In recent years, the U.S. Army and Brazilian Army have increased interoperability through Exercise Southern Vanguard. Exercise Southern Vanguard is a USSOUTHCOM-sponsored, USARSOUTH-conducted exercise at the operational and tactical levels designed to increase interoperability between U.S. and Western Hemisphere forces with the ultimate goal of establishing a multinational exercise, that will improve readiness, security, and interoperability.[6] The first iteration with Brazil took place in Brazil in December 2021, with participating units from the U.S. Army's 101st Airborne Division (Air Assault) and the Brazilian Army's 5th Battalion, 12th Infantry Brigade.[7] The latest iteration took place in Brazil in November 2023. U.S. participants

included USARSOUTH, 101st Airborne Division (Air Assault), 7th Special Forces Group, 1st Security Forces Assistance Brigade (SFAB), and the New York Army National Guard who trained alongside more than 1,000 Brazilian army personnel assigned to the 52nd Battalion, 23rd Infantry Brigade.[8] CORE is an extension of SV and is an exercise where a Brazilian unit participates in a CTC rotation at the Joint Readiness Training Center (JRTC) in Fort Polk, Louisiana.

Brazilian Army Cavalry: South America's Largest Armored and Cavalry Formations

In Brazil, the branch that accounts for the Brazilian Army's armored and cavalry formations is the Cavalry Branch. In contrast, the branch that accounts for the U.S. Army's armored, mechanized, and cavalry formations is the U.S. Armor Branch. The modern history of the Brazilian Army's Cavalry and Armored formations can be traced to the 1980s when the Brazilian Army received a large quantity of domestic and international mechanized vehicles to equip brigade and below armored and

mechanized units. In 1997, the Brazilian Army received the M60A3 tank thermal sight (TTS) tank. In 1998, the Brazilian Army received the Leopard 1A1.[9] The acquisition of these vehicles provided an increase of combat power to brigade and below units across the Brazilian Army. In 2009, the Brazilian Army began replacing the Leopard 1A1 with the Leopard1A5.[10] Since 2014, the Brazilian Army has incorporated the Viatura Blindada Transporte de Pessoal (VBTP) Guarani into its structure along with the incorporation of the Lince Light Multitasking Armored Vehicle and the Centauro II.[11] The acquisition of the Centauro II 8x8 Mobile Gun System represents a significant enhancement of Brazil's cavalry and reconnaissance capabilities, providing the Brazilian Army with a modern, highly mobile fire support platform. The Centauro II, known for its firepower, speed, and versatility, aligns with Brazil's strategy to modernize its mechanized forces while maintaining operational flexibility in diverse terrains. The strategic acquisition of the Centuaro II for the Brazilian Army marks a significant modernization effort for the Brazilian Army, enhancing its ability to conduct highly mobile armored warfare while maintaining a strong presence in diverse operational environments. The Centauro II's combination of firepower and mobility makes it particularly suited for Brazil's vast and diverse terrain, including its open plains in the south, dense jungle regions, and urban environments.

The Brazilian Army's Cavalry Branch is the proponent of all cavalry, armor, and mechanized forces. Due to the large spectrum of operations and missions assigned to the Brazilian Army, the Cavalry Branch has organized its units based on vehicles and functionality to accomplish their missions. The mechanized cavalry constitutes a highly mobile and powerful force capable of conducting reconnaissance and security actions on wide fronts and in great depths. It is a light armored force capable of participating in both offensive and defensive operations.[12] The armored cavalry constitutes a highly mobile and powerful force, equipped and trained to conduct combat on board. Its combat power rests on the combined use of tanks and armored

Figure 3. Soldiers from the Brazilian Army meet MG Phillip Ryan, USARSOUTH CDR, at JRTC, Fort Polk, LA. *(U.S. Army photo)*

riflemen. The possibility of quickly concentrating or dispersing on the battlefield makes armored cavalry a key element in combat decisions. The parachute cavalry constitutes a highly mobile and powerful force, capable of carrying out reconnaissance and security missions and participating in airborne assault operations. The light cavalry is an airborne force carried by Army Aviation helicopters and can quickly operate in any part of the national territory.[13] The jungle cavalry is a force capable of operating in the Amazon environment, increasing the firepower and security of its surrounding echelon.

Figure 4. Southern Vanguard 2024 was a combined training exercise in Belem, Macapa, and Oiapoque, Brazil, Nov. 6 - 16, 2023. About 300 U.S. Army and National Guard Soldiers trained alongside more than 1,000 Brazilian army personnel. *(U.S. Army National Guard photo by SPC Joseph Liggio)*

The guard cavalry is used, primarily, in Internal Defense operations and military ceremonies.[14]

Combat Training Center Interoperability Considerations

This portion of the article intends to discuss how a Brazilian armor company would fight at the National Training Center (NTC) alongside a U.S. Army ABCT or SBCT. This analysis is modeled by Exercise Talisman Sabre 23 where a U.S. Armor tank company went to Australia to train at the Townsville Field Training Area.[15] We will focus on a company-sized element. We analyzed authentic materials from the Brazilian Army that were in Portuguese to provide accurate information. Based on the prospect of a Brazilian Cavalry unit being paired up with a U.S. Army ABCT or SBCT, we will explore the capabilities of an armored and mechanized unit.

Training at NTC with the Brazilian Army

A potential training exchange between the U.S. Army and the Brazilian Army at NTC would offer valuable insights into mechanized warfare tactics, interoperability, and logistical challenges. If a Brazilian armored platoon were to participate in an NTC rotation, its structure, operational methods, and logistical considerations would need to be examined in depth. Likewise, if a U.S. platoon were to train in Brazil, understanding the Brazilian training environment, infrastructure, and operational challenges would be essential. A Brazilian Leopard 1A5BR platoon is structured similarly to a U.S. Army tank platoon. The composition of a typical Brazilian armored platoon includes: four Leopard 1A5BR main battle tanks, one First Lieutenant platoon leader (PL) responsible for tactical command and maneuver decisions; one "Segundo Sargento" Platoon Sergeant (PSG) who is equivalent to a U.S. Army Staff Sergeant and responsible for leadership, discipline, and logistics within the platoon; two "Terceiro Sargentos" Section Leaders who are equivalent to U.S. Army Sergeants, each commanding a two-tank section; and a mix of twelve "Cabos" and "Soldados" Crew

Members. "Cabos" function similarly to a U.S. Army Corporal, overseeing junior soldiers and assisting in vehicle operations. This structure enables tactical flexibility, ensuring that Brazilian armored platoons can conduct operations effectively while integrating infantry support when necessary.

Regarding tactical deposition and combat employment, Brazilian armored units follow offensive-oriented doctrines, with a standard disposition that prioritizes attack formations and area security operations. Their employment of Leopard 1A5BR tanks often includes forward attack positions, maintaining offensive pressure, integration of dismounted elements for securing key terrain and supporting armored advances, and the use of defensive positions when required, particularly in terrain where mobility is constrained. The Leopard 1A5BR is a versatile platform, optimized for maneuver warfare, and although it lacks the advanced protection and firepower of modern main battle tanks, it remains a highly capable vehicle for fast-moving engagements. When it comes to fuel and sustainment capabilities, one notable logistical advantage of the Leopard 1A5BR is its ability to operate on multiple fuel types. While it primarily uses traditional diesel fuel, it can also run on kerosene-based jet fuel if diesel is unavailable. This flexibility is particularly beneficial in austere environments where fuel supply chains may be inconsistent.

Training at the Brazilian Army's Regional Training Center

If the U.S. Army sends a tank platoon to Brazil, the training would take place at "O Centro de Adestramento Sul" (CA-Sul), Brazil's equivalent to NTC. Located in the south of Brazil, CA-Sul serves as the primary training and evaluation center for all Brazilian armored formations. Unlike the U.S., where training centers are distributed across different regions and can certify different brigade combat team (BCT) formations, Brazil consolidates armored unit evaluations at CA-Sul. Brazil also has other regional training and evaluation areas in the north and east, but these

are primarily used for infantry, air assault, and light mechanized units. Any armored unit, regardless of where it is stationed, must undergo final evaluations at CA-Sul before being considered fully operationally certified. An exercise in Brazil between the U.S. Army and the Brazilian Army using a U.S. tank platoon would be the first time and would demonstrate the value of interoperability. An exercise of this type would provide valuable lessons in combined arms maneuver warfare; however, several challenges must be addressed.

One challenge would be infrastructure. The infrastructure required to support heavy mechanized units varies significantly between the two nations. Unlike the United States where roads, bridges, and rail systems can accommodate Abrams tanks and Bradley Fighting Vehicles, Brazil's road networks and transport capabilities are optimized for lighter mechanized units. Transporting U.S. armored assets to training locations would require extensive logistical planning. Another challenge is logistical sustainment. Sustaining a U.S. tank platoon in Brazil presents a unique set of logistical hurdles such as fuel and ammunition resupply because while Brazil's Leopards can operate on multiple fuel types, U.S. tanks and Bradleys would require JP-8 or diesel in large quantities. Regarding vehicle maintenance, spare parts, and specialized repair facilities may not be readily available, requiring the deployment of additional maintenance teams and equipment. As for resupply chains, U.S. supply chains are accustomed to operating in environments with well-established logistics hubs, whereas Brazil's armored units rely on regional supply depots that may not align with U.S. Army sustainment models. Additionally, a challenge that exists is overcoming language barriers to create interoperability. Although many Brazilian military personnel speak English, Portuguese is the primary language of instruction and communication. This could create challenges in coordinating operations, issuing orders, and conducting after-action reviews. While interpreters could mitigate some of these difficulties, the efficiency of training exercises could be affected by communication barriers. A U.S. Army and Brazilian

armored training exchange at NTC or CA-Sul would offer significant benefits that would foster tactical interoperability, promote cross-training opportunities, and enhance bilateral defense and security cooperation objectives. Infrastructure constraints, logistical considerations, and language barriers must be carefully managed to ensure a successful and productive training rotation. For example, communication barriers can be overcome with coordinated and deliberate integration with U.S. Army Foreign Area Officers (FAOs), MPEPs, and 1SFAB advisors. Despite these challenges, such an exchange would enhance combined arms maneuver capabilities and interoperability.

Conclusion

In all iterations of SV/CORE to date, Brazilian Army units have been paired with a unit from a U.S. Army IBCT company. As SV/CORE exercises mature, there is a possibility of the introduction of Brazilian Army Armor and Cavalry formations to join a U.S. Army SBCT or ABCT in a CTC rotation at the NTC in Fort Irwin, California. Additionally, the possibility of a U.S. tank platoon training with a Brazilian armored formation is within the realm of possibilities. The purpose of SV/CORE is "to enhance interoperability at the tactical level with operational and strategic significance" ensuring integrated deterrence.[16] The participation of U.S. and Brazilian armored formations working together at the NTC or CA-SUL is the definition of integrated deterrence that ensures stability in the Western Hemisphere and makes America safer, stronger, and more prosperous.

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WHINSEC Maneuver Captain's Career Course, and the Infantry Basic Officer Leader's Course, and has completed Airborne, Air Assault, Ranger, Pathfinder, and Combat Advisor training. He holds a bachelor of science from the U.S. Military Academy, and master's degrees from Liberty University, Teachers College (Columbia University), and Columbus State University. MAJ Moyeno's awards include the Meritorious Service Medal, Expert Infantryman Badge, Basic Army Instructor Badge, Order of St. Maurice, and Noble Patron of Armor.

Master Sergeant Jaime Cantu is a 19C Bradley Crewmember currently serving as a Military Personnel Exchange Program (MPEP) Instructor at the Brazilian Army Armor School (CIBLD), Santa Maria. His operational experience includes Platoon Sergeant with 2-13 CAV in South Korea, Senior Scout with 6-1 CAV completing rotations at NTC and JRTC, a Security Forces Assistance Team (SFAT) deployment to Jordan training Jordanian Armed Forces, and a deployment to Afghanistan with 3-66 AR conducting patrols and raids. MSG Cantu also served as a U.S. Army Recruiter and held key staff positions as an Assistant S3 NCOIC and acting First Sergeant in 2-13 CAV. His military education includes the Master Leaders Course, Common Faculty Development Instructor Course, Senior Leaders Course, and multiple other leadership and specialized courses. MSG Cantu is pursuing a bachelor's degree in organizational leadership from the University of Charleston, West Virginia, and is recognized with two Meritorious Service Medals, two Army Commendation Medals, the Combat Action Badge, and the Bronze Order of St. George, among other awards and badges.

Notes

1 CALL; U.S. Army South Exercise SOUTHERN VANGUARD 22 Integrated Deterrence in the Western Hemisphere; No. 22-716, August 2022 https://api.army.mil/e2/c/downloads/2023/01/31/513386df/22-716-southern-vanguard-22-public.pdf

2 Ibid.

3 Association of the United States Army (AUSA); Profile of the U.S. Army 2024 https://www.ausa.org/publications/profile-united-states-army-2024

4 Defense Security Cooperation Agency (DSCA); Security Cooperation Overview and Relationships https://samm.dsca.mil/chapter/chapter-1#C1.1.

5 Association of the United States Army (AUSA); Profile of the U.S. Army 2022 https://www.ausa.org/sites/default/files/Profile-of-the-United-States-Army-2022.pdf

6 Ibid.

7 Brazilian Army Armor and Cavalry Capabilities Brief

8 Ibid.

9 Ibid.

10 AUSA; Profile of the U.S. Army 2024 https://www.ausa.org/sites/default/files/AUSA-Army-Profile-2024.pdf

11 Brazilian Army Armor and Cavalry Force Capabilities Brief, 2023.

12 Ibid.

13 Ibid.

14 Ibid.

15 Ibid.

16 Ibid.

17 Maj. Jessica Rovero, "U.S. Army M1A2 tanks train in Australia alongside partner nations for the first time," U.S. Army Pacific, Aug. 1, 2023, https://www.usarpac.army.mil/Our-Story/Our-News/Article-Display/Article/3479360/us-army-m1a2-tanks-train-in-australia-alongside-partner-nations-for-the-first-t/

18 CALL; U.S. Army South Exercise SOUTHERN VANGUARD 22 Integrated Deterrence in the Western Hemisphere; No. 22-716, August 2022 https://api.army.mil/e2/c/downloads/2023/01/31/513386df/22-716-southern-vanguard-22-public.pdf

Support Operations in an ABCT

Maintenance and Mobility with the Hercules and LET

by MAJ John Paulson

Armored brigade combat teams require constant heavy lift support for sustainment and recovery operations. The division sustainment brigade's heavy and medium truck companies are designed to support the movement of 96 tracked vehicles in one series for onward movement in or out of theater. The Support Operations Office must prioritize the truck companies' support for two to three brigades, their deployments, and maintenance requirements. Heavy and medium truck companies cannot support smaller ad hoc missions at the battalion level. Commercial line haul (CLH) assets are contracted for smaller movements to support movement needs. These contracts can be costly and require two to four weeks of planning, depending on the distance, road system, and payload.

At the brigade level, the forward support company and headquarters and headquarters company in each battalion have organic assets that, if trained and planned properly, readily address support requirements within the brigade while easing the burden on division assets. In 4-10 CAV, 3rd ABCT, 4 ID, the Cavalry Squadron realized lessons learned during its training cycle and rotation to Poland in support of Operation European Assure, Deter and Reinforce 2024. Utilizing its organic M88A3s and Light Equipment

Transporter (LET), the squadron completed two unique mission sets moving containerized equipment and tracked vehicles without external support.

Maintenance planning estimates must retain options and address shortfalls.[1] During the squadron's 24-02 training rotation at the National Training Center (NTC), the squadron was spread across all three corridors simultaneously. The squadron identified risk in its operations outpacing its sustainment plan, with three of six M88A3s non-mission capable. The Iron Brigade coordinated fourteen Heavy Equipment Transporter (HET) collection points to keep squadron recovery assets forward while using brigade-resourced HETs for larger movements.

With several light track deadlines, the squadron still faced a resource shortfall in moving the light track fleet from the point of recovery to the unit maintenance collection point. Given the tow capacity and gross weight of the M984, the squadron prioritized wheeled Wrecker support to recover M113 and M1068 variants. This enabled priority of M88A3 support to the M1A2 and M2A3 fleets. A heavy reliance on the M88A3 continued through NTC and into the United States

Figure 1. A U.S. Army Light Equipment Transport Vehicle assigned to 1st Battalion, 64th Armor Regiment, 3rd Infantry Division, pulls a D7R Dozer during Marne Focus at Fort Stewart, Georgia, April 7, 2024. *(U.S. Army photo by PFC Santiago Lepper)*
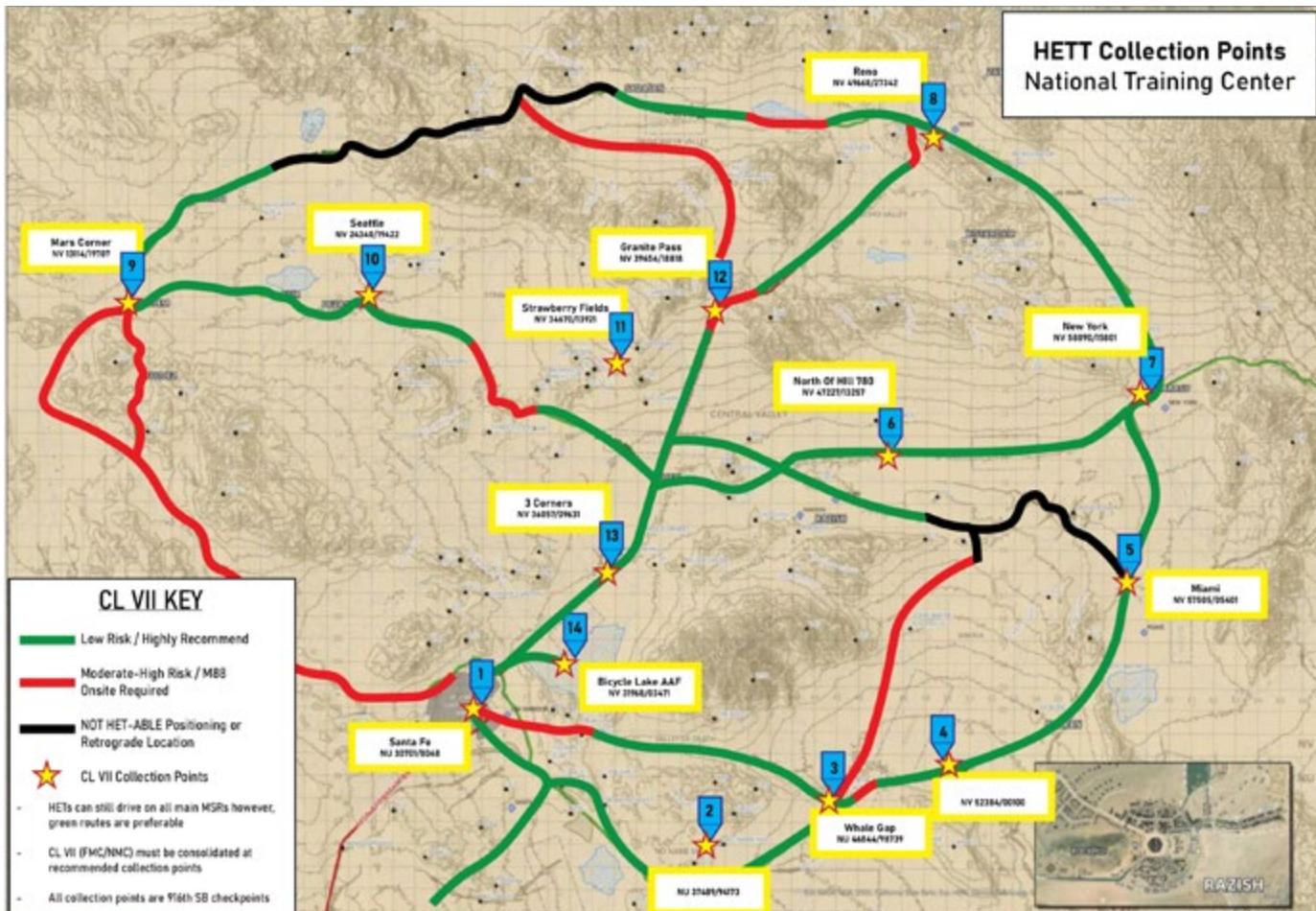
Figure 2: Recovery Concept for NTC 24-02 *(U.S. Army graphic)*

European Command (USEUCOM) deployment.

In March 2024, 4-10 CAV deployed to Logistics Support Area (LSA) South, Poland, with a concrete slab motorpool near the Mielno Range Complex. This motorpool did not provide any overhead cover or lift, and the squadron relied on organic lift assets between forward repair systems (FRS), M88A3s, and its Heavy Expanded Mobility Tactical Trucks (HEMTT) with a crane for light tracks and decks. While this left a major reliance on the M88A3 for services and unscheduled repairs, the maintainers received training opportunities to improve their competency in using platform-based hoists. In a unique case, the squadron received a short-notice task to support containerized equipment loading onto LETs. The problem set entailed four fully loaded 20-foot containers near LSA South set for transport the next day. Due to the distance and maintenance issues, a 30k forklift was not feasible to complete the task. The container weights

exceeded the 23,283 lbs. limit for the Enhanced Container Handling Unit (E-CHU), but were well within the M88A3's 64,000lbs 'pick and carry' capacity (Figure 3).

The squadron completed the mission with zero deficiencies through its H9, H8, and hazardous materials (HAZMAT) certified support and recovery team and 88Ms. Proper knowledge of rigging and pre-equipment inspections ensured a safe and controlled mission for personnel and equipment.[2]

During redeployment from USEUCOM, 4-10 CAV controlled the port node in Bremerhaven, Germany, from October to January. Maintenance was vital to support the fleet, given the unique redeployment schedule over five vessels and the freezing weather. Port authorities denied 'heavy maintenance' or repairs involving petroleum, lubricants, and oil. The squadron procured a maintenance pad at LSA Garlstedt with the assistance of the German Army, 21st Theater Sustainment Command (21

TSC), and 1 CD. The Port of Bremerhaven is 37 minutes or 24 miles from LSA Garlstedt on city roads and the autobahn. During initial planning, 21 TSC sourced CLH trucks to move eight tracked vehicles. This planning required weeks to coordinate with German transportation authorities to confirm routes and deconflict local construction and traffic. Over the four months at port, more tracked vehicles required evacuation to LSA Garlstedt for heavy maintenance. The squadron could not predict or aggregate all movement requests to synchronize the movement and maintenance plans. The staff and Master Driver found a practical solution to reduce cost and time through the brigade's organic LETs.

An additional six light tracks required transportation to LSA Garlstedt for heavy maintenance. Using brigade organic capabilities reduced financial and timing demands on the unit. The staff coordinated monthly March Credits through 21 TSC for an approved

Figure 3: M88A3 loading a container onto a trailer. Note the safety guide cables on the lower corners. *(Photo by author)*

Figure 4: A 91H chains an M1068 to a LET. *(Photo by author)*

window for the LET to move vehicles to and from the port. Using organic equipment over CLH provided more control over planned maintenance as well as a cost savings. The squadron used M88A3s to lift and load light tracks onto the LETs, further reducing demands on external assets. Boasting M88A3's usefulness even more, mechanics sustained the LET movements through M88A3's fuel transfer tools.

When planning maintenance and movements, it is vital to understand the logistical enterprise. Understanding your unit's capabilities and competencies, the environment, and echelons above brigade will identify limitations early on. Armored brigade combat teams must accurately address planning estimates to implement a sustainment plan anticipating resource shortfall. Staff, forward support companies, and the brigade support battalion must create a flexible plan to offer the commander options and ensure mission success. From the lessons learned over the past two years, mechanics and sustainers must be properly trained on their equipment. Building monthly and quarterly training plans focused on advanced operator training will build trust and competency in organic capabilities. Emphasizing a Master Driver program that challenges and trains operators to meet the demands of future missions will enhance a unit's effectiveness.

Major John Paulson is an Armor Officer currently serving as an ATGM Threat Analyst for the Defense Intelligence Agency/Missile and Space Intelligence Center (MSIC) at Redstone Arsenal, Alabama. MAJ Paulson's key operational and command assignments include serving as the Squadron Executive Officer for 4th Battalion, 10th Cavalry Regiment, 3rd Armored Brigade Combat Team (ABCT), 4th Infantry Division at Fort Carson, Colorado. MAJ Paulson commanded both the Headquarters and Headquarters Company (HHC) and Bravo Company of the 1st Battalion, 35th Armored Regiment, 2nd ABCT, 1st Armored Division at Fort Bliss, Texas. He is a graduate of the Command and General Staff College (CGSC) and all levels of professional military education for Armor Officers. MAJ Paulson earned a bachelor's of science in mechanical engineering from the United States Military Academy and a master's of science in mechanical engineering from Purdue University.

Notes

1 Department of the Army. (01 Aril 2025). Ground Equipment Battle Damage Assessment, Repair, and Recovery (ATP 4-31). https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN43423-ATP_4-31-000-WEB-1.pdf.

2 Ibid.

Historical Armor Losses: Shifting Tactics and Strategic Paralysis

by Bryan Powers

For almost three years the Ukraine War has raged across the eastern and southern oblasts of the country as the Russian Federation continues its invasion. The invasion by Russian Federations Armed Forces (RFAF) began by assaulting Ukraine along five major axes with strikes at major city centers, including the capital in Kyiv.[1] However, when the invasion stalled by the end of Spring 2022, RFAF had to transition from large-scale combat operations (LSCO) involving divisions and brigades to company and below assault forces predominantly in eastern and southern Ukraine, fully withdrawing from its northern axis along the Kyiv, Chernihiv, and Sumy oblasts. Simply put the Russian forces had failed to accurately assess the level of resistance, public support of Ukrainian resistance, and the strength of the Ukrainian Armed Forces (UAF) in relation not only to their own forces, but a more capable force than the army Russia had fought in the first Donbas War in 2013 through 2014.[2]

Today the RFAF continues to use small scale rifle actions between dismounted infantry forces assaulting adversarial fighting positions.[3] Despite this reality, the forward line of own troops (FLOT) is anything but static as UAF and RFAF trade fighting positions weekly, if not daily, with Russia being primarily on the offensive.[4,5] The exception being the UAFs incursion into Kursk which began in August 2024 and has seen the UAF transition primarily to the defensive as the RFAF have retaken more than half of the territory that was originally seized.[6-8] This is in addition to North Korea deploying thousands of its soldiers to the Kursk region and fighting alongside the RFAF.[9]

Russia's transition to smaller, predominantly dismounted infantry offensive actions, was a result of many factors in the Ukraine conflict. Perhaps the largest factor is the inundation of both commercial off the shelf (COTS) and military-grade unmanned aerial systems (UAS) across the battlefield utilized down to the squad and fire team levels of both RFAF and UAF. The obvious benefits of these UAS are the ability to provide both intelligence, surveillance, and reconnaissance (ISR) and kinetic strike weapons down to the lowest level. More importantly however is that these UAS have removed the ability of either Ukraine or Russia to effectively mass forces near the FLOT to plan and execute battalion and above offensive operations, accounting to 60-80% of all combat casualties in the Ukraine conflict in 2025.[10-14]

A critical factor of Russia's inability to mass, specifically the ability to mass armored formations, is its critical main battle tank (MBT) and armored fighting vehicle (AFV) losses in the conflict. As of 1 June 2025, Russia is said to have lost 4,030 MBTs and 8,833 AFVs, based upon the credible open-source database tracker Oryx which monitors and analyzes damaged and destroyed combat vehicles in conflict.[15] According to the International Institute for Strategic Studies' (IISS) 2021 Military Balance, Russian ground forces (or SV) had between 2,800 and 3,330 operational tanks at the start of the full-scale invasion, which would mean that Russia has suffered between 121-143% losses of its operational tank force.[16] The same report claimed Russia had between 13,000 and 14,000 AFVs at the start of the war, which would account for between 63-67% of its pre-war inventory. These losses account for the largest armored vehicle losses that Russia has suffered since World War II, and a higher total number of losses than compared to all armored vehicles losses incurred in conflicts from 1946-2022, in which Russia, or its predecessor the Soviet Union participated.

Ukrainian Math = Army Math

It is worth noting that the Ukrainian General Staff has repeatedly reported a significantly higher number of Russian armored vehicles losses than what is usually cited by national defense ministries or independent think tanks.[53,54] There are certainly some political and informational operation aspects that play into the General Staff's considerations. Analysis should consider that a fraction, albeit an unknown quantity, of the vehicles the General

Historic Russian Tank Losses									
Losses	Conflict Years								
	1945 – 1979*	Soviet Union Afghanistan War 1979 – 1989	Russia – Moldova War 1992	First Chechen War 1994–1996	Second Chechen War 1999–2000	Russo–Georgia War 2008	Donbas War 2013–2022**	Combined Casualties 1945–2022	Ukraine War 2022 – Current
MBT	*100	340	6	192	23	4	*100	~765	4,030
AFV	*100	655	4	503	201	30	*100	~1,593	8,883

*The Soviet Union supported partners in several conflicts outside of Europe from 1945–1979,[17] including support to allies in the First Indochina War 1946-1954,[18-20] Korean War 1950-1953,[21-23] Vietnam 1955-1975,[24,25] Israeli– Egypt 1969-1970,[26,27] Angolan Civil War 1975-1991,[28] and the Ethio-Somali War 1978–1979.[29] During these conflicts, the Soviet Union was not a primary combatant and as a result combat losses are not attributed to the Soviet Union despite the fact in most cases it provided lethal aid in the form of financial assistance, small arms, combat advisors, and armored equipment such as MBTs, AFVs, armored cars, trucks, and both fixed and rotary wing aircraft.

*However, during the same period, the Soviet Union was a direct combatant in several Eastern European uprisings, and external conflicts such as the East German uprising in 1953,[30,31] the Hungarian Revolution 1956,[32-34] Vlora Incident in Albania 1961,[35,36] the invasion of Czechoslovakia 1968,[37,38] and the Sino–Soviet border conflict 1969. [39-42] While accounts vary significantly in these conflicts, the Soviet Union's combat casualties were relatively insignificant. A summation is provided for these conflicts.

**Donbas War (First War in Ukraine) 2014–2022 (Pre-2022 invasion) – There is little doubt amid a mountain of evidence concerning Russia's involvement in the first Ukraine war from 2013-2022. However, determining Russian losses in the first invasion both in personnel, and in lost armored vehicles proves to be challenging. Conservative estimates place Russian armored vehicles losses somewhere between 200 and 500.[43,44] However, it should be noted that many, but not all the armored vehicles lost during this period by Russian forces, or its Russian–led Separatist forces (RLSF) were vehicle seized by separatists and repurposed.[45-47] Russia did employ several modernized tanks, such as the T-90A and T-72B3, as cited by research conducted by the Bellingcat group in 2016.[48-52] A conservative summation is provided for this conflict.

Figure 1. Table provides an estimate of Soviet/Russian main battle tanks and armored fighting vehicles that have been destroyed since the end of World War II indicating a substantial increase in losses during the War in Ukraine.

Staff records are likely only damaged and either self-evacuate from the field or are extracted by Russian forces themselves to be repaired and fight again. This could account for dozens, if not, hundreds of armored vehicles which are counted as "lost" or destroyed and are in fact double counted.[55] This explanation is plausible considering Russia is well known for its subordinate repair-refit battalions and defense factories, including its tank repair factories, or *BroneTankovyy Remontny Zavod* (BTRZ), that are established during combat operations for the reconstitution of combat capability.[56,57]

Why Are Russian Armor Forces Suffering?

Despite these significant losses, and the questions remaining of Russia's capability to reconstitute it's forces amid the ongoing conflict, there is little doubt that the Kremlin will continue to push forward regardless of their personnel and armored vehicle casualties. The de-evolution of tactics undertaken by the SV troops serving in Ukraine has seen Russia deploy its armor forces in near suicidal front assaults. These armored vehicle assaults are often as small as two lone vehicles or up to company sized assaults, featuring MBTs and AFVs with anti-drone or "cope cages", ad-hoc armor and metal slapped onto the sides or top of the vehicle to protect against first person view (FPV) drone attacks and drone dropped munitions. Although these tactics more closely resemble what one would expect of a Mad Max movie, the tactics are nothing new as Russia utilized similar tactics in its wars in Chechnya, as did the Islamic State of Iraq and Syria (ISIS), with some Russian forces even using the armored vehicles as modified vehicle-borne improvised explosive devices (VBIEDs).[58]

Noticeably absent almost from the start of the invasion from Russian armored vehicles assaults are coordinated movements indicating trained vehicle crews and unit formations.[61,62] Instead, these assaults rely heavily on advancing as quickly as possible in column formations and almost always in front assaults on Ukrainian positions.[63] Once forces are engaged, and armored vehicles begin to be targeted chaos ensues as vehicle drivers have, in more than purely anecdotal incidents, driven over their own dismounted infantry forces, to withdraw from the battlefield.[64] One could argue that there is logic in such tactics, with the battlefield being inundated with attack drones and anti-tank guided missile systems; especially if the Russians used it as a diversionary attack with older model Soviet armored vehicles, while keeping modernized systems such as T-90M, T-72B3M or T-80BVM MBTs in reserve.[65] However, in the Ukraine conflict Russian forces are as likely to use a 1960s era vehicle in the same suicidal attacks as they are a vehicle produced the previous month.[66]

Ukraine is not immune to some of

these same failed tactics as demonstrated during the summer 2023 counteroffensive, where Ukrainian armored columns became mired in Russian minefields.[67] Unfortunately, the 2023 counteroffensive failed to present Ukraine with an operational breakthrough and came at great cost to both personnel and much of its armaments of Western supplied vehicles.[68] Despite the obvious futility of such tactics, surmounting losses amid a war of attrition, one most also judge the fact that Russia is not risk adverse to high casualties. So, in terms of personnel the Kremlin will almost certainly continue to push forward with mobilization, contract personnel, and prisoners, but can the defense industry meet the needs of the Army?

Draining Strategic Reserves and Shades of Revitalization of Defense Industry

Given that the Ukraine conflict is predominantly a large-scale combat operation based on ground forces supported by air, naval, and strategic rocket forces, estimation of ground force capabilities are often reserved the highest analysis. The Russian Ministry of Defense and Kremlin officials have claimed since 2023, that the defense industry is capable of building more than 1,500 MBTs annually, with Russia's former President and current deputy chairman of the Security Council of Russia, Dmitry Medvedev, claiming the vast majority of these tanks are T-90Ms.[69,70] Despite the high number of vehicle losses, Russia maintains one of, if not the largest stockpiles of strategic reserve in the world with anywhere between 3,000 and 4,000 MBTs and more than 7,000 AFVs and personnel carriers.[71] The strategic depots are under the control of Russia's Main Automotive-Armored Directorate of the Ministry of Defense, or *Glavnoye Avtobronetankovoye Upravleniye MO RF* (GAB-TU).

Throughout the conflict, intelligence assessments released by defense think tanks, and NATO public releases have cautioned on Russia's strategic reserve and defense industry capabilities.[72-75] Ironically, many of the most accurate assessments of Russia's capability to

Figure 2. Russian MODs Zvezda Television Channel showcasing Russia' Center Grouping of Forces utilizing rebar spiked turrets in tanks referred to as "HedgeHogs", 30 May 2025.[59]

withdraw from strategic depots have come from and often cited for in-depth but independent users on social media and other outlets using commercial imagery and open-source research. In 2024, special attention was given to open-source researchers Covert Cabal, @HighMarsed, @Jonpy99, and Vishun (Military Prophet) and the release of dozens of social media threads, open-source assessments, and videos which detailed the depletion of Russia strategic reserves.[76]

Conservative estimates made by the culmination of these assessments, both think tanks and open-source researchers, put Russia's strategic reach through 2025, and likely culminating sometime in 2026.[77,78] Additionally, the output from Russia's defense industry is reliant almost entirely on the refurbishment of Soviet-era MBTs and AFVs, including archaic T-55/54 MBTs, BMP-1 IFVs, BTR-Ms, and BTR-60/70 series APCs.[79,80] That's not to say that Russia is not capable of producing new production vehicles such as the BMD-4 and BMP-3 IFV, and T-90M MBTs; however, estimates place production levels for new hull production at only a few hundred of each vehicle system with the more modernized production still reliant on modernization of Soviet-era systems into T-72B3 and T-80BVMs.[81,82]

Historically, tank counting is one of the most challenging aspects of modern warfare, with roots to the second World War when the Western Allies attempted to better understand the output of Nazi Germany's tank factories, specifically for the Panther (Panzerkampfwagen V) and Tiger (Panzerkampfwagen VI) model tanks. The Western Allies ingeniously created a mathematical equation which examined the tanks captured and studied the serial numbers of parts to determine the number of factories and possible outputs. The challenge would become known as the "German Tank Problem".[83-85] Russia has likely increased production rates at several of its primary tank and armored vehicle factories such as Omsk, Nizhny Tagil, Kurgan, and Arzamas.[86-89] Despite economic sanctions placed on Russia by mostly Western nations, it has not prevented Russia's defense industry from mobilization to at least partially meet the demands of the current conflict.

Assessments, however, should shy away from comparing the defense industry's mobilization to that of the Soviet Red Army of World War II. Simply put the Red Army had the benefit of additional personnel manning, labor forces, and most importantly factories which today are local in sovereign Ukraine, such as the Kyiv and Kharkiv tank factories, or the 140th repair plant in Belarus, among others.[90,91] Russia has re-opened and increased its

DJI FPV(First Person Video) Racing Drone.
Configured to deliver anti-armor shaped charges

DJI FFV uses first person video links for precise targeting of moving objects, also uses GPS, GLONASS and GALILEO guidance systems to navigate to static targets.

Flight duration 20 minutes @ 40 Kph

The DJI FPV can accelerate From 0-100 kph in two seconds. It has a max speed of 140 kph.

VR headset for 1st person flight control

Flight controller

4K Camera specs: 3840×2160 at 50/60 fps FHD: 1920×1080 at 50/60/100/120fps

A variety of weapons payload can be used, including the projectiles of RPG anti-armor weapons.

Piezoelectric Impact fuse.

RPG warhead can penetrate more than 500 mm of rolled homogenous armor.

RPG warhead, drone and soldier to approximate scale.

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Figure 3. Mockup diagram of one version of FPV drones utilized by Ukrainian forces in late December 2023.[60]

refurbishment and modernization rates at several of its own repair plants including the 61st BTRZ in Saint Petersburg, the 81st BTRZ in Armavir, 103rd BTRZ in Chita, 144th BTRZ in Yekaterinburg, 60th BTRZ in Vozzhaevka.[92-96] Like the German tank problem the use of the BTRZs to refurbish multiple variants of vehicles, both MBTs and AFVs presents analysts with a difficult challenge in attempting to understand output potential as the vehicles arrival to the battlefield could come from multiple facilities. As a result, without the ability to exploit captured or abandoned vehicles, Western and Ukrainian analysts must rely heavily on persistent intelligence collection on individual factories.

Why Accuracy Matters

Along with its internal defense industry, Russia continues to benefit from economic partners in nations such as Kazakhstan and China which have seemingly ignored sanctions with critical parts and funding to its defense

industrial base.[98] However, not all is perfect in Russia's defense industry. Russian pundits have begun to call into question the sustainability of the conflict given increasing labor shortages and record high inflation, which has plagued many facets of not only the defense industry but the average daily life of Russian citizens.[99,100] The work force across the nation, especially that of the defense industry has only gotten "older" in age as young able-bodied men are sent to Ukraine to fight, leaving their fathers and grandfathers behind to build their systems of war and the ammunition to support ongoing operations.[101,102] This too is affecting deployed soldiers as the economic issues have forced pensioners, disabled persons, and ill citizens to serve in combat roles.[103,104] Russian ground forces in Ukraine have continued its offensive actions but are in many ways losing its armored teeth relying on light armored vehicles, personally owned vehicles, all-terrain vehicles, etc, which offer little in protection, speed, or firepower.[105]

While the war in Ukraine continues to rage, accurate intelligence assessments will be key, especially when presented to major political players in the West. The assessments which underestimated the UAF in 2022 are just as dangerous as overestimation of Russian capabilities today. The factors which will lead to future assessments must examine all aspects of Russia's defense industry, political and public will, and combat casualty rates, and must be free of Western intent to influence political narratives. History has proven that estimation of adversarial capability and allied combat power is not always the strong suit of Western or U.S. intelligence. From GEN George B. McClellan's overestimation of the size of the Army of Northern Virginia in the American Civil War, to France overestimating the size and intent of the invading Wehrmacht forces in 1940, the belief the Afghanistan National Security Forces would hold its resistance to the Taliban in 2020, or that the UAF would collapse in three days in 2022, overestimating the

correlation of forces of one's adversary and underestimating the capability or failures of allies burdens battlefield commanders with command paralysis and forces policy makers to make strategic and long lasting decisions that could affect generations.[106-110]

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Notes

1 Nolan Peterson. Russian Troops Enter Belarus, Escalating Threat of Kyiv Encirclement. 17 January 2022. Coffee or Die magazine, https://coffeeordie.com/russian-troops-belarus; accessed 2 January 2025.

2 Neveen Shaaban Abdalla, Philip H.J. Davies, Kristian Gustafson, Dan Lomas, and Steven Wagner. Intelligence and the War in Ukraine, Part 2. War on the Rocks, 19 May 2022.

3 Constant Meheut. Ukraine's Donbas Strategy: Retreat Slowly and Maximize Russia's Losses. The New York Times. 5 October 2024, https://www.nytimes.com/2024/10/05/world/europe/ukraine-donbas-strategy-russia-war.html; accessed 11 January 2025.

4 Associated Press. Russia's Push On Eastern Front Prompts Ukraine Civilian Evacuation. 10 August 2023. Coffee or Die magazine, https://coffeeordie.com/russia-push-ukraine-evacuation, accessed 2 January 2025.

5 Frontelligence Insight. Overview of the Operational and Tactical Situation in Ukraine: From Kharkiv to Zaprozhzhia. 10 December 2024. https://frontelligence.substack.com/p/overview-of-the-operational-and-tactical; accessed 11 January 2025.

6 International Crisis Group. Ukraine War Map: Tracking the Frontlines, https://www.crisisgroup.org/content/ukraine-war-map-tracking-frontlines; accessed 11 January 2025.

7 Olena Mukhina. Ukraine exploits Russian troop rotation to launch assaults across Kursk front, says military expert, 5 January 2025. EuroMaidan Press.

8 Adam Givens and Gian Gentile. Ukraine, Kursk, and the Importance of Lines of Operation in History. 6 September 2024. RAND Corporation.

9 Dr. Choi Yonghwan. The Meaning and Significance of North Korean Troops' Deployment to Russia. 4 December 2024. Royal United Services Institute for Defence and Security Studies, https://rusi.org/explore-our-research/publications/commentary/meaning-and-significance-north-korean-troops-deployment-russia; accessed 11 January 2025.

10 Dr Jack Watling and Nick Reynolds. Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive. 4 September 2023. Royal United Services Institute for Defence and Security Studies, https://www.rusi.org/explore-our-research/publications/special-resources/stormbreak-fighting-through-russian-defences-ukraines-2023-offensive, accessed 3 January 2025.

11 Michael Kofman. The Return of Global Russia: Assessing Russian Military Adaptions in 2023. Carnegie Endowment for International Peace. October 2024.

12 David Hambling, Forbes Magazine, February 2025. New RUSI Report: Drones Now Inflicting Two Thirds Of Russian Losses; https://www.forbes.com/sites/davidhambling/2025/02/18/new-report-drones-now-destroying-two-thirds-of-russian-targets/; accessed 4 June 2025.

13 Dr. Jack Watling Nick Reynolds. February 2025. Tactical Developments During the Third Year of the Russo–Ukrainian War; https://www.rusi.org/explore-our-research/publications/special-resources/tactical-developments-during-third-year-russo-ukrainian-war; Royal United Services Institute for Defence and Security Studies, accessed 4 June 2025.

14 Steve Brown. 28 March 2025. ANALYSIS: Casualty Figures Reveal Game-Changing Impact of Drones on Ukrainian Battlefield, Kyiv Post, https://www.kyivpost.com/analysis/49712; accessed 4 June 2025.

15 Jakub Janovsky, Naalsio, Aloha, Dan, Kemal, and Alexander Black. Attack On Europe: Documenting Russian Equipment Losses During The Russian Invasion Of Ukraine, Oryx, https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-equipment.html, accessed 1 June 2025.

16 The International Institute for Strategic Studies (IISS), The Military Balance 2021, February 2021, Chapter 5, pages 192-193, https://www.iiss.org/publications/the-military-balance/the-military-balance-2021/; accessed 29 December 2024.

17 Wikipedia. List of wars involving Russia; https://en.wikipedia.org/wiki/List_of_wars_involving_Russia; accessed 31 December 2024.

18 Office of the Chairman of the Joint Chiefs of Staff. History of the Joint Chiefs of Staff. The Joint Chiefs of Staff and the First Indochina War, 1947-1954. 2004.

19 Alpha History. Chinese and Soviet Involvement in Vietnam. https://alphahistory.com/vietnamwar/chinese-and-soviet-involvement/; accessed 31 December 2024.

20 Wikipedia. First Indochina War. https://en.wikipedia.org/wiki/First_Indochina_War; accessed 31 December 2024.

21 Kathryn Weathersby. The Korean War: A Crucial Turning Point in the Cold War. The Wilson Center. https://digitalarchive.wilsoncenter.org/essays/korean-war-crucial-turning-point-cold-war; accessed 31 December 2024.

22 Wikipedia. Soviet Union in the Korean War. https://en.wikipedia.org/wiki/Soviet_Union_in_the_Korean_War#:~:text=Though%20not%20officially%20a%20belligerent,B%2D29s%2C%20Korea%201951; accessed 31 December 2024.

23 Charles Kraus. Preparing for War: Soviet-North Korean Relations, 1947-1950. The Wilson Center. https://www.wilsoncenter.org/blog-post/preparing-war-soviet-north-korean-relations-1947-1950; accessed 31 December 2024.

24 Central Intelligence Agency (CIA). Status of Soviet and Chinese Military Aid to North Vietnam. September 1965. https://www.cia.gov/readingroom/docs/DOC_0000652931.pdf; accessed 31 December 2024.

25 Wikipedia. International participation in the Vietnam War. https://en.wikipedia.org/wiki/International_participation_in_the_Vietnam_War#:~:text=From%20July%201965%20to%20the,save%20South%20Vietnam%20from%20collapse; accessed 31 December 2024.

26 Wikipedia. War of Attrition. https://en.wikipedia.org/wiki/War_of_Attrition; accessed 31 December 2024.

27 Isabella Ginor and Gideon Remez. The Soviet-Israeli War, 1967-1973: The USSRs Military Intervention in the Egyptian-Israel Conflict. Journal of Powers Institutions in Post-Soviet Societies. 2017. Hurst and

Company, UK.

28 Jeremy Bervoets. The Soviet Union in Angola: Soviet and African Perspectives on the Failed Socialist Transformation. Geohistory, https://geohistory.today/soviet-union-angola-history/; accessed 31 December 2024.

29 Sam Wilkins. Buried in the Sands of the Ogaden: Lessons from an Obscure Cold War Flashpoint in Africa. War on the Rocks, https://warontherocks.com/2019/09/buried-in-the-sands-of-the-ogaden-lessons-from-an-obscure-cold-war-flashpoint-in-africa/; accessed 31 December 2024.

30 Christian Ostermann. East German Uprising. Wilson Center, https://digitalarchive.wilsoncenter.org/essays/east-german-uprising; accessed 31 December 2024.

31 Wikipedia. East German Uprising of 1953, https://en.wikipedia.org/wiki/East_German_uprising_of_1953; accessed 31 December 2024.

32 Matt Fratus. The 1956 Hungarian Revolution and the Russian Tanks That Crushed It. 20 January 2022. Coffee or Die Magazine, https://coffeeordie.com/hungarian-revolution; accessed 2 January 2025.

33 Nicholas Smith. The Beast of Budapest. 19 July 2018. HistoryNet, https://www.historynet.com/the-beast-of-budapest; accessed 2 January 2025.

34 Central Intelligence Agency (CIA). Analysis of the Hungarian Revolt. 17 January 1957. https://www.cia.gov/readingroom/docs/DOC_0001302853.pdf; accessed 2 January 2025.

35 Ana Lalaj, Christian F. Ostermann, and Ryan Gage. Albania is not Cuba." Sino-Albanian Summits and the Sino-Soviet Split. Cold War International History Project Bulletin, Issue 16. The Wilson Center, https://www.wilsoncenter.org/sites/default/files/media/documents/publication/CWIHPBulletin16_p3.pdf; accessed 2 January 2025.

36 Wikipedia. Expulsion of Soviets from Albania, https://en.wikipedia.org/wiki/Expulsion_of_Soviets_from_Albania; accessed 2 January 2025.

37 Matt Fratus. Russia's Invasion To Crush 'Prague Spring' Mirrors Ukraine Buildup. 19 January 2022. Coffee or Die Magazine. https://coffeeordie.com/prague-spring; accessed 2 January 2025.

38 Wikipedia. Battle for Czechoslovak Radio. https://en.wikipedia.org/wiki/Battle_for_Czechoslovak_Radio; accessed 2 January 2025.

39 Wikipedia. Sino-Soviet conflict. https://en.wikipedia.org/wiki/

Sino-Soviet_border_conflict; accessed 31 December 2024.

40 Miles Maochun Yu. The 1969 Sino-Soviet Border Conflicts As A Key Turning Point Of The Cold War. The Hoover Institution. https://www.hoover.org/research/1969-sino-soviet-border-conflicts-key-turning-point-cold-war; accessed 31 December 2024.

41 Michael S. Gerson. The Sino-Soviet Border Conflict. Deterrence, Escalation, and the Threat of the Nuclear War in 1969. November 2010. Center for Naval Analysis.

42 William Burr. The Sino-Soviet Border Conflict, 1969. U.S. Diplomatic Reactions and Diplomatic Maneuvers. The National Security Archive. George Washington University; https://nsarchive2.gwu.edu/NSAEBB/NSAEBB49/index2.html#:~:text=On%202%20March%201969%2C%20the,50%20Soviet%20soldiers%20were%20killed; accessed 31 December 2024.

43 International Crisis Group. Conflict in Ukraine's Donbas: A Visual Explainer; https://www.crisisgroup.org/content/conflict-ukraines-donbas-visual-explainer; accessed 11 January 2025.

44 Kyiv Post. Nuland says 400-500 Russian soldiers killed in eastern Ukraine. 10 March 2015, https://archive.kyivpost.com/article/content/war-against-ukraine/us-claims-400-500-russian-soldiers-killed-in-eastern-ukraine-383079.html; accessed 11 January 2025.

45 Wikipedia. War in Donbas, https://en.wikipedia.org/wiki/War_in_Donbas; accessed 11 January 2025.

46 RadioFreeEurope, Radio Liberty. Ukraine's Armored Vehicles Significantly Damaged in First 2 Years of Donbas Conflict.12 February 2020, https://www.rferl.org/a/ukraine-armored-vehicles-significantly-damaged-2-years-of-donbas-conflict/30429979.html; accessed 11 January 2025.

47 Bellingcat. Tanks of Buhaivka: A training facility in Eastern Ukraine, 17 March 2017, https://www.bellingcat.com/news/uk-and-europe/2017/03/17/tanks-buhaivka-training-facility-eastern-ukraine/; accessed 11 January 2025.

48 Bellingcat. Russia's 200th Motorized Infantry Brigade in the Donbass: The Hero of Russia. https://www.bellingcat.com/news/uk-and-europe/2016/06/21/russias-200th-motorized-infantry-brigade-in-the-donbass-part-2/; accessed 11 January 2025.

49 Bellingcat, author, Askai707. Russia's 200th Motorized Infantry Brigade in the Donbass: The Tell-Tale Tanks, 4 July 2026,

https://www.bellingcat.com/news/uk-and-europe/2016/07/04/russias-200th-motorized-infantry-brigade-donbass-tell-tale-tanks/; accessed 11 January 2025.

50 Bellingcat, author, Askai707. Russia's 6th Tank Brigade: The Dead, the Captured, and the Destroyed Tanks (Pt. 1), 22 September 2015, https://www.bellingcat.com/news/uk-and-europe/2015/09/22/russias-6th-tank-brigade/; accessed 11 January 2025. This post originally appeared in Russian on the LiveJournal of Askai707, sled-vzayt.livejournal.com.

51 Ibid

52 Veli-Pekka Kivimaki. Tankspotting: T-90As in the Donbass. 2 April 2017. Bellingcat, https://www.bellingcat.com/news/uk-and-europe/2017/04/02/tankspotting-t-90as-donbass/; accessed 11 January 2025.

53 Chris York, As Russian tank losses in Ukraine pass 9,000, here's what you need to know. Kyiv Independent. 1 July 2024, https://kyivindependent.com/as-russian-tank-losses-in-ukraine-continue-to-mount-heres-what-you-need-to-know/#:~:text=the%20early%201980s.-,How%20many%20tanks%20does%20Russia%20have%20left?,of%207%2C000%20tanks%20in%20storage, accessed 29 December 2024.

54 Centre for Strategic Studies. Russia's war on Ukraine.11.01.25, Operational Situation. 11 January 2025. https://substack.com/home/post/p-154628419; accessed 11 January 2024.

55 Yohann Michel and Michael Gjerstad. Equipment losses in Russia's war on Ukraine mount. 12 February 2024. The International Institute for Strategic Studies (IISS), https://www.iiss.org/online-analysis/military-balance/2024/02/equipment-losses-in-russias-war-on-ukraine-mount/?utm_source=chatgpt.com; accessed 11 January 2025.

56 Dara Massicot and Richard Connolly. Russian Military Reconstitution: 2030 Pathways and Prospects. Carnegie Endowment for International Peace. September 2024.

57 Covert Cabal. BTRZs - Tank Repair Factories. Can They Keep Up? YouTube, https://youtu.be/_EHpGXbOrY8?si=EyXVxpQZDSqS0P_w; accessed 12 January 2025.

58 Max Haupman. Russia's antique tanks are finding a second life as VBIEDs. Task and Purpose, 20 June 2023; https://taskandpurpose.com/news/ukraine-russia-tanks-vbied/. Accessed 19 January 2025.

59 Social Media platform X user @CITeam_en | Russian MODs Zvezda Television Channel showcasing Russia' Center

Grouping of Forces utilizing rebar spiked turrets in tanks referred to as "Hedge-Hogs", posted 30 May 2025.

60 Social Media platform X user Chuck Pfarrer | Indications & Warnings | @ChuckPfarrer, posted on 26 December 2023; https://x.com/ChuckPfarrer/status/1739705046177042868.

61 James Bickerton. Untrained Russian Troops Struggling to Fit Tank Armor, Causing Losses: U.K. Newsweek, 18 August 2022; https://www.newsweek.com/untrained-russian-troops-struggling-fit-tank-armor-causing-losses-u-k-1734741; accessed 19 January 2025.

62 David Axe. The Russians Aren't Just Running Out Of Tanks—They're Running Out Of Tank Crews, Too. And It's Going To Get Worse. Forbes, 7 August 2023, https://www.forbes.com/sites/davidaxe/2023/04/07/the-russians-arent-just-running-out-of-tanks-theyre-running-out-of-tank-crews-too-and-its-going-to-get-worse/; accessed 19 January 2025.

63 Sky News. Ukraine War: Dramatic drone footage shows Russian convoy 'ambush'. YouTube, 10 March 2022, https://youtu.be/dcYOjbyttvM?si=JHWkknYUxPzmwRzS; accessed 19 January 2025.

64 The Sun. Watch as Russian tank commander takes out FIVE of his own men using turret in blundering footage. YouTube, 1 February 2023, https://youtu.be/FqlDtdyAo3M?si=CWK1HsZDPUucH0z4; accessed 19 January 2025.

65 David Axe. It Was 'Unfortunate Suicide' For A Lonely Russian Crew Conducting A One-Tank Assault In Eastern Ukraine. Forbes, 16 January 2025, https://www.forbes.com/sites/davidaxe/2025/01/16/it-was-unfortunate-suicide-for-a-lonely-russian-crew-conducting-a-one-tank-assault-in-eastern-ukraine/.

66 Dr Jack Watling and Nick Reynolds. Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine. Royal United Services Institute for Defence and Security Studies, https://rusi.org/explore-our-research/publications/special-resources/meatgrinder-russian-tactics-second-year-its-invasion-ukraine; 19 May 2023. Accessed 20 January 2025.

67 Dr Jack Watling and Nick Reynolds. Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive. 4 September 2023. Royal United Services Institute for Defence and Security Studies, https://www.rusi.org/explore-our-research/publications/special-resources/stormbreak-fighting-through-russian-defences-ukraines-2023-offensive, accessed 3 January 2025.

68 Robert E. Hamilton. Tanks a Lot (Well, Actually Not That Many for Ukraine). Foreign Policy Research Institute, 2 February 2023; https://www.fpri.org/article/2023/02/tanks-a-lot-well-actually-not-that-many-for-ukraine/. Accessed 19 January 2025.

69 Military Watch Magazine. Russia's Medvedev Reveals 1500 T-90M Tanks Will Be Built This Year: Expresses Confidence They Can Tackle Top Western Armour, 25 March, 2023; https://militarywatchmagazine.com/article/medvedev-t90m-built-tackle-western; accessed 12 January 2025.

70 Sergio Miller. 1,500 new and modernised tanks – really? Wavell Room. 1 May 2023, https://wavellroom.com/2023/05/01/1500-new-and-modernised-tanks-really/; accessed 12 January 2025.

71 Military Prophet (Vishchun). The pace of decommissioning of armored vehicles is falling: what is happening at Russian storage bases; 24 April 2024, https://www.vishchun.com/post/tempy_rozkonservatsii_bbm_padaiut_shcho_vidbuvaietsia_na_rosiiskykh_bazakh_zberihannia; accessed 12 January 2025.

72 Congressional Research Service. Russian Military Performance and Outlook. 10 October 2024, https://crsreports.congress.gov/product/pdf/IF/IF12606; accessed 12 January 2025.

73 Dr. Jack Watling and Nick Reynolds. Russian Military Objectives and Capacity in Ukraine Through 2024; 13 February 2024. Royal United Services Institute for Defence and Security Studies, https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024; accessed 12 January 2025.

74 Chatham House. Assessing Russian plans for military regeneration. 9 July 2024, https://www.chathamhouse.org/2024/07/assessing-russian-plans-military-regeneration; accessed 12 January 2025.

75 Pavel Luzin. Challenges to Russian Arms Resupply: Tanks, Combat Aviation, Artillery Ammunition, 7 July 2022. Eurasia Daily Monitor Volume: 19 Issue: 101, the Jamestown Foundation, https://jamestown.org/program/challenges-to-russian-arms-resupply-tanks-combat-aviation-artillery-ammunition/; accessed 12 January 2025.

76 Covert Cabal. Good on Paper, Looming Disaster in Reality - The Remains of Russia's Soviet Arsenal. 28 December 2024. YouTube, https://youtu.be/K8CcuVCDEUw?si=3HVzGKzSyDZlCoTH; accessed 12 January 2025.

77 Military Prophet (Vishchun).

Calculation and analysis of Muscovy's tank potential at the beginning of 2024. 18 April 2024, https://www.vishchun.com/post/pidrakhunok_ta_analiz_tankovoho_potentsialu_moskovii_na_pochatku_2024; accessed 12 January 2025.

78 Dr. Jack Watling and Nick Reynolds. Russian Military Objectives and Capacity in Ukraine through 2024. RUSI, 13 February 2024; https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024. Accessed 19 January 2025.

79 Military Prophet (Vishchun)., Statistical analysis of Russian tank losses. 18 April 2024.

80 Covert Cabal. Russia's Central Tank Storage Base is now Virtually Empty - The 22nd. 28 December 2024. YouTube; https://youtu.be/J8wIKhujASE?si=APJIchwjTpn1qS-J; accessed 12 January 2025.

81 Michael Gjerstad. Russian T-90M production: Less than meets the eye. 11 June 2024. The International Institute for Strategic Studies (IISS), https://www.iiss.org/online-analysis/military-balance/2024/06/russian-t-90m-production-less-than-meets-the-eye/; accessed 12 January 2025.

82 Brent M. Eastwood. Russia's New Ukraine Problem: Running Out of Tanks? 24 November 2024. 1945, https://www.19fortyfive.com/2024/11/russias-new-ukraine-problem-running-out-of-tanks/; accessed 12 January 2025.

83 NStatum (@nstatum8290). The German Tank Problem: How the Allies defeated the Nazis with statistics. YouTube, https://youtu.be/eAvsLFrwGfI?si=Do7MgPYeBawrlULu; 16 March 2023. Accessed 20 January 2025.

84 Wikipedia. German tank problem. YouTube, https://en.wikipedia.org/wiki/German_tank_problem; accessed 10 January 2025.

85 Anthony Lee and Steven Miller. Generalizing the German Tank Problem. PUMP Journal of Undergraduate Research, https://journals.calstate.edu/pump/article/view/3547, Volume 6, 31 January 2023. Accessed 20 January 2025.

86 Pavel Luzin. Russia's Military Industry Forecast 2023-2025. Foreign Policy Research Institute, 20 April 2023; https://www.fpri.org/article/2023/04/russias-military-industry-forecast-2023-2025/#_edn26. Accessed 20 January 2025.

87 Boyko Nikolov. Russian plant producing BMP-3 & BMD-4 IFVs faces risk of submersion. Bulgarian Military, https://bulgarianmilitary.com/2024/04/11/

russian-plant-producing-bmp-3-bmd-4-if-vs-faces-risk-of-submersion/; 11 April 2024. Accessed 20 January 2025.

88 David Axe. The BTR-82A Massacre: How Russian Regiments Lost 13 Of The Wheeled Vehicles In A Single Day. Forbes, https://www.forbes.com/sites/davidaxe/2023/10/21/the-btr-82a-massacre-how-russian-regiments-lost-13-of-the-wheeled-vehicles-in-a-single-day/; 21 October 2023.

89 Global Security. Arzamaz Machine-Building Plant, https://www.globalsecurity.org/military/world/russia/amz.htm; accessed 20 January 2025.

90 Wikipedia. Maylshev Factory, https://en.wikipedia.org/wiki/Malyshev_Factory; accessed 19 January 2025.

91 Joint Stock Company, 140 Repair Plant, homepage, https://140zavod.by/en/.

92 Dr. Lester Grau and Charles K. Bartles. The Russian Way of War. Force Structure, Tactics, and Modernization of the Russian Ground Forces. 2016. Foreign Military Studies Office, Fort Leavenworth, KS; https://www.armyupress.army.mil/portals/7/hot%20spots/documents/russia/2017-07-the-russian-way-of-war-grau-bartles.pdf. Accessed 20 January 2025.

93 MilitarNYI. Russia shows modernization of T-62 tanks. Ukrainian Military public webpage, https://mil.in.ua/en/news/russia-shows-modernization-of-t-62-tanks/; 12 March 2023. Accessed 20 January 2025.

94 Army Recognition. Rostec enterprises working hard to repair Russian military hardware damaged in Ukraine, 4 October 2022; https://armyrecognition.com/news/army-news/2022/rostec-enterprises-working-hard-to-repair-damaged-russian-military-hardware. Accessed 20 January 2025.

95 Open Sanctions. JSC Armour Repair Plant No. 560, https://www.opensanctions.org/entities/NK-gTJmnsvZnbjP-WvBXFjDQDT/; accessed 20 January 2025.

96 Covert Cabal. BTRZs - Tank Repair Factories. Can They Keep Up? YouTube, https://youtu.be/_EHpGXbOrY8?si=EyXVxpQZDSqS0P_w; accessed 12 January 2025.

97 X Social media post, user D'Mithridates, @Rhaescuporis, 18 April 2025, https://x.com/Rhaescuporis/status/1913223387138113795; citing press release by the Russian Ministry of Defense on Russian social media platform Telegram; https://t.co/XtEYvmbN9V.

98 Oliver Ruth. The Impact of Sanctions and Alliances on Russian Military Capabilities. RUSI.

99 Evgeniy Fedorov. Military-industrial complex-2024: personnel shortage becomes threatening. Top War, RU, military blog. 30 December 2024.

100 Dara Massicot and Richard Conolly. Russian Military Reconstitution: 2030 Pathways and Prospects. Carnegie Endowment for International Peace. September 2024.

101 NewIZV. Only "Old Men" Are Going Into Battle*: The country's defense factories cannot recruit workers. https://en.newizv.ru/news/2023-01-19/only-old-men-are-going-into-battle-the-country-s-defense-factories-cannot-recruit-workers-394358; 19 January 2023. Accessed 20 January 2025.

102 Abbey Fenbert. Russia desperate to recruit workers at defense plants amid personnel shortage, BBC reports. The Kyiv Independent, 2 October 2024; https://kyivindependent.com/russia-desperate-to-recruit-workers-at-defense-plants-amid-personnel-shortage-bbc-reports/. Accessed 20 January 2025.

103 BNE Intellinews. Russian Army hiring pensioners as young people refuse to sign up, 10 October 2024; https://www.intellinews.com/russian-army-hiring-pensioners-as-young-people-refuse-to-sign-up-347535/. Accessed 20 January 2025.

104 Neil MacFarquhar and Milana Mazaeva. Where is Russia Finding New Soldiers? Wherever it can. The New York Times. 30 December 2024, https://www.nytimes.com/2024/12/30/world/europe/russia-ukraine-war-soldiers.html; accessed 20 January 2025.

105 Marc Santora. On E-Scooters and ATVs, Russian Forces Swarm Ukrainian Positions in the East. The New York Times, 2 January 2025; https://www.nytimes.com/2024/12/31/world/europe/ukraine-russia-attacks-eastern-front.html#:~:text=The%20Russian%20troops%20have%20also,quite%20easily%2C%E2%80%9D%20he%20said. Accessed 20 January 2025.

106 Ronald Roberts. Lessons on Mission Command from McClellan's Failures At Antietam. Modern War Institute. 13 November 2020.

107 Drew Thompson, American Battlefield Trust Youth Leadership Team 2020. The Peninsula Campaign: McClellan's Strategic Masterstroke and Tactical Blunder. American Battlefield Trust, 27 April 2021, https://www.battlefields.org/learn/articles/peninsula-campaign-mcclellans-strategic-masterstroke-and-tactical-blunder. Accessed 20 January 2025.

108 LTC (Ret.) Dale Spurlin and LTC (Ret.) Matthew Green. Demystifying the Correlation of forces Calculator. Infantry Magazine, Fort Moore, GA. January – March 2017 Issue, https://www.moore.army.mil/infantry/magazine/issues/2017/JAN-MAR/index.html; accessed 20 January 2025.

109 Karl-Heinz Frieser. The Blitzkrieg Legend: The 1940 Campaign in the West. Association of the United States Army, Naval Institute Press, 15 January 2013.

110 Jacqui Heinrich and Adam Sabes. Gen. Milley says Kyiv could fall within 72 hours if Russia decides to invade Ukraine: sources. Fox News, https://www.foxnews.com/us/gen-milley-says-kyiv-could-fall-within-72-hours-if-russia-decides-to-invade-ukraine-sources; 5 February 2022. Accessed 20 January 2025.
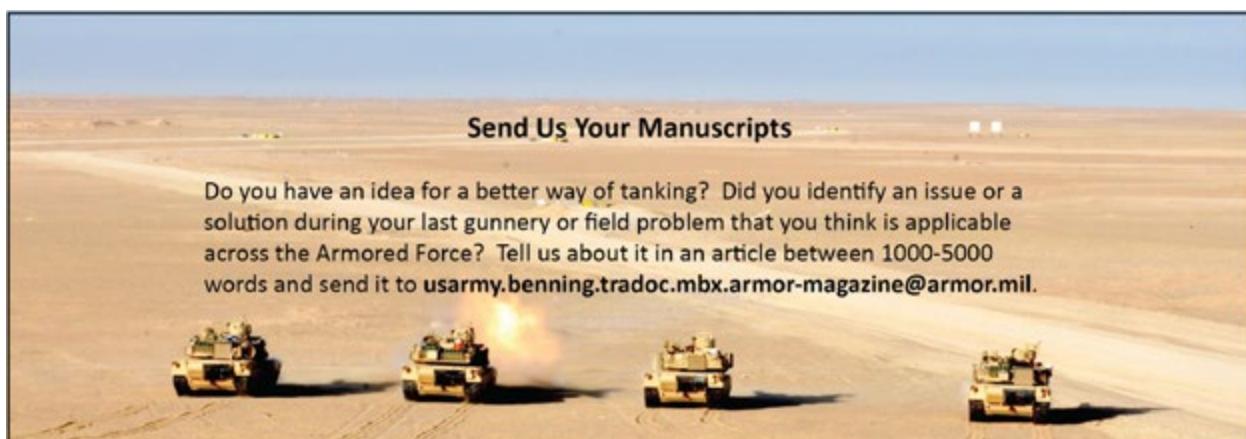
M242 Bushmaster Gun Theory

by SFC Marc E. Price

Since the introduction of the M242, 25-mm automatic cannon in 1980, detailed training materials on its principles of operation, cycle of function, and gear flow are not readily available to non-commissioned officers (NCOs) in the force. Army Training Manual (TM) 9-1005-200-23&P/Marine Corps TM 08672A-23&P is meant to be used as a technical manual for unit and direct support maintenance for the M242, containing detailed information about the various components and functions of the M242. However, since June 11, 2001, there have been no updates to Army TM 9-1005-200-23&P/Marine Corps TM 08672A-23&P, and no official publication had been created as a reference or training resource for Bradley commanders and Bradley gunners.

Overview

Training Circular (TC) 3-20.31-242, *Mastery: Gun Theory, M242* which is currently available through the Army Publishing Directorate (APD), was created as a primary reference designed to provide Bradley commanders and Bradley gunners mastery-level understanding in a comprehensive, yet easy to understand format.[1,2] This TC is specifically designed to provide the Bradley commander and Bradley gunners a detailed text reference of "how" this complex autocannon works. It describes the interaction, movement, and function of each gear, lever, switch, and component of the gun in a step-by-step manner. It will provide Bradley commanders and Bradley gunners a mastery-level understanding of the M242 and highlights the importance of understanding the equipment that Bradley crewmembers operate during training and combat operations. This TC allows Bradley Master Gunners (MG) and Bradley commanders to provide mastery-level instruction to their crews before, during, and after their scheduled gunnery density. It is meant to be easy to read for those who are unfamiliar with the M242 and displays graphics to enhance the readers' understanding of the text that accompany it.

Investing Into the Future of the Bradley Master Gunner

TC 3-20.31-242 was designed by Bradley MGs for Bradley MGs, enabling unit-level, subject-matter expert (SME)

Image 1. M242 Bushmaster component weight description chart. *(U.S. Army graphic)*

GUN, ENHANCED AUTOMATIC: 25-mm, M242
1005-01-454-0396

ENHANCED AUTOMATIC GUN FEEDER

BARREL ASSEMBLY (RIBBED)

AUTO GUN RECEIVER

82.35 in
209.2 cm

21 in
53.3 cm

105.2 in
257.2 cm

AUTO GUN RECEIVER	92 lbs.	41.7 kg
BARREL ASSEMBLY (RIBBED)	107 lbs.	48.5 kg
ENHANCED AUTOMATIC GUN FEEDER	59 lbs.	26.7 kg
TOTAL	258 lbs.	117.0 kg

Legend: lbs. – pounds; kg – kilogram; in – inches; cm - centimeters

M242 ENHANCED GUN IDENTIFICATION. The Enhanced M242 gun (M242 ENH) can be identified by the following markings:

⚠
- Receiver, PN 12524301: Stamped with "M242 ENH" on the receiver side.
- Feeder Assembly, PN 12524100-1: Has "quick detachable" bridge plates.
- Barrel Assembly, PN 12524520: Ribbed barrel assembly with chrome lined bore.

AUTO-GUN RECEIVER ASSEMBLY BEVEL GEARS

STRAIGHT DRIVE SHAFT

LARGE BEVEL GEAR

SPUR ASSEMBLY GEAR

SMALL BEVEL GEAR

SPUR GEAR CLUSTER

CLUTCH ASSEMBLY

LARGE AND SMALL BEVEL GEARS –
Are driven by the MOTOR ASSEMBLY, driving the CLUTCH ASSEMBLY.

Figure 2. 3D rendering illustrating the large and small bevel gears. *(U.S. Army graphic)*

led instruction to a mastery-level understanding. This manual is a primary reference for units conducting sabot academy lessons to improve unit lethality. TC 3-20.31-242 is written in a progressional format, beginning with introducing the reader to the history and lineage of the M242, 25-mm automatic cannon, highlighting the development process that occurred before the creation of this automatic cannon. Chapter 2 transitions into depicting and describing the different gears, switches, levers, and components of the M242 and how they interact with each other during normal gun functions. This is followed by Chapter 3, describing the overarching theory of operation of the M242 by describing how the muzzle brake, bolt and carrier assembly, mechanical safety interlock system (MSIS), dual-feed system, and power train operates, and describes how double feeds are prevented. Chapter 4 and Chapter 5 then describe the cycles of function and how the electrical system functions, and what occurs when each sensor is displayed through the bolt position indicator (BPI). To enhance Bradley crewmembers ability to maintain the M242, Chapters 6-8 focus on pre-combat

procedures, troubleshooting procedures (specifically highlighting how to identify and remediate symptoms that prevent firing operations), and how to properly clean and lubricate every component of the M242. Appendix A then provides services information, with graphical training aid (GTA) 17-06-242 – M242 operational readiness reference, being made available and designed for unit standard operation procedure integration.[3] Bradley commanders and Bradley gunners can print these GTAs with ½ page portrait formatting so that they may be integrated into the Bradley crew's pre-to-fire checklists and services checklists. GTA 17-06-242 is available through the Central Army Registry (CAR).[4] Appendix B provides diagrams and instructions for proper storing of the M242, while also including diagrams for construction of gun stands. Finally, Appendix C provides Bradley commanders and Bradley gunners the most important terms and definitions to solidify a mastery-level understanding of the M242, in an easy-to-read format.

3D Modeling

This GTA features higher quality images using 3-dimensional models and

easily identifiable callouts of the different components of the M242. These callouts help readers identify where the component is located within the feeder or receiver assemblies, and where they are located amongst other smaller components. A brief explanation of each component is provided within the graphic, while a more detailed description is provided in the main text.

Gear Flow Chart

The gear flow chart has been recreated, with the intent of replacing the old hand drawn style callouts with accurate picture representations of the different gears included in the receiver and feeder assemblies. Additionally, the gear flow chart has been broken down into two separate graphics, that depict the gears that are contained within the feeder assembly and what gears are contained within the receiver assembly, respectively. The gear flow chart is one of the most crucial concepts to understand when operating the M242, as it can assist Bradley commanders and Bradley gunners in understanding why and how a malfunction has occurred. Timing of the gears of the M242 is a crucial step of pre-combat procedures, and TC 3-20.31-242 describes why it is such an important event that must not be overlooked when preparing for firing operations.

Storage/Gun Stand for the M242

TC 3-20.31-242 also contains dimensions for M242 related equipment, such as dimensions of storage containers and gun stands. The storage crate dimensions provided can be used for securely packaging M242 components by units that are preparing to deploy their Bradley formations anywhere in the world. These crates reduce the abuse that the M242's receive when they are simply bubble wrapped and strapped to the troop seat of a Bradley Fighting Vehicle (BFV). The gun stand is also provided and will enable more in-depth instruction at the platoon level, as well as providing a means to conduct more thorough weekly maintenance on the M242, keeping the weapon system off the back ramp of the

BFV. Gun stands are an especially crucial item that can enhance the training value of any class involving the M242, by allowing the instructor to bring the M242 out of the Bradley turret and allowing for a more hands-on program of instruction from SMEs.

These graphics provide the measurements and materials required, while the text provides the steps for creating these items, as well as what markings are required for transport and storage.

Sergeant First Class Marc E. Price currently serves as a Training Developer/ Writer in the Weapons and Gunnery Branch, DOTD, at Fort Benning, GA. His previous positions include Brigade Master Gunner for HHT, 3ABCT, 1CD at Fort Hood, TX; Battalion Master Gunner for HHC, 1-12 CAV, 3ABCT, 1CD at Fort Hood; Platoon Sergeant for 2nd Platoon, B TRP, 6-9 CAV, 3ABCT, 1CD at Fort Hood; Section Sergeant for B SEC, 2nd Platoon, B TRP, 6-9 CAV, 3ABCT, 1CD at Fort Hood; and Team Leader for B SEC, SCT PLT, HHC, 1-66 AR, 4ID at Fort Carson, CO. His military education includes the Maneuver Leaders' Maintenance Course, Cavalry Leader's Course, and Doctrine Developers Course at Fort Benning, as well as the Maneuver Senior Leader Course at Camp Shelby, MS, and the Bradley Master Gunner School at Fort Benning. SFC Price holds an associate's of arts in interdisciplinary studies from American Military University. His awards and recognitions include various commendations reflecting his service and expertise.

Notes

1 TC 3-20.31-242, Mastery: Gun Theory, M242, https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1031337

2 Army Publishing Directorate (2025, July). APD – Army Publishing Directorate. Retrieved from ArmyPubs: https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1031337

3 GTA 17-06-242 – M242 Operational Readiness Reference, from https://rdl.train.army.mil/catalog/#/search?search_terms=17-06-242

4 Central Army Registry (2025, July). CAR – Central Army Registry. Retrived from https://rdl.train.army.mil/catalog/#/search?search_terms=17-06-242

General Frederick M. Franks Jr. Writing Competition Award
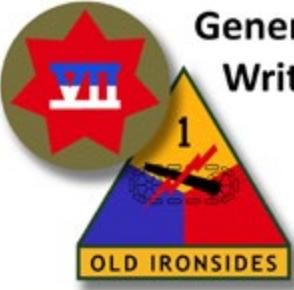
Submission Window
1 January - 31 March 2026

The General Frederick M. Franks Jr. Writing Competition Award is given annually to a program participant who submits the manuscript that best addresses the topic selected by the Commandant, U.S. Army Armor School (USAARMS). The competition will evaluate and recognize outstanding writers from across the force who demonstrate clarity and vision about the future of the mounted force through clear and consise writing.

The topics for the 2026 General Frederick M. Franks Jr. Writing Competition Award are:

- How does the company/brigade/battery Executive Officer fight and enable the fight (before, during, and after the mission)?
- What are the optimal roles/responsibilities for the Executive Officer?
- How does this change in the future as the Army transforms?

The nomination/submission window for this award is January - March 2026, with the winner being announced during the Armor Week events in May and official recognition during the Maneuver Warfighter Conference to be held in September 2026 at Fort Benning, GA. Submit nominations no later than **31 March 2026** to the Office of Chief of Armor, ATZK-AR, 1 Karker Street, Fort Benning, GA. 31905-4500 or via email at: usarmy.benning.mcoe.mbx.armor-ocoa.army.mil.

The competition is open to active or reserve component offcers, warrant officers, noncommissioned officers, and Department of the Army civilians, regardless of branch or occupational speciality.

Nomination packets for Soldiers must include the STP and an 8x10 military photo (quality JPEG); for civilians, a one page summary of government service and an 8x10 photo (civilian attire with coat and tie).

Packets will be evaluated by the Armor School Deputy Commandant with the recommendation forwarded to the Armor Commandant for review and final apporoval.

For additional information contact the Office of the Chief of Armor coordinator at (706) 626-8265, usarmy.benning.mcoe.mbx.armor-ocoa@army.mil

BOOK REVIEWS
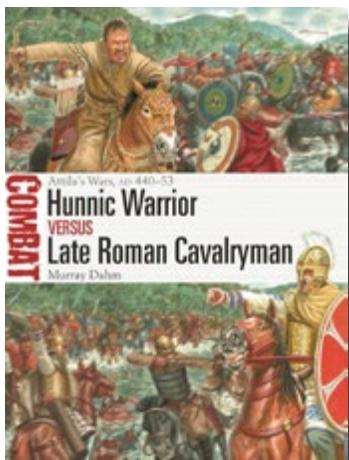
Hunnic Warrior versus Late Roman Cavalryman: Attila's Wars, AD 440-53 by Murray Dahm, New York: Osprey Publishing, 2022, 80 pages, $22.00

This book continues Osprey's tradition of packing a lot of information into a few pages. In this installment, Dahm compares the late Roman cavalryman to the Hunnic warriors during their invasions and border clashes. This monograph is directly aimed at antiquarian and military historians. As is the norm with Osprey books, it balances well-researched scholarly writing with excellent use of photographs, illustrations, and maps. It can serve both as an introduction, or a handy quick reference volume.

It is organized into six main chapters. The first deals with each side's composition and size, organization and command, and equipment and tactics. The next three chapters review the battles at Naissus, the Utus River, and the Catalunian plains. The next chapter evaluates each side's overall effectiveness, and the book ends discussing the aftermath and the impact on the fall of the Roman empire not long after.

Dahm's core argument is that the Hunnic invaders under Attila had tactical superiority over the Roman Cavalry forces for a number of reasons. First is the Hun's slower but more hardy horses. Second is the fact that the Hunnish forces were essentially all mounted light cavalry or skirmishers. He argues that their horse-based nomadic lifestyle gave them superior horsemanship. For the Romans, Cavalry was only one part of a Roman "combined force" with multiple different "flavors" of cavalry, some of which were tied to social status. On the Hunnish side, they tended to integrate conquered peoples into their core ranks, whereas the romans brought in allied troops generally as separate units, leading to division and organizational challenges. A final difference was that the Huns were not interested in taking and holding territory, allowing them to raid at will and mass their forces with impunity. The Romans, faced with the need to defend all their possessions and limited manpower were generally unable to mass forces in a timely manner. Even when they were able to hold their own in battle, they generally couldn't risk a full on pursuit of retreating Hunnish forces.

Dahm has written several monographs for Osprey as well as many military history magazine articles. He references 37 ancient and 30 modern works in the present volume, adding to his credibility. One thing that stood out was his clear delineation of the (surprisingly few) known facts and the much larger body of assumptions and guesswork. While he weaves a compelling narrative of the battles as well as the political realities facing both sides, he always qualifies it as being a "best guess."

The book's detailed and comparative approach to equipment, organization, and tactics did an excellent job of bringing both sides to life. He weaves a seamless narrative moving from strategic and manpower concerns, to logistics, politics, and tactics. This is especially true when discussing the impact Atilla had in unifying the essentially tribal/clan-based Hunnish forces. The battle maps, illustrations, and pictures of artifacts bring both the troops and the battles into sharp focus. The main weakness is that the book draws, perhaps unavoidably, from contemporary Roman accounts of the battles and overall conflict. As the Hunnish forces didn't favor fixed cities, there is little written or archaeological data from the contemporary Hunnish side. While the Roman facts, viewpoints, and motivations are easy to trace, that leaves much of the other side of the conflict open to conjecture. Again, Dahm makes sure to highlight this at every opportunity. Given its focus, the book largely overlooks Roman non-Cavalry formations, which made up the bulk of Roman forces.

This monograph illustrates many themes of use to the modern military reader. At first blush, it can appear to be a narrative about fixed defenses facing a mobile attacker, or utilization of light versus heavy forces. However, a closer reading shows it as a case study in applying the nine principle of war. With the possible exception of the Catalaunian battle, which by some interpretations was a draw, the Hunnish forces were superior in their application of the principles. The Hunnish forces had clear objectives (generally plunder and tribute), maintained the offense, had economy of force, unity of command, security, tactical surprise, and simple battle strategies. However, where they really won their battles was maneuver, choosing the timing and places of battle, and then massing their forces at the point of decision. This book deserves a place in a professional development reading list, especially for future or junior officers and NCOs of the mounted combat arms.

RETIRED COL Vincent J. Stoneking
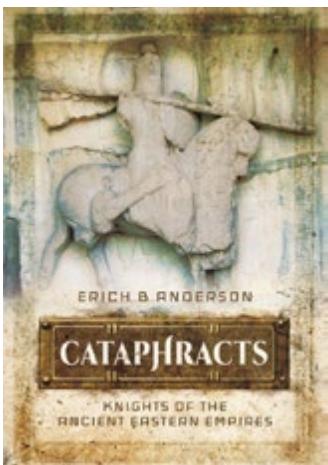
Cataphracts. Knights of the Ancient Eastern Empires by Erich B. Anderson, Bransley, South Yorkshire, UK; Pen & Sword Books, 2017, 217 pages, $25.67

Mobile warfare was born in Eurasia, obscured from history by distance from the literate, littoral civilizations budding in an arc from China to Crete sometime in the Third Millennium, B. C. From serving as a wild food source to domestic cattle and then to becoming a beast of burden, the horse entered human history on the windswept steppe, there to remain as our chief companion in warfare until the eve of World War II. The evolution of the horse as an instrument of war in and around the cradles of civilization, culminating in the development of fully armored riders and mounts – Cataphracts – is the story unfolding in the pages of Erich Anderson's book of the same title.

Horse-enhanced warfare evolved from chariots, as Homer described it in the Trojan War, transporting infantry to battle, to light cavalry at the start of the First Millennium, B. C. Charioteers began armoring their horses; however, cavalry from Central Asia - Scythian and Persian, initially – proved superior in battle, compelling littoral states to follow suit and mount their soldiers. The Assyrians were the first to do this, and their steeds soon had frontal armor, as their charioteer forebears had.

It was not long before Scythian and Persian riders began adding armor to themselves and their mounts, as well as adding the lance to their armament. These innovations continued to originate on the steppes, as military R&D typically flowed from the Eurasian interior to littoral civilizations for most of the pre-modern era. One critical exception was the technology transfer from Assyria to their Scythian allies of scale armor metalworking. While Assyrian soldiers used scale armor only to cover their torsos, Scythian troops saw the new technology as an opportunity to completely enclose their bodies, sometimes to a depth of four layers, and wealthier soldiers armored their horses, as well. These troops were the first true mobile armored striking force.

Tactics developed apace with technology, as Anderson relates, relying on ancient sources, archaeology and modern scholarship to create a coherent and comprehensive narrative. Fully armored lancers used 'shock and awe' tactics to overrun opponents, and when operating in combined arms formations, with mounted archers using indirect fire to soften up the target while infantry providing follow-on support, they were virtually irresistible, as the Romans discovered at Carrhae in 55, B. C. However, when operating independently, vulnerabilities existed which an opponent could exploit. When Cataphracts were dispersed or unhorsed, they were virtually immobile and subject to destruction by close assault from the flanks or behind.

Horse-breeding developed alongside armor and weaponry, culminating with mounts over 15 hands high, able to bear the weight of an armored rider and their own protection while charging at the gallop. Before the development of the stirrup and spur in the early Medieval Era, Cataphracts were limited in how they deployed their armament; afterward, they could handle a shield and lance simultaneously, and they could also use bow, often of the Mongolian composite variety, allowing them to take the 'Parthian shot,' by facing rearward at the gallop while still delivering accurate fire. They also employed the 'Mongolian pull,' using the thumb instead of their fingers, to help stabilize their fire while on the move.

The final evolution of the Cataphracts produced the "iron knights" of the Byzantine Empire. This elite striking arm was the backbone of Byzantine military superiority for centuries, enabling smaller armies to defeat more numerous foes. Due to the cost involved several military landholders often pooled resources to support one Cataphract; at a cost of 16 lb. gold, or approximately $650,000 dollars. (In comparison, the first M4 Shermans cost $33,500 to build, or about $770,000 in today's dollars.) Units of eight were recruited from the same district; this reflects sound practice; from Nestor's advice to Homer's Greeks to Van Crevald's analysis of Wehrmacht performance in the World Wars, unit cohesion and performance improves when soldiers fight alongside friends and family instead of in the company of strangers.[1-3] The system began to decay when later Byzantine society had fewer citizen-soldiers, as some chose to pay not to serve while many others lost their holdings to acquisitive, wealthy neighbors. After the Fourth Crusade sacked Constantinople in 1204, a mortally weakened Byzantium could no longer afford Cataphracts, and these Eastern armored units passed into history.

This book is recommended for anyone interested in the development of pre-modern armored units, and what lessons we can learn from their successes and failures on the battlefield.

Notes

1 https://www.motales.com/trucks/sherman-tanks.php

2 Homer, Illiad, book 2, l. 60-68

3 https://mitpressbookstore.mit.edu/book/9780313091575

RETIRED SFC Lloyd A. Conway
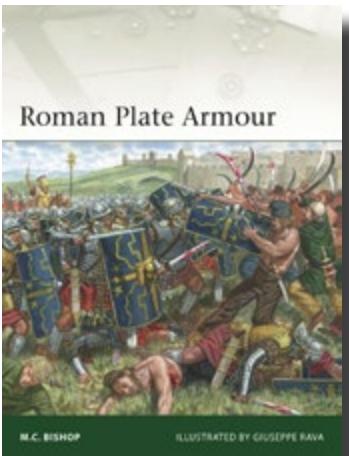
Roman Plate Armour by M.C. Bishop, New York; Osprey Publishing, 64 pages, $20.00

This admirably brief monograph covers the design and evolution of plate armor used by the Roman armies from the Republican to late Imperial periods, drawing not only on traditional historical resources, but also more recent archaeological finds.

While its short length limits the amount of detailed analysis it can provide, it admirably combines scholarship, accessible writing, color photographs, drawings, and custom artwork to make the topic come alive. It is an excellent introductory text and a good specialized resource for those interested in Roman plate armor.

Bishop argues that lorica segmentata, Roman plate armor, was a revolution in armor that came about between the 1st century BC to the 4th century AD, due to growing technological prowess of Roman industry and greater tactical sophistication. He looks at the evolution from the Kalkriese to Corbridge, and Newstead types (each named after a significant archaeological find), emphasizing how they were each adaptations to military needs. He points out historical misconceptions of Roman armor based on the art of Trajan's column.

He argues that the lorica segmentata was almost exclusively used by citizen soldiers, Legionaries and Praetorians, with others using mail or scale armor, despite some contradictory finds. He gives significant attention to its significantly lighter weight and greater flexibility compared to its more common alternatives as well as its much more involved creation and fitting processes, as well as the fragility of many of its parts, leading to frequent field repairs and cannibalization. The other forms of armor and accessories are dealt with in some detail despite being outside the core scope of this monograph.

M.C. Bishop is a writer and archaeologist who focuses on the Ancient Roman Military and its arms and armor. He is the editor, author, or co-author of dozens of books and articles on the topic, including several for Osprey. He also conducts tours of Hadrian's Wall among other Roman heritage sites. His bibliography, which is cited consistently throughout the text, is significant for such a brief work, including 14 ancient and 36 modern works.

Bishop does a superb job of condensing detailed archaeological and historical information into a readable narrative for the non-expert. Each chapter is well researched and well organized, making it easy grasp its significance. Practical insights are gained by including perspectives from reenactors, allowing the reader to consider the armor as an actual piece of kit, rather than a historical curiosity.

For such a brief book, extensive use is made of illustrations and photographs. However, it is done so skillfully that a picture is actually "worth a thousand words." The density of technical detail is impressive, without losing the reader in excessively technical jargon. The one area of weakness is his treatment of horse armor. While he argues that equine armor and eye protection were used only for sport and not in battle, these claims don't have the same evidence as the rest of the book.

This book offers many insights for modern military readers. It provides a great foundation for study of personal gear, equipment testing, standardization, and maintenance. It demonstrates the eternal nature of logistics as a driver of operations, including efforts to standardize equipment across their force. Its coverage of repairs, both "depot" level and field expedient, highlight the maintenance side of the equation. Likewise, it highlights the importance of the industrial base in determining equipment design, in particular the discussion of Roman plate armour requiring steel rolling equipment to manufacture. At the same time, the armor had to be at least semi-custom fitted to the man. It was not "one size fits all" and mail might be. Of note are examples showing that the armor's modular construction was likely driven by needs for easy transport. He clearly shows how trade-offs were made over time as the armor iterated based on experiences in the field and local technologies throughout the Empire.

This book won't satisfy someone looking for a deep treatment of Roman armor, though it should be noted that Bishop has several longer form books on this exact topic. However, it is an excellent and well detailed introduction to field with clear lessons for the modern reader interested in equipment design.

RETIRED COL Vincent J. Stoneking

68th ARMORED REGIMENT

VENTRE A TERRE

The colors, blue and white, associate the organization with infantry. The lion symbolizes the power of a tank regiment. The motto translates to "With Great Speed." The distinctive unit insignia was originally approved for 68th Infantry Regiment March 23, 1937. It was redesignated for 68th Armored Regiment Sept. 18, 1942. It was redesignated for 68th Tank Battalion Nov. 22, 1943. The insignia was redesignated for 68th Medium Tank Battalion Aug. 29,1952. It was redesignated for 68th Armor Regiment Nov. 15, 1957. It was amended to update the description Nov. 17, 2010.

U.S Army photo by SSG Sharon Matthias

Headquarters, Department of the Army
Approved for public release, distribution is unlimited