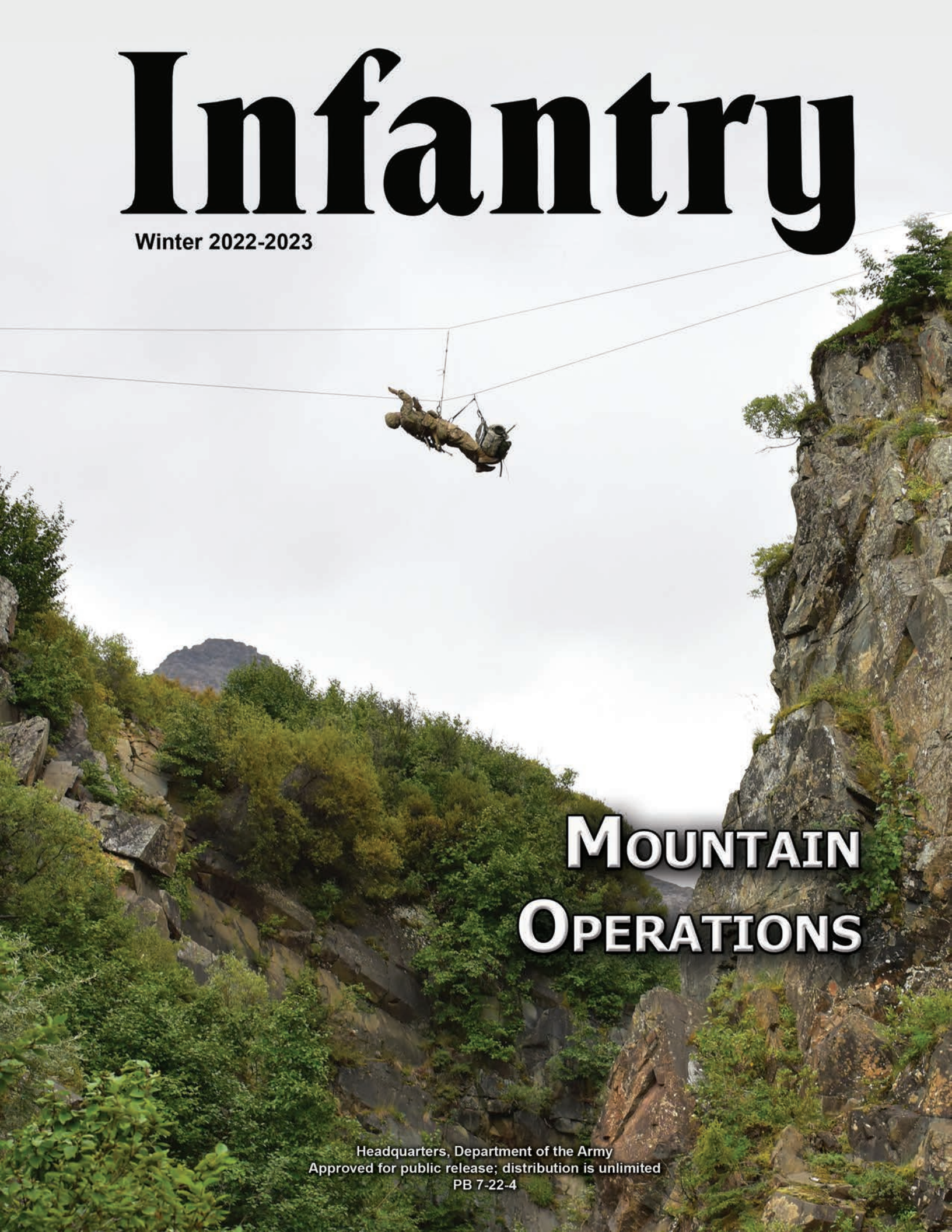
Infantry

Winter 2022-2023



Mountain Operations

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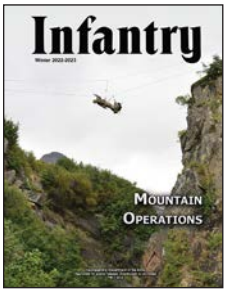
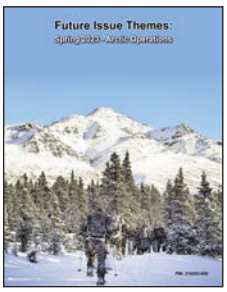


FRONT COVER:

A Basic Military Mountaineering Course student crosses a rope bridge over a mountain gorge at the Northern Warfare Training Center's Black Rapids Training Site in Alaska on 15 August 2020. (Photo by John Pennell)

BACK COVER:

Cold Weather Orientation Course 20-002 students snowshoe into the mountains while pulling loaded ahkio sleds at the Northern Warfare Training Center's Black Rapids Training Site in Alaska on 11 February 2020. (Photo by John Pennell)



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Commandant's Note

BG LARRY BURRIS

The Army is hard at work readying itself for the large-scale combat operations (LSCO) likely to comprise the nation's future engagements. Producing the Army of 2030 requires changes to doctrine, organization, training, materiel, and more. LSCO will differ in many respects from this century's earlier counterinsurgency campaigns. Still, the United States Army Infantry will remain the world's premier maneuver fighting force. The Army's valuable experience gained over the past two decades of operating in the complicated landscape of the mountains, deserts, and cities of Afghanistan, Syria, and Iraq will undoubtedly contribute to the organization's future success in the complex physical terrain of future warfare. In this issue of *Infantry*, we look up to the mountains.

When most people consider the characteristics relative to mountainous terrain, a cold climate is usually the first to come to mind. After all, the Army conducts much of our mountain training in the snow-capped mountains and hills of upstate New York, Vermont, Colorado, and Alaska. And our doctrine, like ATP 3-90.97, *Mountain Warfare and Cold Weather Operations* and ATP 3-21.50, *Infantry Small-Unit Mountain and Cold Weather Operations*, jointly address this as well. However, the new FM 3-0, *Operations*, released in October, makes clear that "mountainous terrain can be found on jungle, Arctic, and desert islands." Extreme heat or cold, dryness or humidity, lush jungles, or sparse vegetation are all possible. Afghanistan, for example, has several different mountainous environments within the same area of operations.

It is impossible to predict where the men and women of the Infantry will fight the next battle. In his aptly named book *Out of the Mountains*, Dr. David Kilcullen argues that future combat will shift toward coastlines and urban areas. Yet almost every country has mountains, and nearly every war has included some form of mountain operations. Mountains comprise 25 percent of the globe's dry surface, and 10 percent of the world's population calls them home. One-quarter to one-third of those mountain populations live in cities. Fighting to, in, and through these spaces requires careful attention to the terrain.

Mountains introduce a vertical terrain challenge to an already crowded battlefield, making medical evacuations and lines of communication more complex. The need for technical climbing expertise and specialized equipment become prerequisites along with the additional physical training required for Soldiers maneuvering at altitude before firing a single shot.

Recent fighting by other nations should inform our thinking about mountain operations. Armenian and Azerbaijani forces fighting in the rugged Nagorno-Karabakh area claimed some 7,000 lives in 2020 and another 300 this past September. The effective use of small unmanned aircraft systems (SUAS) to target armor, air defense, and dismounted targets is a lesson with implications far beyond the Caucasus. In June 2020, dozens of soldiers died in close combat in the mountains along India's 3,000 kilometer disputed border with China. Two nuclear powers fighting hand-to-hand in the mountains is a sobering reminder that no technological progress eliminates the need for strong and capable Infantry formations.

The topography of our adversaries likewise proves the relevance of mountain operations for our Infantry formations. The Himalayas along China's southwest border contain some of the highest elevations on earth. Iran's territory is 55 percent mountainous, principally on its borders. Russia's Ural Mountains sharply divide the country's east and west. Mountains make up 70 percent of the Korean Peninsula. To think about the landscape of the future battlefields is to consider the likelihood of combat in the mountains seriously.

The Army today is taking necessary steps to prepare for future mountain operations in several ways. For example, the Army Mountain Warfare School in Vermont provides numerous courses focused on individual Soldier mountaineering skills and training, such as Basic and Advanced Military Mountaineering, Rough Terrain Evacuation, Mountain Rifleman, and the Mountain Planner Courses. The 5th Ranger Training Battalion in the north Georgia mountains trains students on the collective mountaineering skills and training of units through the execution of the Ranger Course program of instruction. These two organizations, along with the Northern Warfare Training Center, the Sapper Course, the 25th Infantry Division's Lightning Academy, and other organizations from around the force, make up the Army's Mountaineering Board. These organizations come together multiple times throughout the year to discuss lessons learned from the operational force and training centers to improve the instruction required for the Army to operate within such complex terrain.

But, as with all specialized training, mountains must not cause us to lose sight of the Infantry's fundamentals. Per ATP 3-21.50, vii, "While the Infantry rifle company is an organization not specifically designed for mountain … operations, it is well suited for this environment." So long as we continue to provide our Soldiers with appropriate equipment and training, the men and women of the Infantry will implement the principles of land warfare into any environment to fight and win.

I am the Infantry! Follow me!

Mountain Operations

The Case for Cold Regions and Mountain Operations Training

CPT EDWARD M. KWAIT
PETER D. SMITH

> *"Losses among the troops because of frost weigh heavier on the commander's conscience than battle casualties. Because in this case there always remains the disturbing feeling that losses due to the cold might possibly have been avoided if greater precautions had been taken."*
>
> **— Marshal of Finland Carl Gustaf Emil Mannerheim**, 1942

Military operations conducted in a mountainous environment are affected by severe weather, insufficient infrastructure, restricted mounted and dismounted access, high elevation, and snow and cold weather proportionate to the season and elevation.[1] The U.S. Army trains military mountaineers to succeed in terrain and weather that may otherwise impede or halt operations. When engaging in mountain warfare, military mountaineers advise commanders on the limitations and possibilities of the environment for friendly and enemy forces. This includes the application of the warfighting functions to mountain environments, with a specialty in mobility operations. These subject matter experts have been crucial to the success of military operations in the past, continue to demonstrate their value in the present, and are necessary to prepare for mountain warfare in the future.

A Look at the Past

The common theme in past mountain conflicts is that disaster awaits those unprepared for the environment. Even a brief look at the history of warfare in mountainous and cold regions reveals the need to utilize specialized tactics, techniques, and procedures. Harsh lessons from the Austria-Italian front waged more than 100 years ago still apply today.

During World War I, the Italian Army was given the mission to re-take the heavily fortified ground occupied by Austria in the Eastern Alps, which included the Dolomites and the Carnic Alps.[2] To have a chance of success despite their evident disadvantage, the Italians emplaced weapons and observation posts high in the mountains, blasted miles of trenches out of solid rock, formed tunnels and barriers

Photo by CPT Edward Kwait

A view of the East Alaska Mountain Range as seen by students of the Advanced Military Mountaineering Course in July 2021.

in the deep snow, and constructed paths through the rugged terrain.[3] The vastly developed supply network included the "telerifica" which utilized wires and pulleys to carry fighting men, wounded, equipment, and rations to and from inaccessible points.[4] Throughout these efforts, the Italians had to contend with both the enemy and the environment. Austrian machine guns were positioned on the high ground and could decimate exposed troops with plunging fire. Rock fall and steep, exposed terrain were ever present hazards that led to loss of men and equipment. Deep snow restricted vehicle movement and required heavy loads to be transported on sleds.[5] Avalanches took the lives of 10,000 soldiers in the Dolomites in December 1916; on both sides, more than 60,000 would perish from these deadly snow slides.[6] The remote fronts of both armies made it difficult to supply clothes, food, water, and shelter; and both were forced to adapt over the three plus years of mountain warfare. Cold temperatures and high altitude hindered soldier performance and further stressed the supply system.

National Archives photo

Soldiers with the 10th Light Division (Alpine) prepare for ski training at Camp Hale, CO.

The United States began to debate the need for mountain troops at the outset of World War II. In 1939-1940, Finnish winter tactics had dealt a severe blow to the Soviets. Despite being seriously outclassed in every measure by the Soviet military, the Finns were able to inflict a 95-percent casualty rate on the invading Russians by using their knowledge of how to exploit the terrain and weather to their advantage. As WWII began, intelligence reports disclosed that the Germans were preparing specialized forces for combat in Alaska, Canada, and the Western United States. The U.S. Army also took note of the failure of standard Italian divisions in Albania.[7] This led to the activation of the 87th Mountain Infantry and Mountain Winter Warfare Board (MWWB) at Fort Lewis, WA, and the Mountain Training Center (MTC) at Camp Carson, CO. These pioneer organizations developed the first formalized mountain and winter warfare training and would eventually provide experts to fill the ranks of the 10th Light Division (Alpine).[8] The MTC developed mountain and winter warfare instructors that trained the Mountain Infantry Regiments at Fort Lewis and Camp Hale. They also taught a variety of units in Massachusetts, New Hampshire, Wisconsin, Virginia, and West Virginia rock climbing, basic mountaineering, snowshoeing, skiing, and winter warfare to aid in their preparation to conduct collective mountain and winter training.[9] In Virginia, the MTC provided low mountain training and instruction for the 36th and 45th Infantry Divisions' deployment to Sicily, which substantiated the program's value. Five additional divisions would later receive training in the mountains of West Virginia.[10]

In 1943, the U.S. Army activated the first division-sized mountain unit, the 10th Light Division (Alpine). During the following year, the division would complete collective mountain and winter warfare training which culminated in a three-week exercise called the "D-Series." This exercise required personnel and equipment to move over unforgiving terrain, including climbing 2,000 feet over rock and ice in temperatures as low as 35 degrees below zero, and address a series of field problems along the way. Division-level maneuvers demonstrated the need for decentralized command and control as well as unique solutions for mountain mobility, supply, and medical evacuation. The greatest dividend noted by participants at all levels was the development of resourceful, mentally and physically tough Soldiers.

In 1945, the 10th Mountain Division's victory in the northern Apennine Mountains of Italy confirmed the value of the past five years of mountain and winter warfare training in the U.S. Army. The Germans controlled the high ground in the Apennines which prevented the Allies from accessing the rest of Europe. Allies had tried and failed at dislodging the Germans from the Mount Belvedere ridgeline due to well-established and fortified German positions. These German positions easily controlled the only available routes below, the valleys within their range, and were believed unassailable. The 10th Mountain Division installed ropes, pitons, and anchors in preparation for a 1,700-2,200 foot climb up vertical rock and ice to attack the adjacent Riva Ridge. Due to the vulnerability of their formation while negotiating steep terrain, the Soldiers moved through darkness and fog on the night of the attack. Their tactics succeeded in taking the ridge, and they were able to hold off German counterattacks for five days. The day after Riva Ridge was taken, six infantry battalions assaulted up Mount Belvedere and fought for six days before taking control of the ridgeline. Following the success at Mount Belvedere, the 10th Mountain Division Soldiers continued to fight north through the Apennine Mountains and were the first to reach and cross the Po River, forcing the German army to retreat and ultimately surrender in May of 1945.[11]

With the activation and deployment of the 10th Mountain

Division in 1944, and the need for troops in all theaters, the MTC and Low Mountain Training Program were inactivated. Continuity was held by the Mountain and Winter Warfare Section, but state-side maneuvers came to a halt. The development of Field Manual (FM) 70-15, *Operations in Snow and Extreme Cold*, and FM 70-10, *Mountain Operations*, were intended to be the continuity for mountain and cold weather operations.[12] Following WWII, the 10th Mountain Division was deactivated. Since then, a division-level mountaineering program has ceased to exist for the U.S. Army.

Current State of Training and Operational Requirements

Since WWII, the U.S. Army's mountaineering training has evolved into what is now provided by the Army Mountain Warfare School (AMWS) and the U.S. Army Northern Warfare Training Center (NWTC) today. The mountaineering-specific courses have the same program of instruction (POI) between the two schools, which encompass a 14-day Basic Military Mountaineering Course (BMMC) and 14-day Advanced Military Mountaineering Course (AMMC). NWTC also provides an 11-day Cold Weather Leaders Course (CWLC) and a five-day Cold Weather Orientation Course (CWOC) with an emphasis on extreme cold weather and cold regions operations. This training provides a percentage of the formation with mountain and cold weather training with the expectation that these Soldiers are leveraged by command and staff should the need arise.

Training for brigade combat teams currently takes place at one of four training centers (the National Training Center [NTC], Joint Readiness Training Center [JRTC], Joint Multi-National Readiness Center [JMRC], or the Joint Pacific Multinational Readiness Center-Alaska [JPMRC-AK]) and serves to prepare our Army to fight a near-peer force in a decisive action training environment (DATE). However, the first three training centers lack an emphasis on training in a mountainous and cold weather environment, and only one JPMRC-AK winter training cycle has been completed thus far. Additionally, training areas across U.S. Army Forces Command (FORSCOM) lack mountainous terrain, and unlike some of our partners and near-peer adversaries, there has not been a requirement to train in the mountains to protect borders or resources. National security interests in Alaska, partner nation interests in the Arctic and sub-Arctic, and impacts from climate change have led to a shift in this mindset. In the Army's 2021 Arctic Strategy "Regaining Arctic Dominance," the Department of the Army defines Arctic-capable units as those "enabled by doctrine, trained at echelon, with the right equipment, and manned by Soldiers with the appropriate knowledge, skills, and abilities to successfully operate in the Arctic. These formations could be employed in other sub-arctic, extreme cold weather (ECW) and mountainous environments anywhere in the world."[13]

The Northern Warfare Training Center uses the Black Rapids Training Site (BRTS) in Alaska to conduct its training courses. BRTS is made up of more then 3,800 acres and is located south of Delta Junction.
Photo by CPT Edward Kwait

Photo by SSG Christopher Dennis

A student in the Advanced Military Mountaineering Course conducts a controlled fall on 12 July 2022 at Black Rapids Training Site in Alaska.

Arctic-capable units could be employed to fight in the vast tundra and sea ice north of the Arctic Circle across the globe, the 1,500-mile-long Himalaya mountain range which serves as home to the world's highest peaks and maintains a history of contention, or the rest of the mountain ranges that make up 38 percent of the world's landmass. The strategy outlines the resources available — NWTC, AMWS, and the Joint Pacific Alaska Range Complex (JPARC), which enable Arctic formations to meet the end state: fight, win and survive in extreme cold weather and rugged mountainous conditions over extended periods.[14] Lastly, the strategy alludes to echelons above brigade participating in annual requirements for combined arms maneuver in harsh terrain.[15]

Two recent exercises in the JPARC illustrate the importance of brigade-on-brigade training exercises in austere mountain and cold weather environments. The Center for Army Lessons Learned (CALL) identified significant gaps in training during the February Arctic Warrior 2021 exercise in the JPARC. In March of 2022, units were able to narrow the gaps identified in the previous exercise during the U.S. Army's first JPMRC-AK. During JPMRC-AK, the lessons learned for the two participating brigades focused on the importance for "Soldiers to be masters of their craft in Arctic warfare, not just to survive but to thrive in extreme cold weather and mountainous terrain."[16] This was a great step towards higher echelons developing the appropriate knowledge, skills, and abilities to operate in sub-arctic, extreme cold weather, and mountainous environments. As has been true in the past, individual and small unit proficiency is the foundation of success.

Building Mountaineering and Cold Weather Proficiency

On 6 June 2022, the 11th Airborne Division was activated at Fort Wainwright and Joint Base Elmendorf-Richardson, AK. Guidance from the division commander includes plans to conduct another JPARC JPMRC exercise in the winter of 2023 and a focus on mountain, extreme cold weather, high-latitude, and high-altitude training throughout the year. NWTC provides small unit leader training to support this guidance. Units outside of Alaska may be tasked to support mountain or cold regions operations and have an obligation to leverage existing experience, seize educational opportunities, and build expertise in cold regions and mountain operations.

All these obligations were accomplished from 2019 to the present in the 10th Mountain Division. In 2019, COL Scott W. Horrigan, previous battalion commander of 1st Battalion, 32nd Infantry Regiment, set the precedence for unit-level mountain warfare training when he tasked his staff to develop a training concept culminating in a tactical field training exercise (FTX) in the Adirondack Mountains of New York. Fortunately, there was mountaineering knowledge available within the organization that was aligned against the task. SFC Seth N. Toy, Level III mountain leader and previous NWTC senior instructor from 2012 to 2016, was crucial in sculpting and implementing individual and collective training across the battalion. He started with inspecting all the battalion's High Angle Mountaineering Kits (HAMKs) and cutting each rope and cord to the appropriate length. Next, he integrated all qualified Soldiers within the battalion into the instruction of mountaineering tasks that corresponded with the skills required for the FTX. Under his supervision, these instructors trained the battalion in individual and collective tasks progressing from basic knot tying and squad mobility systems to platoon tactics for establishing expedient squad rappel lanes on Fort Drum. The culminating event for 1-32 IN mountaineering training was the tactical company FTX in the Adirondack Mountains. This exercise included a fixed-rope infiltration established by the scout platoon to mass combat power on the objective, a company raid, and a 40-foot rappel exfiltration off Cathedral Rock.

Since then, the division's mountaineers have teamed up as a part of a Mountain Cell to serve as advisors and supervisors for mountaineering training. Soldiers have continued to conduct individual mountaineering training at smaller echelons, and four Soldiers from Fort Drum attended the

NWTC's Advanced Military Mountaineering Instructor Course in Boulder, CO, in 2021 and 2022. The availability of military mountaineering-qualified Soldiers continues to be a worthwhile resource to build additional expertise within the 10th Mountain Division. However, high operational tempo focused on the requirements of the rapidly deployable division inhibits a robust mountaineering training program at echelon. Despite the lack of a company-level tactical mountaineering exercise since 2019, the lessons learned prove that realistic mountain warfare training is possible for any unit.

Mountain and cold regions proficiency is important for the U.S. Army. The drastic changes in the newly re-designated Alaskan 11th Airborne Division demonstrate commitment to achieving the end state outlined in the Arctic Strategy. As higher headquarters continues to refine the arctic-capable formation, we must leverage available experience, seize educational opportunities, and build expertise in cold regions and mountain operations. These subject matter experts have been crucial to the success of military operations in the past, continue to demonstrate their value in the present, and are necessary to prepare for mountain warfare in the future.

As higher headquarters continues to refine the arctic-capable formation, we must leverage available experience, seize educational opportunities, and build expertise in cold regions and mountain operations.

Notes

[1] LtCol Scott W. Pierce, U.S. Marine Corps, "Mountain and Cold Weather Warfighting: Critical Capability for the 21st Century," (School of Advanced Military Studies, U.S. Army Command and General Staff College, 2008): 5-6.

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Photo by CPT Edward Kwait

Soldiers from 1st Battalion, 32nd Infantry Regiment rappel down Cathedral Rock during training in the Adirondack Mountains of New York in August 2019.

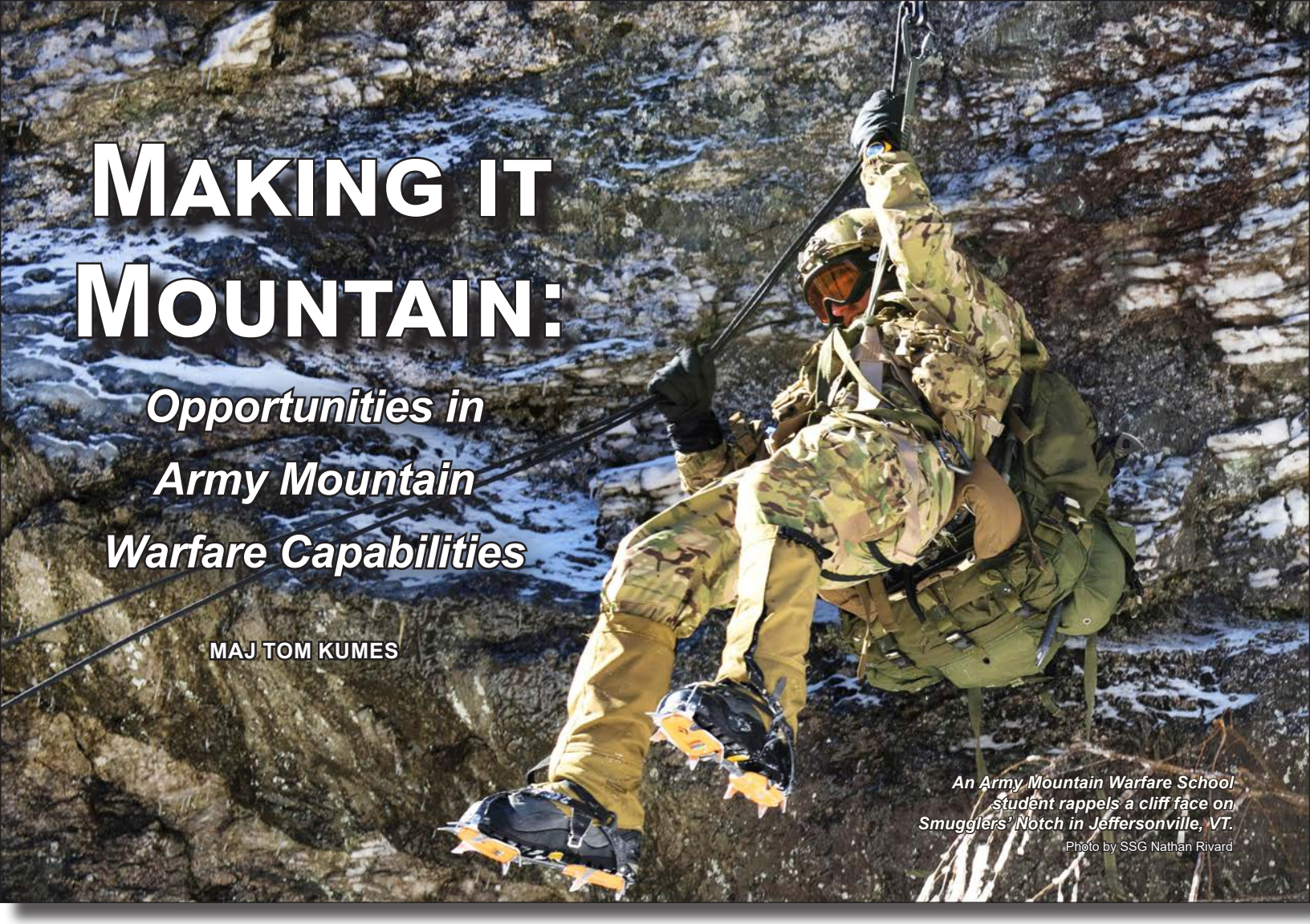
CPT Edward M. Kwait currently serves as the Training Branch OIC for the Northern Warfare Training Center (NWTC), 11th Airborne Division, Fort Wainwright, AK. His previous assignments include serving as a scout platoon leader, heavy weapons platoon leader, and operations officer with 1st Battalion, 32nd Infantry Regiment, 1st Brigade Combat Team, 10th Mountain Division, Fort Drum, NY. He is a graduate of the Infantry Basic Officer Leader Course, Maneuver Captains Career Course, Ranger Course, Reconnaissance and Surveillance Leaders Course, Air Assault Course, Basic Airborne Course, Mountain Warfare Course, Rappel Master Course, Basic and Advanced Military Mountaineering Courses, and Cold Weather Leaders Course. CPT Kwait earned a bachelor's degree in kinesiology from Temple University.

Peter D. Smith currently serves as training specialist at NWTC. He is a graduate of the Infantry Captains Career Course, Ranger Course, Basic Airborne Course, Bradley Leader Course, Basic and Advanced Military Mountaineering Courses, and Cold Weather Leaders Course. He earned a bachelor's degree in biology from the U.S. Air Force Academy and Master of Social Work from the University of Southern California.

Making it Mountain:

Opportunities in Army Mountain Warfare Capabilities

MAJ TOM KUMES



An Army Mountain Warfare School student rappels a cliff face on Smugglers' Notch in Jeffersonville, VT.
Photo by SSG Nathan Rivard

In the coming months, the 10th Mountain Division is set to undergo a change to its modified table of organization and equipment (MTOE) that will make it the only active component U.S. Army Forces Command (FORSCOM) entity with a stated focus on mountain and cold weather operations. The division's MTOE will reflect a requirement that additional enlisted positions per brigade are coded for the Special Qualification Identifier (SQI)-E (Military Mountaineer), which will serve as a forcing function to ensure more Soldiers across the division receive specialized training in military mountaineering. In ushering in this change, 10th Mountain Division leaders have made the most significant moves progressing Army mountaineering in the past decade. It is a tremendous start, but we have a way to go in establishing the essential capabilities needed to master the unique operating conditions imposed by the mountains.

The 10th Mountain's addition of designated military mountaineer positions onto its MTOE will help drive the development of their mountain culture and improve the mobility and lethality of their formations. Having more qualified mountaineers concentrated in one organization will make significant inroads in establishing best practices and tactics, techniques, and procedures (TTPs). Critically, this will bring the force more in line with the principles dictated in U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 252-8-2, *The U.S. Army Learning Concept for Training and Education 2020-2040*. By nature, an active-duty organization focusing on relevant applications to the contemporary operating environment (COE) will cultivate a much wider talent pool and facilitate "…seamless transitions… into and out of operational units and institutional opportunities."[1] Five years from now, the Army Mountain Warfare School (AMWS) and our sister schoolhouses at the Northern Warfare Training Center (NWTC) and 5th Ranger Training Battalion (RTB) will provide better education thanks to an influx of instructors experienced in mountain operations. During the coming assignment cycle(s), Soldiers from AMWS, NWTC, and 5th RTB should receive priority consideration for leadership assignments within 10th Mountain to drive the cultural shift and ensure that the right training, people, and leadership is positioned to facilitate the organization's success.

Prior to the 10th Mountain MTOE change, the 86th Infantry Brigade Combat Team (IBCT) (Mountain) was the only designated mountain brigade in the Army. The 86th IBCT is a National Guard unit headquartered across the street from AMWS on the Ethan Allen Firing Range (EAFR) in Jericho, VT. Elements of the 86th are spread between Vermont, Maine, New Hampshire, Massachusetts, Connecticut, and Colorado. The 86th IBCT has more than twice the density of SQI-E positions than comparable 10th Mountain brigades. In

the coming years, additional changes to the 10th Mountain MTOE should be considered to standardize capabilities so senior leaders can better conceptualize the unique skills these organizations bring to the COE.

Currently, there is no additional skill identifier (ASI) available for officers or warrant officers denoting their status as military mountaineers akin to the SQI-E awarded to enlisted Soldiers. As such, there is no requirement for leaders selected for mountain units and training institutions to have attended "Mountain School." This is counterintuitive and easily fixable. While many officer positions are coded for ASI-5S (Ranger Parachutist), Mountain Phase of Ranger School focuses on very different skillsets than the Basic Military Mountaineer Course (BMMC), as evidenced by the fact that all Mountain Phase instructors at 5th RTB go through BMMC as part of their instructor development and risk mitigation plan. In establishing a military mountaineering ASI for the officer community, we will double down on our commitment to the mountain mentality at all echelons. It will aid the Army Interactive Marketplace (AIM) in identifying and selecting those officers who have demonstrated a desire and commitment to mountaineering for the right positions.

There are also considerations of geography in posturing our mountain forces. Gaining and maintaining proficiency in the mountains requires living and training in the mountains. Neither Vernon Parish, LA, nor Watertown, NY, are renowned for their towering peaks and rolling hills. Overcoming a lack of mountain terrain at home station presents a long-term conundrum to 10th Mountain leaders. Compounding this is the struggle to balance required training metrics versus the (currently) unquantified mountain skillsets. Until military mountaineering is tied to specific mission-essential tasks (METs) and a mission-essential task list (METL) is developed specific to mountain units, balancing mountain proficiency against the Regionally Aligned Readiness and Modernization Model (ReARMM)-dictated training gates will remain a challenge. Long term, the Army should examine developing existing training areas along similar lines to what the Marine Corps has done in developing their Mountain Warfare Training Center in Bridgeport, CA, where they are able to conduct large-scale force validation in an alpine environment.

A competent mountain organization must be fundamentally organized and equipped differently than their light counterparts. Basic soldier loads must be kept to an absolute minimum to retain mobility and situational awareness. While a step forward, current Joint Light Tactical Vehicle (JLTV)/high mobility multipurpose wheeled vehicle (HMMWV) substitutes like the Infantry Squad Vehicle (ISV) and Light Reconnaissance Vehicle (LRV) will often still prove impractical. Sustaining forces in a mountainous environment will require greater reliance on aerial resupply where available and utilization of lighter wheeled platforms than what forward support companies (FSCs) are currently equipped with. The organization of a mountain brigade support battalion (BSB) may need to be examined to incorporate niche skillsets like advanced sling-load operations, animal packing, and tramway construction/operation, or even consolidation of Level II assault climbers into a "mountain guide" element similar to pathfinder formations (think of it as the rigger company equivalent for mountain organizations).

An Army Mountain Warfare School student scales the mountain at Smugglers' Notch in Jeffersonville, VT, on 16 February 2016.

Photo by SSG Nathan Rivard

The majority of Army-issued mountaineering gear in the High Angle Mountaineering Kits (HAMKs), Snow and Ice Mobility Kits (SIMKs), and Assault Climber Team Kits (ACTKs) were issued in 2014 and have since expired. Replacement components are often unavailable, or worse, have been sitting in a warehouse for nearly a decade and aren't safe for use. Commercial-off-the-shelf (COTS) solutions are available to bridge the gap, but a deliberate effort is needed to achieve a long-term remedy. There are several pieces of individual equipment that mountain organizations need to be successful including a mountain boot, cold weather boot, and integrated glove system. We have an opportunity and an imperative to standardize solutions across the force so

Photo by SSG John Yountz

Soldiers from 1st Battalion, 503rd Parachute Infantry Regiment move up a mountain to establish an observation post during mountain warfare training with the Italian Army's Alpini Brigade on 2 October 2022.

that Soldiers gain equipment proficiency and familiarization that follows them from assignment to assignment.

It's imperative that across the force we understand that arctic is not mountain. After the publishing of the "Regaining Arctic Dominance" document in January 2021 and reflagging of our Alaska-based units to the 11th Airborne Division "Arctic Angels," it's been in vogue to equate these two distinct operating environments and relate proficiency in one to the other.[2-3] While there are some similarities, asking a force to specialize in both, especially in the infancy of its specialization(s), will result in proficiency in neither. Arctic operations primarily require skill in operating in extreme cold weather environments. Many mountains are not situated in cold weather environments. Much of the arctic is flat. I'm writing this from the Huachuca Mountains; the training, equipment, and mindset I need to operate effectively here is vastly different than what I need to traverse a glacier in the Arctic Circle.

Achieving a robust mountain capability will require a more nuanced approach than framing the problem as just another stoplight chart. Change is hard, and the successful development of these capabilities will require fundamental changes to the way some of our organizations look and conduct business. As once noted, "You are either a zealot or a martyr."[4] Leaders in these burgeoning mountain organizations need to embrace change and uncertainty as we develop the infrastructure to enable our future success.

Mountains make up 24 percent of the Earth's surface and house 10 percent of the world's population; a disproportionate amount of armed conflict is fought in the mountains.[5] In terms of our greatest competitor, 33 percent of China's total area, much of it on their borders and immediate periphery, is mountainous terrain.[6] The People's Liberation Army (PLA) has multiple light brigade-sized units that live and train at elevations upwards of 13,000 feet. They have a medium brigade equivalent stationed above 4,500 feet.[7] They have a tank specially designed to function at altitudes above 15,000 feet.[8] Not known for their robust away game, likely conflicts involving the PLA will take place in the mountains, as recently witnessed in the Doklam standoff on the shared border between India/China/Bhutan and Ladakh incident along the China/India Himalayan border.[9-10] Were China to become expeditionary, their most likely target remains Taiwan. Central and eastern Taiwan is a nightmare of complex, compartmentalized, and severely restricted terrain with more than 200 peaks above 9,800 feet.[11] Outside concerns about our near-peer competitors, we must remember that mountainous terrain remains a corresponding factor predictive of insurgency and civil war.[12] The need for mountain-capable units within our force structure is real and here to stay.

Notes

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Mountain Operations

Mountain Alpine Forces for Strategic Competition

MAJ GERARD T. SPINNEY
MAJ EVAN K. MAIR

Evolving light infantry divisions require direction, justification, and resources to meet the emerging threats of strategic competition. The Army must transition to meet current Russian and potential future People's Republic of China aggression. Historically, light infantry divisions provide the Army and the joint force with rapidly deployable forces able to operate in all environments, including in austere conditions, at altitude, and within the arctic climate. This article proposes that a light infantry division transforms into a mountain alpine infantry formation, capable of rapidly deploying and executing a broad range of missions across the joint competition continuum.

This article provides the ***why***, the ***what***, and the ***how*** necessary for developing the future mountain alpine infantry formation for the joint all-domain force. The scope centers on two primary questions: First, why must the Army man, train, equip, and organize future division formations to win in extreme cold weather, mountainous, and high-altitude environments? Second, what is the utility of light infantry formations within multidomain operations doctrine during a period of strategic competition? The simple answer to these questions is that a future mountain alpine division would offer the unique advantage of providing high-impact results at a low cost.

The mountain alpine infantry formation would provide the joint force with specific land combat power capabilities, including strategic mobility (depth), a decentralized and highly flexible organization (agility), low-cost modernization, and rapid integration to joint task forces (convergence) — all of which maintain its advantage of being able to strategically deploy faster and with fewer resources than mechanized forces (endurance). Alpine infantry formations would be uniquely capable of providing combined arms capabilities across multiple domains. Additionally, aligned with the original purpose of the light infantry division, the alpine infantry formations would use infiltration operations through rough terrain to create and exploit positions of relative advantage for terrain denial during periods of cooperation, competition below armed conflict, and armed conflict. The transformation of a light infantry division into a mountain alpine infantry formation requires low-cost modernization, worldwide partnered training opportunities, and the continued development and retention of the Army's toughest Soldiers and leaders.

The Why: Specialization for Alpine Domination

During the last 18 years, the Army has deliberately forged a modular force capable of fighting and winning independently in a complex world across a full spectrum of conflict. This evolution made the force more flexible during the global war on terrorism, including adopting a standardized structure for all division headquarters elements. This transition was a timely decision based on threat analysis, recent lessons learned in Afghanistan and Iraq, and resource constraints.

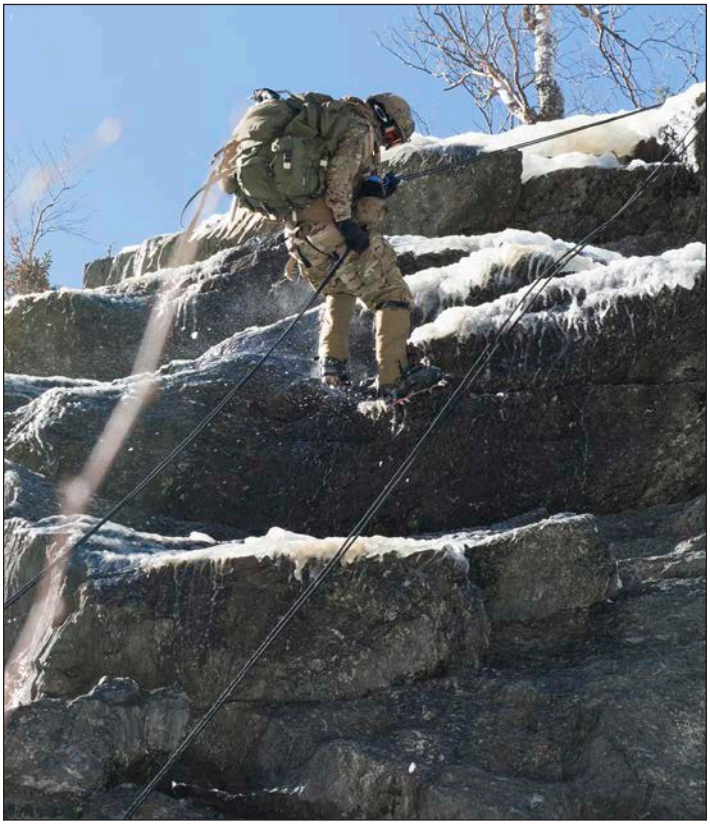

Photo by SSG Nathan Rivard

A student at the Army Mountain Warfare School rappels a cliff face on Smugglers' Notch in Jeffersonville, VT.

Historically, great power competition required highly trained, rapidly deployable light infantry forces. Examples include the British actions in the Falkland Islands (1982), Israeli operations in Lebanon (2006), U.S. initial actions in Afghanistan (2001), the Second Nagorno-Karabakh conflict (2018), and the recent Russian invasion of Ukraine, which reveal that decisive forces do not always have to be armored forces. Historically, a light infantry division has a greater tooth-to-tail ratio than other Army divisions and will be deployable much faster than a heavy division. The light infantry division must also be an expeditionary force prepared to operate in all

environments. They will also be available for contingencies elsewhere, including regions that lack a developed support infrastructure. Subsequently, light infantry divisions must still evolve and modernize to maintain strategic relevance and tactical effectiveness.

To remain relevant in strategic competition, a mountain alpine division must see the world as a globe rather than a map.[1] This approach allows the military to maximize the opportunities of the arctic "northern routes" to speed force projection from the continental United States to points around the globe. The arctic region extends across multiple geographic combatant command areas of responsibilities. A mountain alpine division must adapt, posture, train, and equip future combat power to support and enable multidomain operations in extreme conditions and rugged terrain over extended periods.

Additionally, regaining dominance in mountainous and cold weather environments provides new opportunities to engage and train with allies and partners as the division modernizes with Force Design Unit (FDU) 2030 and beyond. The Army's Arctic Strategy explicitly states that if there is an arctic contingency response, the Army forces responding must have the proper training for operating in the arctic environment, the right equipment that can function in the challenging terrain and extreme conditions, and then they must have the ability to sustain the force over extended distances.[2] Strategic competition takes place in many regions with mountainous or cold weather areas, thus requiring future mountain alpine forces to train with and assist new strategic partners.

The 2022 National Defense Strategy (NDS) states that mutually beneficial alliances and partnerships are an enduring strength for the United States.[3] A mountain alpine infantry division can contribute to our nation's enduring strength with its many potential partners who share similar training environments. Training with allies and partners with like formations would strengthen our country's relationships and also provide opportunities to share lessons learned in mountainous and cold weather training and with special equipment. The alpine infantry formations' rapid deployability can provide combat forces to critical regions during competition and crisis. A mountain alpine force's presence could affect the outcome of hostilities by demonstrating U.S. resolve and capability during an accelerated transition from crisis to conflict.

The What: Alpine Infantry Formations

As an integrated deterrence force, alpine infantry formations must be combat credible and able to fight anytime, anywhere, and against any opponent. This demanding mission requires the highest degree of tactical excellence and unit readiness. To meet this challenge, alpine infantry formations must be capable of infiltration operations for terrain denial. The division will need to be able to deny the enemy key terrain using initiative, stealth, and surprise, especially in enduring regional competition and limited armed conflict. Alpine infantry formations will be "key terrain-focused" forces, experts in fieldcraft and masking, skilled in countermobility techniques, and quick to seize advantages provided by their

Paratroopers from 2nd Battalion, 503rd Parachute Infantry Regiment provide covering fire during training in Italy on 3 Ocober 2022.

Photo by SSG John Yountz

tough Soldiers and NCOs. These formations will be a highly responsive division organized for a wide range of missions during cooperation, competition below armed conflict, and armed conflict, mainly where close-fighting terrain exists.

In addition to cooperation and competition below armed conflict, mountain alpine infantry forces can also be employed during large-scale combat operations (LSCO). During LSCO, mountain alpine infantry forces will require reinforcement with corps enablers to increase combat power and sustainability. The alpine infantry formations could assume supporting missions during LSCO, freeing Stryker and armored brigade combat teams for decisive points elsewhere. The alpine infantry formations will maintain organizational flexibility so they can be tailored for different missions. Mountain alpine infantry forces will habitually operate as combined arms teams with organic engineers, artillery, aviation, and air defense. They will operate independently at brigade, battalion, and company levels when suitably augmented and organized for specific missions.

Superb leaders, fighting Soldiers, and demanding training must be the hallmarks of mountain alpine infantry forces. Soldier Power will make the mountain alpine forces uniquely effective through their tough, patient, and self-reliant identity. Soldier Power derives from education, rigorous training, physical and mental toughness, fieldcraft, and innovative leadership. Mountain alpine forces will leverage innovative multi-level training, modernized high technology, and cross-domain convergence to give Soldiers a crucial edge over their future adversaries by Soldier-focused kill-webs. Mountain alpine infantry leaders will establish a resilient command climate and serve as role models for tactical skill and technical modernization, physical toughness, and moral behavior.

Additionally, alpine infantry formations must be specially equipped for the mission. Modernized technology will enhance command and control, firepower, sustainment, and ground mobility. Developing modernized mountain alpine capable equipment and combat resources will become an integral part of the Army's Regionally Aligned Readiness and Modernization Model (ReARMM) process. Modernized mountain alpine equipment requires reduced size and weight for strategic mobility and tactical effectiveness. Modernized communication sets to enable rapid integration into the Joint All-Domain Command and Control (JADC2) ecosystem are critical to becoming capable of multidomain operations. Having the right properly trained and led Soldiers, with the right skills and equipment, alpine infantry formations will make an impact wherever the mission requires.

Mountain alpine infantry formations must drive the modernization and transformation process for other arctic forces. The DoD enterprise must recognize mountain alpine forces' political, operational, and tactical utility as an integrated deterrence "inside force." The concept is relevant because it involves the development of highly mobile, rugged, and hard-hitting combat units with a higher ratio of combat-to-support capabilities with comparatively small modernization requirements. With modernization and strategic employment, the mountain alpine formation can be used to understand and shape the operational environment and operate as the premier "inside force" across mountainous and sub-arctic conflict zones. If funded and organized, mountain alpine forces will increase the Army's combat power and, as a result, play a significant role in future U.S. contingency response.

The alpine infantry formations could assume supporting missions during LSCO, freeing Stryker and armored brigade combat teams for decisive points elsewhere. The alpine infantry formations will maintain organizational flexibility so they can be tailored for different missions.

In support of the 2022 NDS's integrated deterrence effort, the alpine infantry formations will seek to develop their warfighting capabilities with allies and partners who also operate within cold, mountainous, and high-altitude environments.[4] Through collaborations with key allies and partners, current light infantry formations such as the 10th Mountain Division, 25th Infantry Division, and the new 11th Airborne Division must re-address doctrine, training, and equipment. As mentioned in the previous section, a mountain alpine division would actively seek training opportunities with allies and partners with similar formations throughout the other geographic combatant commands.

The How: Building the Mountain Alpine Infantry Formation

The mountain alpine infantry formations initiative cannot be "business as usual," and these forces' transformation must reach maturity quickly. Their mission is to deploy tonight and infiltrate to fight tomorrow. Many of the concepts of light infantry are already time proven. The evolution of the light infantry concept must remain within the constraints of combat readiness. Division missions, structure, equipment, and employment concepts must be carefully evaluated and should apply lessons to the other light divisions as well.

Personnel Readiness. Personnel readiness is the source of "Soldier Power," and it must remain the top priority in alpine infantry formations. Mountain alpine infantry forces require quality officers and NCOs. Leaders must demonstrate critical skills and behaviors such as innovation, agility, endurance, diversity of thought, depth of cold weather, and mountain life experience. Leadership positions will require Ranger and mountaineer training. Unit commanders will be among the most experienced officers in the Army, and the most technically advanced, physically and mentally tough trainers must be available to fill NCO leader positions.

Austerity in the mountain alpine infantry design demands that the division have maximum personnel readiness. This will allow horizontal and vertical development across the ReARMM cycle. With a more stable unit environment, alpine

infantry formations will produce tight-knit, self-confident, competent units capable of withstanding the most demanding stresses of war. The ReARMM cycle will be used to provide modernized mountain alpine infantry battalions beyond Army 2030.

Equipment Readiness. Mountain alpine infantry forces must test and modernize the most effective weapons and efficient cold weather equipment. The development of new lightweight weapons and equipment must consider the unique operating characteristics of mountain alpine infantry. The new design will include commercial off-the-shelf (COTS) equipment that is lightweight, highly deployable, man-portable, highly reliable, and simple to maintain and support at extended range over rough terrain.

Critical developments for mountain alpine forces are modernized anti-tank weapons, shoulder-fired air defense weapons, weaponized unmanned aerial vehicles, and longer-range precision artillery. Mountain alpine forces require modern lightweight, securable, anti-jam, joint communications equipment necessary for integration into the JADC2 ecosystem. Divestment of big and bulky vehicles that are non-conducive to mountainous terrain must be a priority to begin fielding vehicles better equipped for the harshest environments. Modernized equipment will enable the mountain alpine forces to conduct infiltration operations in a decentralized and independent method. Finally, mountain alpine forces will require additional electronic warfare, space, and information-dominance capabilities to achieve the depth and endurance under multidomain operations doctrine.

Supply Readiness. The unique support structure of the alpine infantry formations will require innovative logistics concepts, equipment, and organizations which take advantage of modernized technology and unit productivity enhancements. Operating in extreme environments will need innovative ways to manage batteries and generate water sources. Mountain alpine forces will require substantial increases in lightweight fire support systems similar to modernized, lightweight 105mm howitzers and 120mm mortars. Corps support enablers will augment the division when the mission or geography is required. Future support initiatives, programs, and funding must improve support to families, minimizing the impacts of frequent deployments and fostering the mountain community image of the Soldiers and families in the future infantry divisions.

Training Readiness. Training is the most critical element of the mountain alpine infantry concept. It must also promote cohesion when leaders and Soldiers share stress and hardships.

Individual training must concentrate on critical fieldcraft skills as well as basic infantry and support skills. Essential to individual skills in mountain alpine forces is expanding mountaineering skills through establishing the Special Qualification Identifier (SQI)-E (Military Mountaineer) and additional advanced training through course attendance at the Army Mountain Warfare School or Northern Warfare Training Center. Basic and advanced mountaineer courses teach light formations to operate effectively and safely across complex, high-angled terrain and extreme climates. Mountaineering skills also cultivate independence, initiative, navigation, and leadership skills within the officer and NCO Corps.

Photo by John Pennell

A Basic Military Mountaineering Course student crosses a rope bridge over a mountain gorge during training at the Northern Warfare Training Center's Black Rapids Training Site in Alaska on 15 August 2020.

Photo by SGT Gregory Muenchow

Soldiers assigned to 2nd Battalion, 87th Infantry Regiment, 2nd Brigade Combat Team, 10th Mountain Division, and Chilean army soldiers assigned to 3rd Mountain Division, cross-country ski at the Chilean Army Mountain School in Portillo, Chile, on 27 August 2021.

Training as combined arms teams will continue to be standard. Combat leaders will practice infiltration by integrating the initiative, stealth, and surprise inherent in mountain alpine infantry operations with the firepower of artillery, air defense, aviation, and joint support. Periodically, mountain alpine infantry must train with joint and NATO partner forces within the continental United States and abroad to meet a broad range of potential employment needs. A mountain alpine formation would seek foreign military mountain warfare schools to send their Soldiers and leaders.

Off-post deployments, including overseas training, must become routine so that leaders and units have maximum opportunities to develop and mature. Tailored mountain alpine infantry combined arms forces will train to meet constrained deployment times using emergency deployment readiness exercises from the company team through the division level. Frequent training with Air Force and Navy forces will be critical to MDO integration.

Conclusion

A mountain alpine infantry formation would provide the Army with a highly responsive, rapidly deployable force capable of operating in all environments, including in austere conditions, at high altitudes, and within the arctic climate. Mountain alpine forces will consist of the toughest and most resilient Soldiers in the Army. A mountain alpine infantry formation would be the unit of choice for all missions within the harshest of environments.

Notes

[1] Headquarters, Department of the Army, "Regaining Arctic Dominance: The U.S. Army in the Arctic," 19 January 2021, 3.

[2] Ibid, 10.

[3] Department of Defense, "2022 National Defense Strategy Fact Sheet," 28 March 2022, 1.

[4] Ibid, 2.

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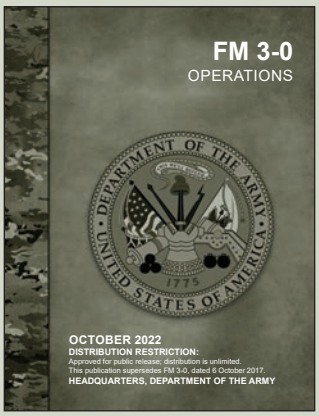
Updated FM 3-0, *Operations*, Released

The manual describes how the Army fights and addresses the challenges the nation faces between now and 2030. The manual, a product of the Combined Arms Doctrine Directorate at Fort Leavenworth, KS, provides a framework for Army operations and a baseline for all future Army doctrine.

The newly updated FM 3-0 establishes multidomain operations (MDO) as the Army's operational concept, with a focus on large-scale combat operations against peer adversaries who possess the capability to contest the joint force in all domains. The new doctrine defines MDO as "the combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders."

Available at: https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN36290-FM_3-0-000-WEB-2.pdf



The Army Mountain Warfare School

and the Past, Present, and Future of Military Mountaineering

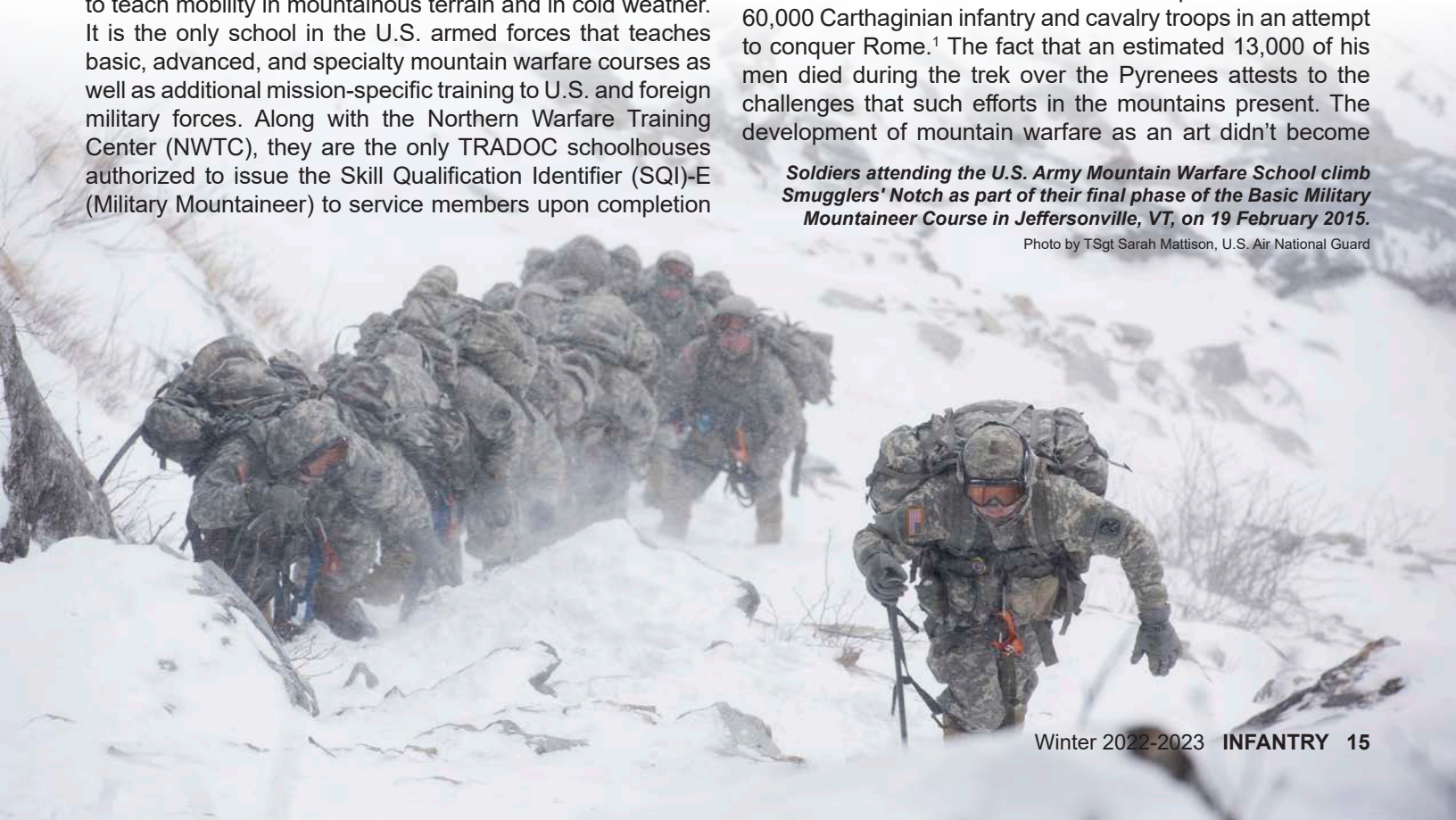
MAJ MICAH KIDNEY

The concept of military mountaineering has continuously evolved throughout the history of armed conflict, and the Army Mountain Warfare School (AMWS) in Jericho, VT, will continue to lead the way in the instruction of skills needed for U.S. forces to fight and win in those environments. Fighting in the mountains has historically proven difficult for any military unit due to challenges to maneuver, sustainment, and communications. In the future, the U.S. Army will continue to require units that can effectively conduct operations on vertical terrain and in cold temperatures. Due to these realities, the U.S. Training and Doctrine Command (TRADOC) depends on the AMWS to serve as the premier provider of the training of our maneuver leaders in alpine fieldcraft. AMWS instructors excel within that role and will continue to teach our warfighters to overcome the challenges inherent to mountain operations.

The AMWS is the executive agent for military mountaineering for its proponent, the U.S. Army Infantry School (USAIS). The ultimate objective for the school's instruction is to teach mobility in mountainous terrain and in cold weather. It is the only school in the U.S. armed forces that teaches basic, advanced, and specialty mountain warfare courses as well as additional mission-specific training to U.S. and foreign military forces. Along with the Northern Warfare Training Center (NWTC), they are the only TRADOC schoolhouses authorized to issue the Skill Qualification Identifier (SQI)-E (Military Mountaineer) to service members upon completion of the Basic Military Mountaineer Course (BMMC). Students who complete the basic course can return to continue their alpine education in the Advanced Military Mountaineer Course (AMMC). The school also offers three specialty courses — the Rough Terrain Evacuation Course (RTEC), Mountain Rifleman Course (MRC), and the Mountain Planner Course (MPC). The Soldiers and leaders who receive this instruction return to their units with the lessons that they've learned and pass those skills on to others in order to improve the mountain competency of their organizations.

Looking to the Past

A quick study of the history of military mountaineering offers clear evidence of its importance to today's Army. Traditionally, infantry forces have strived to occupy difficult alpine terrain in order to take advantage of the protection that ground provides as well as the tactical benefits it offers to those that control it. One of the first examples of strategic mountain operations occurred in 218 B.C. during the Second Punic War when Hannibal crossed the Alps with more than 60,000 Carthaginian infantry and cavalry troops in an attempt to conquer Rome.[1] The fact that an estimated 13,000 of his men died during the trek over the Pyrenees attests to the challenges that such efforts in the mountains present. The development of mountain warfare as an art didn't become



Soldiers attending the U.S. Army Mountain Warfare School climb Smugglers' Notch as part of their final phase of the Basic Military Mountaineer Course in Jeffersonville, VT, on 19 February 2015.

Photo by TSgt Sarah Mattison, U.S. Air National Guard

evident until the Middle Ages when the Swiss utilized the mountains to successfully defend their homeland. They did this by taking advantage of elevation and observation and fighting in small mobile formations from defensive positions on the high ground against the European monarchies that threatened them.[2] It was evident to the Swiss that the mountains and the harsh conditions that they presented were as much of a threat to their forces as the enemy. Unforgiving weather, jagged terrain, and the virtual impossibility of alpine logistics provided challenges that became unsurmountable for formations that were not specially trained in those conditions.[3] Force ratios needed to win engagements were cut in half for units which occupied dominant terrain and operated against forces that used predictable valley mobility corridors and then had to fight uphill. Italian Alpini units were among the first that could be considered experts in military mountain operations after their formation in 1872 to defend their northern mountainous borders in the Alps.[4] After seeing the Italians' success, other European nations with mountainous terrain followed suit and formed specialized units to fight on elevated ground.[5] In America, cold weather and mountain operations have been part of every conflict since the Revolutionary War, most famously when George Washington and the Continental Army reconsolidated on the frigid plateaus of Valley Forge, PA. The Civil War also had dozens of engagements involving units that utilized vertical terrain to their advantage including the Battle of Missionary Ridge and the Little Round Top engagement during the Battle of Gettysburg.

The concept of specialized mountain and cold weather units first entered into the minds of American military leaders in 1939 after studying the results of the Winter War where numerically inferior Finnish forces defended effectively against an invasion by the Soviet Union.[6] The Finns used superior knowledge of cold weather operations to inflict massive losses upon the Soviets and, in doing so, were able to maintain their sovereignty with the signing of the Moscow Treaty of 1940. Operating in extremely harsh winter conditions, Finnish forces destroyed two Soviet divisions and killed more than 120,000 enemy soldiers, often conducting operations on skis. At the time, U.S. Army decision makers were concerned that we did not possess the ability to defend against a German invasion that they anticipated would present itself through the Appalachian Mountains. Those decision makers took notice of Finnish success and immediately made plans to develop their own mountain fighters versed in cold weather operations.

On 15 November 1941, the 87th Mountain Infantry Battalion was activated at Fort Lewis, WA, and became the first American unit of specialized alpine soldiers. The next year the unit expanded to a regiment and relocated to Camp Hale in Colorado before it gained its first operational experience deploying to the Aleutian Islands of Alaska in the summer of 1943. Upon their return they were assigned to the newly formed 10th Light Division (Alpine), which was later renamed the 10th Mountain Division in December 1943. In 1944 and 1945, the 10th Mountain Division, composed of the 85th, 86th, and 87th Mountain Infantry Regiments, utilized mountain skills in Northern Italy, most notably during the victories over German defenses on Riva Ridge and Mount Belvedere in the Apennine Mountains. The 10th Mountain Division was deactivated after the war but was eventually reactivated in 1985 at Fort Drum, NY, reconnecting the unit to its historical accomplishments. The 10th Mountain Division currently operates as a light infantry division without a specifically tasked mission to conduct mountain operations and, since its reactivation, has become the most deployed unit in the Army. The only currently active U.S. Army unit that is specifically tasked to conduct mountain operations is the 86th Infantry Brigade Combat Team (Mountain) out of Jericho, VT, that deployed to Iraq in 2004, Afghanistan in 2010, and multiple other locations across the Middle East, Africa, and the Balkans in 2021. The 3rd Battalion, 172nd Infantry from the 86th is one of the only National Guard units to be awarded the Valorous Unit Award for its actions fighting in the mountains of eastern Afghanistan in 2010 while attached to the 3rd Brigade Combat Team (Rakkasans) of the 101st Airborne Division.[7]

Although active Army units specifically tasked with mountain operations were deactivated after World War II, Army training schools continued to teach those critical alpine skills to individuals and units. The first Army alpine school was the Mountain Training Center at Camp Hale, which was initially stood up in 1942 using cadre from the newly formed 87th Mountain Infantry Battalion. It was tasked with providing cold weather and mountain training to units preparing to head overseas to fight in World War II. Following the inactivation of 10th Mountain Division in 1945, the War Department understood that maintaining mountain warfare capabilities was critical to our success in future conflicts and kept those

U.S. Army photo

Soldiers in 3rd Battalion, 172nd Infantry Regiment prepare to load onto a UH-60 Black Hawk after a mission in Paktya Province, Afghanistan, on 1 May 2010.

alpine training centers open. The Army later stood up the Army Mountain and Winter Warfare School in 1946 at Camp Carson in Colorado, using returning 10th Mountain veterans as instructors. The school continued to instruct those skills between Camp Carson and Camp Hale until 1957. The Army also opened up the Arctic Training Center in 1948 at Big Delta, AK, which eventually was renamed Fort Greely. After training ended in Colorado in 1957, the center in Alaska was first renamed the Army Cold Weather and Mountain School and then became the Northern Warfare Training Center in 1963, which is the name that remains today. NWTC, now in Black Rapids, AK, is the Army's primary provider of cold weather training and instructs individuals and units the skills needed to operate in arctic and mountainous terrain.

The Army's Arctic Strategy

Looking to the future, does the Army need a continued focus on cold weather and mountain operational proficiency? A quick study of the Earth's geography and changing climactic conditions in the Arctic clearly answers that question. With 25 percent of the world's surface and more than 38 percent of the world's landmass being classified as mountainous, we can be certain that the U.S. Army will continue to need units that can operate proficiently on vertical terrain and in cold weather.[10] Arctic ice has continued to dissipate at exponentially growing rates, and as a result, access and shipping routes into and through the Arctic have begun to open. It is also estimated that the Arctic contains 15 percent of the world's oil and 30 percent of the planet's natural gas.[11] Arctic and sub-Arctic nations, including our near-peer adversaries, have begun to expand claims into these environments to increase power projection, access these resources, and decrease shipping costs using these newly opened shipping lanes. One only needs to look at your office globe from directly above to see that the Arctic also provides the most direct approach for our peer adversary, Russia, to access U.S. territory in any future conflict.

As a result of these circumstances, both of our near-peer contemporaries, Russia and China, have begun to make bold moves to increase their Arctic presence. The Arctic is essential to Russia's military and international presence and they have invested billions in the development of infrastructure and military bases in the expanses north of their territorial borders.[12] This is a clear effort to expand power and influence into the Arctic region and gain access to the region's resources. China's attention to the Arctic region is primarily an effort to create a northern "Polar Silk Road" that would greatly decrease the oceanic travel distance and the cost of bringing its exports to the west when compared to its current shipping path in the south through the Suez Canal.[13] Both Russia and China's ambitions in the Arctic make it clear that they have strategic aims for the area. What does that mean for the U.S. Army and the Mountain Warfare School in Vermont? The answer to that question becomes clear as one reads the Army Arctic Strategy published by the Department of Army in January 2021. The document, titled "Regaining Arctic Dominance," clearly states our expanding national objectives in the cold environs to our north and a path to attain those goals. The AMWS was mentioned explicitly in the Arctic Strategy as being a key player in the development and instruction of the skills needed to operate in that unforgiving domain and address the growing opportunity that exists in the Arctic north.[14]

With 25 percent of the world's surface and more than 38 percent of the world's landmass being classified as mountainous, we can be certain that the U.S. Army will continue to need units that can operate proficiently on vertical terrain and in cold weather.[10]

The Army's current modernization efforts intend to transform our organization into a multidomain force by 2035. Traditionally, armed conflict has existed in three domains: ground, sea, and air, but in the last few decades it has become evident that we must be able to operate in two new domains, space and cyber. Our solution to this needed evolution exists within the concept of the multidomain task force (MDTF). Each of these MDTFs increase our ability to provide strategic deterrence and fight when called upon, in all five domains: ground, air, sea, space, and cyber. The Army has near-term plans to increase the current number of MDTFs from two to five, and one of those is earmarked for Alaska to counter Russian expansion into the Arctic.[15] This will dramatically increase the number of units and individuals who will need to be trained in cold weather operations. As stated in the Arctic Strategy, "This rejuvenated Arctic capability will increase the Army's ability to operate in cold-weather, mountainous, and high-altitude environments. This strategy poises the Army to adapt how it generates, postures, trains, and equips our forces to execute extended, multi-domain operations in extreme conditions in support of the Joint warfighter."[16]

Additionally, the June 2022 activation of the 11th Airborne Division in Alaska to become our third airborne division, alongside the 82nd and 101st, provides clear evidence of our expanding Arctic vision. This will only increase the demand for our service schools, including the AMWS, to continue to provide cold weather and mountain training to our Soldiers. Finally, the 10th Mountain Division recently added more military mountaineer positions to its modified table of organization and equipment (MTOE) in efforts to improve the unit's competency in the area that gives it its name. Adding these mountaineer slots will also profoundly increase the instructional requirement that lays at the feet of the AMWS.

Army Mountain Warfare School

In 1983 the Vermont National Guard activated Alpha Company in Jericho with the mission to serve as the state's mountain infantry unit. At the same time, the state also established the Mountain Warfare School to train members of that unit. The school initially occupied a small tin shack on Camp Ethan Allen, and together, the company and school served as

the initial component of the Army Regimental Mountain Concept Plan. The evolution of the Mountain Infantry in Vermont continued as Alpha Company expanded to become the 3rd Battalion, 172nd Infantry and eventually was flagged as the 86th Infantry Brigade Combat Team (Mountain) in 2006. Throughout that time the school continued to provide mountaineering training to Soldiers in that formation. In 1986, TRADOC approved the Mountain Warfare School's program of instruction (POI), which validated its instructional content. In 1987, an actual schoolhouse was built in the lower valley at Camp Ethan Allen, and in 1994 it was designated as the proponent of the military mountaineer skill identifier, called the "Ram's Head" device. The school was renamed the U.S. Army Mountain Warfare School in 2003 and was tasked with teaching mountaineering to all Soldiers, active and reserve, as well as other branches of the military, law enforcement, and foreign service members. The schoolhouse conducts courses 11 months out of the year and instructs more than 500 students annually in its two-week Basic Military Mountaineer Course. Initially, a service member needed to pass both the summer and winter iterations of the course to earn the coveted "Ram's Head" device, but since 2008 a Soldier only needs to complete one of the two phases to earn the "echo" qualification. The school has continued to provide relevant, sustainable, mission-focused mountain warfare training, and as a result the school has been designated a "School of Excellence" with accreditation by the U.S. Army Infantry School. It is also the only permanent non-European member of the International Association of Military Mountain Schools.

Training facilities on Camp Ethan Allen have continued to expand and currently include more than 25 square kilometers of training areas and live-fire ranges. On-post training sites include multiple rock-climbing and rappelling routes, an ice-climbing wall, biathlon trails, a ski slope with a renovated lift line, as well as dozens of maneuver training areas, all arrayed in challenging mountainous terrain. In addition to the Mountain School, the training area is utilized by active and reserve units in multiple service branches from across New England. AMWS' story is punctuated by the May 2022 opening of a new $27 million schoolhouse at Camp Ethan Allen that will increase its ability to train Soldiers. All courses considered, the school instructs about 1,000 Soldiers a year, but the demand has increased to over 160 percent of its current capacity. The new school building features state-of-the-art facilities including an increased number of beds and classrooms and a massive four-story indoor climbing wall. The new 80,000 square foot building will help the school meet the current demand that will only increase with the addition of the new mountaineer slots in the 10th Mountain Division as well as the expanded cold weather initiatives laid out in the Army's new Arctic Strategy.

AMWS Courses

The school currently runs both winter and summer courses in its Basic and Advanced Military Mountaineer Courses. BMMC trains Soldiers in mountain mobility and many other skills including land navigation, first aid, and casualty evacuation in alpine terrain. Students learn functional knots and rope systems needed to safely ascend and descend vertical terrain. Students utilize rock- and ice-climbing lanes to hone their skills that they eventually will share with their peers and subordinates back in their home units. The course lasts 14 days, averaging 14 hours a day, where students conduct practical, realistic, and strenuous hands-on mountaineering training. During the course, students become increasingly proficient in the fundamentals, principles, and techniques needed to conduct small unit operations in mountainous terrain and in cold weather conditions. The basic course of instruction focuses on Level 1 Basic Mountaineer tasks described in the TRADOC-approved Army mountain operations manual, Training Circular (TC) 3-97.61.

Photo by SFC Whitney Hughes

An instructor at the Army Mountain Warfare School demonstrates a casualty evacuation technique on 19 January 2022.

The Advanced Military Mountaineer Course also lasts 14 days and is designed to instruct specially selected students who excelled in the basic course and continue their alpine instruction with an eye towards becoming assault climbers. Assault climbers are trained and capable of leading and instructing mountaineering skills on technically difficult, hazardous, or exposed mountainous terrain. They are considered experts in small-unit mountain operations and can be counted on to safely lead and instruct basic military mountaineering skills and provide advisement to their unit commanders in decisions pertaining to alpine operations. The advanced course of instruction focuses on Level 2 assault climber tasks described in TC 3-97.61.

The AMWS also teaches three specialty mountain

courses. The Rough Terrain Evacuation Course focuses on medical and casualty evacuation. In this course students learn to safely transport a casualty from the point of injury to a higher level of care over and through vertical terrain in all climactic conditions. Students experience a mixture of classroom and field time to develop their medical skills in a variety of scenarios and practical exercises. The Mountain Rifleman Course is designed to train snipers to improve their shooting skills and lethality in high-angle situations. Students are instructed in mountain-specific marksmanship skills as the round trajectory changes from horizontal to near vertical through the thin mountain air. Soldiers are instructed in mountain and cold weather mobility, load management, and long-range marksmanship, all in challenging mountainous terrain. They are provided with extensive shooting opportunities on both flat and high-angle ranges and integrate practical exercises that put all of these skills to the test and validate that the shooter can plan and execute missions in alpine terrain. Finally, the AMWS offers the Mountain Planner Course, which is designed to train leaders to better understand the challenges of conducting missions in mountainous terrain and in cold weather conditions. Leaders who can better understand the challenges and requirements for alpine operations set their units up for success when conducting those missions. Students learn about the effects of altitude, vertical terrain, and cold weather on personnel, equipment, movement, reconnaissance, indirect fires, casualty evacuation, resupply, and water procurement. The course provides classroom instruction as well as practical exercises that address these challenges that include route planning, offensive and defensive operations, and patrolling.[8]

If you've ever attended or spoken to a Soldier who has attended one of the courses offered by the AMWS, what will have stood out is the competency and experience of the instructors. Due to the amount of time required to become certified to safely teach students on vertical terrain, instructors typically teach at the school for an extended period of time and become highly proficient in mountain skill craft. The school's 30 instructors have hundreds of years of cumulative climbing experience and extensive knowledge in the instruction of military mountaineering. Instructors at the schoolhouse have climbed hundreds of the world's most challenging summits and have provided guest instruction at most of the military mountaineering schools of our allied nations. They have attended European mountaineering schools in Austria, Germany, Italy, France, and Finland. The schoolhouse has also conducted mobile training teams to provide onsite training for active and reserve units across the country as well as to our foreign allies at alpine training centers around the world. They have been chosen as the Army's instructor of the year and have been called upon multiple times to save lives in critical real-world emergency situations in Vermont and across New England due to their expertise in alpine and cold weather operations.[9] As a result, instructors at the AMWS are commonly referred to as the best in the Army.

Conclusion

The history of military mountaineering shows us that we will continue to need units that can operate in alpine areas and in extreme cold weather. The changing strategic conditions of our world also make clear our nation's future requirements to fight and win in all climactic conditions, including in the frigid Arctic. As a result, we need schoolhouses that can teach those critical cold weather and mountain skills that are

Photo by SFC Whitney Hughes

An Army Mountain Warfare School student aims at a target during training on 24 January 2022.

needed for our warfighters to bring the fight to the enemy from the high ground. The AMWS has accomplished that mission since 1983 and will continue to answer the call to do so moving into the future.

Notes

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Army Builds Tool to Save Lives at High Altitude

CAREY PHILLIPS

Mountain climbing is risky business. When unacclimatized individuals rapidly ascend to altitudes greater than 8,000 feet, they put themselves at risk for suffering from high-altitude illnesses. The addition of hard physical exercise, typical of a military mission, increases this level of risk. Detecting these illnesses prior to occurrence has the potential to save lives.

U.S. Army Research Institute of Environmental Medicine (USARIEM) researchers recently returned from Taos Ski Valley, NM, where they completed their data collection for a tool that will predict Acute Mountain Sickness (AMS) in individuals prior to occurrence. Thirty-eight warfighters from the 3rd Armored Brigade Combat Team, 1st Armored Division at Fort Bliss, TX, volunteered to participate in this research this past summer.

"This tool (the AMS_alert algorithm) has the potential to save lives at high altitude and identify high-risk individuals before a casualty occurs," said Dr. Beth Beidleman, research physiologist with USARIEM's Military Performance Division. "AMS can progress into life-threatening high-altitude pulmonary edema [HAPE] or high-altitude cerebral edema [HACE] which both require evacuation. Both of these illnesses involve fluid either in the lungs or brain and can result in death within 24 hours."

One Soldier in last summer's study experienced all three high-altitude illnesses — AMS, HAPE, and HACE. "Fortunately, we were able to evacuate this volunteer to the nearest emergency room and there were no untoward or lasting effects, but this option is not always available when warfighters are on a mission in remote mountainous regions," said Beidleman. "Having a hypoxia monitoring system on board can be the difference between life and death."

Roughly 50 to 90 percent of unacclimatized warfighters will experience AMS symptoms when rapidly ascending to high altitudes greater than 8,000 feet, depending on the altitude. AMS can impact every aspect of a warfighter's physical and mental performance.

"If we can alert commanders and non-commissioned officers on the field in real time that someone is in trouble prior to occurrence of AMS, HAPE, or HACE, they can begin treatment early, adjust the mission, and plan evacuations safely."

Unlike other environments, the dismounted warfighter is the primary weapon platform at altitude, and the impact of hard physical exercise during ascent is understudied. One aim of this research study was to answer whether hard exercise during altitude ascent impacts the timing and severity of high-altitude illnesses. In addition, most warfighters live below 12,000 feet when deployed to altitude, and the majority of altitude research occurs at altitudes above 14,000 feet.

Warfighters operate in every terrain, elevation, climate and in any-and-all conditions. The AMS_alert algorithm provides a technological breakthrough in physiologic and genomic monitoring not only for the U.S. Army but also for civilian health-care providers, mountaineers, recreational athletes, and search and rescue teams. Read more about the study and AMS tool at https://www.army.mil/article/260429/army_builds_tool_to_save_lives_at_high_altitude.

Fighting as a Tactical Combat Force at NTC

LTC GORDON R. KINNEER
LTC ERIC B. PONZEK

As the saying goes, new things are old things happening to new people. This was the case in the summer of 2022 during the 56th Stryker Brigade Combat Team's (SBCT) recent National Training Center (NTC) rotation, where the brigade was tasked to organize a tactical combat force (TCF). The TCF concept has fallen out of the Army's lexicon in recent years, but with the flood of lessons learned from Ukraine, it is relevant again. The following article outlines Task Force (TF) Paxton's execution of the TCF mission during NTC Rotation 22-08 and provides some lessons learned from the experience.

Photo by CPT Cory Johnson

Soldiers from the 56th Stryker Brigade Combat Team, 28th Infantry Division maneuver their Stryker Infantry Carrier Vehicles during National Training Center Rotation 22-08 at Fort Irwin, CA.

What is a tactical combat force? The TCF has its roots in the creation of AirLand Battle (ALB) doctrine. In the days of ALB, the TCF was designated to defeat a Level III threat, and it still serves the same purpose today. The three levels of threat refer to increasing enemy combat capability, Level III being the most potent. Typically, a Level I threat consists of a small enemy force that can be defeated by units operating in the rear area. A Level II threat generally consists of enemy special operations teams, long-range reconnaissance teams, and attrited small combat units. This threat is an enemy force that is beyond the defense capability of base camps and clusters and any local reserve or response force.[1] During the development of ALB, doctrine writers analyzed the tactics of Warsaw Pact maneuver formations and realized NATO defenses in the rear area lacked the capability to counter a Level III threat, thus the TCF was born.[2]

As the Army reorients from a focus on counterinsurgency (COIN) operations to large-scale combat operations (LSCO), the need to address the Level III threat has returned. Lessons learned from the current war in Ukraine have identified the need to address security in the rear area. Commanders must now ensure their rear area combat forces have the capability to rapidly deploy a lethal combat element, in a sometimes vast area of operations, to defeat a potential armor or mechanized threat that seeks to disrupt their logistical operations. Because of the area that must be covered, the TCF needs to be highly mobile and lethal enough to destroy a Level III threat. Having that criteria in mind, TF Paxton (2nd Battalion, 112th Infantry Regiment) was able to task organize into small mobile teams to rapidly maneuver and counter any Level III threat as it emerged in the brigade's rear area.

While not a typical task for a brigade NTC rotation, adding

the TCF mission set enabled a training repetition for an additional battalion. Typically, an undermanned battalion formation is consumed by the parent brigade and its manpower redistributed to round out other battalions and the brigade staff. Assigning opposing force (OPFOR) elements to act as a Level III threat fundamentally changed how the brigade, the brigade support battalion (BSB), and the brigade engineer battalion (BEB) accounted for their security requirements in the rear area. TF Paxton deployed to NTC with overall reduced manning across the formation. It deployed without its scouts and mortar platoon and fielded a reduced battalion headquarters, headquarters company, forward support company (FSC), and a rifle company with its headquarters and two platoons. While light in terms of combat power, the task force organized into multiple combat and logistical elements to accomplish its TCF mission. These streamlined formations could cover enemy key avenues of approach as the brigade maneuvered out of Logistics Support Area (LSA) Santa Fe, through the Whale Gap, and ultimately west toward Razish and Ujen. Like most NTC rotations, TF Paxton quickly discovered what did and did not work and constantly refined its task organization in order to defeat the Level III threat, named "Desert Rat" by the OPFOR.

The leaders of TF Paxton understood their mission and the importance of operating dismounted Javelin teams to counter an armored formation. Because of the relatively small elements, command and control from the main command post (MCP) focused on battle tracking and information sharing up and out of the battalion MCP to the brigade MCP and laterally to adjacent units. The maneuver was largely left to the commander of Arrow Company and his platoon leaders, with guidance and direction provided by the battalion commander as needed. This also shaped how the MCP and combat trains command post (CTCP) were established. Because of the highly mobile nature of the TCF, and the size of the maneuver element, the battalion staff focused on the rapid decision-making process (RDSP). Prior to the brigade's first offensive operation, TF Paxton executed the military decision-making process (MDMP), followed by a battalion combined arms rehearsal (CAR) and multiple terrain model and technical rehearsals. During these events, the battalion staff quickly realized that RDSP would be the preferred method for quick planning and coordination due to the nature of the mission. Since the mission didn't really change and only the terrain and locations varied, much of the concepts of sustainment and support remained the same, thus enabling RDSP to occur efficiently across the battalion.

During execution of the TCF mission, TF Paxton's scheme of maneuver remained constant. The initial concept of the operation was to fight as dismounted small elements supported by a Stryker Infantry Carrier Vehicle (ICV). Two observation posts (OPs) would be supported by one ICV. The intent was to have a "slinky effect" where OPs would detect and engage the enemy, pulling the ICV forward to support as needed and then sending it back to a hide site that mutually supported both OPs. The element utilized the ICV in a multitude of ways: as a method to sustain the OPs, a non-standard casualty evacuation (CASEVAC) platform, a communication-relay platform, and a mounted weapons platform. TF Paxton had one Stinger team that protected the MCP and could be repositioned to one of the OPs based on the enemy air threat.

During the initial phase of the operation, the Level III threat (Desert Rat) penetrated deep into the brigade rear area through the Whale Gap and into No Name Valley. Fortunately, an intrepid Soldier destroyed two BMPs and one T90 in less than 10 minutes before the threat could mount an attack on the BSB. In subsequent phases, Desert

A team from Task Force Paxton scans the area for enemy targets during National Training Center Rotation 22-08 at Fort Irwin.

Photo by LTC Gordon R. Kinneer

Photo by LTC Gordon R. Kinneer

In the distance, the 2nd Battalion, 112th Infantry Regiment (Paxton) establishes its main command post prior to an attack on the notional city of Ujen on 4 July 2022 during National Training Center Rotation 22-08.

Rat was able to use terrain to its advantage, slip by an OP, and conduct a spoiling attack against the BSB. This mistake served as a good lesson for TF Paxton in the importance of engagement area development (EA DEV) and covering all avenues of approach appropriately. TF Paxton continued to refine its tactics, techniques, and procedures (TTPs) and mounted an effective fight against Desert Rat as the operation progressed.

The TF sustained multiple OP locations across the brigade's large rear area by using a logistics release point (LRP) model. With the field trains command post (FTCP) co-located with the BSB, the CTCP coordinated replenishment of all classes of supply and conducted field maintenance at their location. Located at the FTCP, the Arrow Company supply sergeant shaped the makeup of logistics packages (LOGPACs) based on the logistics status (LOGSTAT) of the OPs. At the OP locations, the supporting ICV moved to the nearest LRP location to receive LOGPAC and then ferried supplies to its supported OP locations. Because of the dispersed nature of OPs across the TCF operational environment, a modified system of tailgate resupply, in conjunction with the use of LRPs, provided the necessary logistical support to sustain the battalion. The distribution platoon was most likely to inadvertently gain contact with the Desert Rat element as it executed its LOGPAC mission. Because of this, a Javelin team was sometimes added to the platoon as it ran between the CTCP, MCP, LRPs, and FTCP.

Five primary lessons emerged from execution of the TCF mission during NTC Rotation 22-08. The first lesson learned was that adjacent unit coordination between the TCF, BSB, BEB, and brigade MCP is vital to having a clear friendly common operating picture (COP) during operations. Frequent communication between the TCF, BSB, BEB commanders and their respective staffs proved to be essential. At the battalion MCP, the COP needed to be friendly focused rather than enemy focused. Analog graphics should focus more attention to blue icons than red icons; knowing what was coming and going in and out of the rear area was critical to avoiding fratricide and understanding what may come into contact with the Level III threat along any given ground line of communication (GLOC).

Second, TF Paxton lacked the ability to effectively combine arms as the TCF without indirect fires. Without its mortar platoon and sections and low priority of fires, TF leaders could not shape their engagement areas and engage the enemy at a distance. Clearance of fires is complex in the rear area due to the amount of friendly elements moving within the TCF area of operations (AO). Fire support coordination measures (FSCMs) must be universally known and coordinated across the brigade rear area in order to provide the TCF accurate and timely fires when the Level III threat is located. Because of the low priority of fires for the TCF and the location of the position area of artillery (PAA), battalion and company mortars are the best indirect fires asset for any TCF commander.

Third, the brigade must clearly delineate who is responsible for what in the rear area. In order for the TCF to be successful, the brigade must clearly articulate who is responsible for the various security tasks required in the rear area to avoid duplication of effort and squandering combat power. Assigning the TCF sole responsibility for countering the Level III threat and the BEB responsibility for countering the Level I and II threats allows each element to better utilize their combat power effectively. The BEB's attached MPs are more than capable of defeating Level I and II threats; however, they would become quickly overwhelmed when attempting to maneuver against a Level III threat. Conversely, if the TCF has to counter all levels of threat, its

response to the appearance of armor or mechanized forces in the rear area will not be effective.

Fourth, the TCF MCP must be lean, agile, and rapidly deployable. Use of camouflage netting and vehicle-mounted command and control (C2) systems in place of tents enabled TF Paxton to rapidly shift its MCP as needed. The reliance on computer systems to create digital products and execute briefings was almost nonexistent due to the time required for set up. The TF established a hybrid analog and digital COP using the Joint Battle Command Platform (JBCP) and traditional map boards and acetate. Leaders completed operation order (OPORD) briefings and RDSP mostly in person over terrain models and over the radio when necessary. Once TF Paxton established a battle rhythm and executed set up and tear down of the MCP a few times, it was able to occupy a new MCP location, establish upper tactical internet (TI), and transition C2 of the fight from the tactical command post to the MCP within about an hour of arrival to a new location.

Lastly, incorporating the use of a TCF into the NTC Operations Group's scenario enables a fourth maneuver battalion the opportunity to participate in the world-class training that only NTC can offer. As a true crucible in any service member's career, there is nothing that can replicate this experience. Participation in the TCF role at NTC is best suited for a battalion with reduced manning or a National Guard battalion that is in its Regionally Aligned Readiness and Modernizations Model (ReARMM) training year and not sourced for a Global Force Management Allocation Plan (GFMAP) requirement. The TCF mission may appear simplistic, but it still exercises a battalion's systems and processes, requires commanders to maneuver their forces, and gives battalion commanders exposure to their peers as they execute combined arms maneuver.

As the Army continues to train in the LSCO training environment against a near-peer threat at Combat Training Centers (CTCs), more refined TTPs associated with fighting as a TCF will emerge. Ultimately, the force package a brigade is able to commit as a TCF will shape how it fights.

The TCF mission may appear simplistic, but it still exercises a battalion's systems and processes, requires commanders to maneuver their forces, and gives battalion commanders exposure to their peers as they execute combined arms maneuver.

There are many ways to employ a unit in the TCF role, and only time will tell how it is incorporated into future operational designs. Our hope is that the hard lessons learned during TF Paxton's NTC rotation will spur conversation and provide future CTC rotation participants a good starting point for planning and resourcing their version of the TCF.

Notes

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LTC Gordon R. Kinneer served as a guest observer controller/trainer and senior trainer for 2nd Battalion, 112th Infantry Regiment during National Training Center Rotation 22-08 at Fort Irwin, CA. He currently commands the 1st Squadron, 104th Cavalry Regiment, 2nd Infantry Brigade Combat Team, 28th Infantry Division, and previously served as the state mobilization and readiness officer for the Pennsylvania Army National Guard. He has held various staff and command positions within the 56th Stryker Brigade Combat Team (SBCT) and recently completed a tour as the bilateral affairs officer at the Office of Defense Cooperation, U.S. Embassy Vilnius, Lithuania.

LTC Eric B. Ponzek currently commands 2-112th IN (Paxton), 56th SBCT. His last assignment was as the 28th Infantry Division battle major, and he executed the last 56th SBCT NTC rotation in 2018 as the S3 for 1st Battalion, 111th Infantry Regiment (Associator), 56th SBCT. He has held various command and staff positions throughout 56th SBCT.

A Stryker reconnaissance vehicle from the 56th Stryker Brigade Combat Team moves out to occupy an observation post in the early morning hours of 29 June during NTC Rotation 22-08.
Photo by LTC Gordon R. Kinneer

Improving Infantry Defenses Against Enemy Air

LTC DARRELL E. FAWLEY III

15 April 1953. No U.S. Soldier has died from enemy aircraft since that date. For nearly 70 years, the U.S. Army has operated in environments in which the air arm dominates. However, those days are fleeting. That the Army gets this is evident in the design of decisive action training environment (DATE) rotations at Combat Training Centers (CTCs) like the National Training Center and Joint Readiness Training Center. Soldiers face "red air" in the form of attack and reconnaissance via opposing force (OPFOR) helicopters and unmanned aircraft systems (UAS). Yet, I believe the infantry platoon lacks basic doctrine, equipment, and organization to deal with the threat, and Infantry officers do not receive adequate air defense employment education. The Infantry must solve this prior to the next conflict.

The 2022 war in Ukraine has driven home that our great and emerging power adversaries have robust rotary-wing assets; it has also driven home the value in possessing handheld and highly mobile air defenses. The Army's current doctrine for infantry squads and platoons, Army Techniques Publication (ATP) 3-21.8, *Infantry Platoon and Squad*, needs better solutions to close range air threats. Appendix F offers that the machine gun can provide defensive fires for low-flying, low-performing aircraft within 800 meters and provides a few generic considerations for employment in this role. Otherwise, the infantry platoon leader is left without much recourse.

Company commanders are left wanting as well. ATP 3-21.10, *Infantry Rifle Company*, offers only that when a column on the march is attacked, all machine guns should engage the aircraft while everyone else seeks cover. While a helicopter likely does not want to fly through a hail of bullets, this solution is problematic. First, it is devoid of accuracy. Second, it is not a core task requiring training. Third, there is no deterrent nature to this solution. Infantry leaders have no means of countering enemy air that puts them on level playing ground and forces enemy pilots to consider avoiding their formations.

Machine guns have been the infantry solution to enemy air for decades. CPT Anthony O'Connor and CPT Robert Kilmer Jr. each discussed training for machine guns in their air defense role in these pages four decades ago.[1] Yet, the concept of air defense at the small unit level does not appear to have received any attention in this professional bulletin since 1989. That year, CPT Michael Parietti argued that the Army should cross-train the company's anti-armor gunners as Stinger gunners. In his article, CPT Parietti advocated for what is essentially an arms room concept where commanders could outfit their anti-armor section with air defense or anti-armor weapons to fit the mission.[2]

Parietti's offering is worthy of rekindling, altering, and expanding. Today, there is no anti-armor section at the company level. Light infantry battalions have heavy weapons companies which move via wheeled vehicle and carry tube-launched, optically tracked, wire-guided (TOW) missiles. Company commanders have six anti-armor teams armed with Javelins all resident within their infantry platoons. This assumes the company is fully manned or that the command prioritizes fill of anti-armor roles over other positions when manning is limited. This does not always occur. A commander could task

Soldiers defend against an enemy air attack during Decisive Action Rotation 21-09 at the National Training Center at Fort Irwin, CA, on 15 September 2021.
Photo by CPT Khari Bridges

organize the anti-armor teams under the headquarters for training and employment purposes, but this is a command decision.

Regardless, Parietti's arms room concept is not the best solution. Making Javelin gunners dual-hat as Stinger gunners detracts from their training which also includes rifle qualification among myriad other tasks and drills. Additionally, a light infantry organization has little in the way of transport and storage in the offense to carry unused weapons systems. Choosing one or the other likely would have down-trace effects on future operations. Finally, an enemy is likely to employ armored vehicles and aerial systems in tandem or in close proximity to each other. Commanders should not have to choose what threat to protect themselves against.

Infantry organizations are air defense poor at echelon. There are no organic air defense systems at battalion, brigade, or division level. The first air defense Soldiers an infantry commander encounters are on the brigade staff where a small air defense cell provides coordination and planning support to the brigade commander. None of these Soldiers has any systems. In practice and in accordance with doctrine, units in a DATE scenario receive air defense units as part of their task organization. However, brigades typically employ these systems to protect their critical assets such as fuel points and command posts. They are not for offensive action nor given to forward units.

Thus, the infantry commander is left to shoot bullets against the grain of gravity at a moving target. The Army needs to do better. Rotary-wing aircraft and medium UAS similar to the car-sized Shadow (in its role as an observer) can do vast damage to a brigade combat team (BCT) and blunt an offensive. Simply put, the infantry leader needs a solution.

Stingers are the obvious answer. Stingers are cheap compared to many other weapons systems to include the Javelin. They are relatively light coming in at roughly 16 pounds lighter than the Javelin. And, they are easy to train on. The U.S. has issued Stinger missiles to fighters from the contra rebels in Nicaragua to the mujahadeen in Afghanistan to the soldiers in Ukraine with great success. Many infantry commanders already choose to train their Soldiers on the system prior to CTC rotations so they can equip their Soldiers with them during the rotation. However, these are Soldiers who have no doctrinal or organizational imperative to train; therefore, their skills can vanish quickly following a rotation. Thus, equipping cannot be the sole response to the problem. In fact, it is the easy part of the solution.

The Army must update the modified table of organization and equipment (MTOE) to reflect anti-air gunners. There are four possible options. First, the battalion's heavy weapons company could take on an air defense platoon. This platoon would be the central training hub for the battalion, overseen by a company commander. The advantages of this would be standardized training and dedicated training time. When something is a platoon's core task, the unit will make training time and become proficient. The disadvantage of this is that rifle company commanders and platoon leaders lack organic assets. They would need the battalion commander or operations officer to provide air defenders from the weapons company for training and operations. This increases the chance a battalion commander would prioritize these assets away from the platoon and company. Additionally, the solution is not exportable across BCTs. Stryker and armored BCT formations do not have battalion weapons companies and thus cannot employ this solution.

Photo by SSG John Yountz

Paratroopers assigned to the 173rd Airborne Brigade practice acquiring a target with a FIM-92 Stinger near Medulin, Croatia, on 8 April 2022.

A possible second solution is to create an air defense section at the company level. This gives commanders maximum flexibility in employment and ensures consistent training within the company. However, it does place the onus on company commanders to prepare their forces against the backdrop of myriad competing priorities. Light infantry commanders already possess mortars and a UAS section at the company level, so they have the means to train specialized elements. Still, mortars have a centralized hub for training support in the battalion mortar platoon. Similarly, the company and platoon medics and forward observers have a higher echelon that trains them. A BCT's air defense cell couldn't provide this level of oversight as currently manned. Due to the need to identify aircraft as hostile, any air defender would need to be highly trained.

The third option would be to create anti-air teams within the weapons squad of each platoon. This reduces the company commander's options but provides flexibility to platoons which can find themselves away from the direct fire support of other elements. These are the elements most likely to have

chance encounters with low performance aircraft. However, a weapons squad leader would be given the burden of training two machine-gun teams, two anti-armor teams, and one or two air defense teams. Even though weapons squad leaders tend to be the most experienced in the platoon, providing them with three diverse training missions could induce challenges in creating fully trained teams. Even if the air defense teams thrived, the other two teams might suffer.

A fourth option would be to designate one rifleman in every rifle squad as a Stinger gunner. ATP 3-21.8 asserts that one rifleman in each squad is a designated marksman while the other is an anti-armor specialist. Employing this option would mean dual-hatting either the anti-armor specialist or the designated marksman. The anti-armor specialist could not carry all the weaponry required to do both jobs and be a rifleman, thus requiring the arms room concept. The designated marksman makes more sense. While not a sniper, a designated marksman should be trained in aspects important to an air defense specialist such as aircraft identification, tracking of a moving target, and accuracy. They would not need to carry the Stinger in operating mode on patrol and thus could perform both functions. However, the average Soldier could likely only carry one missile. Therefore, the squad would be left with one shot or would need to cross-load ammo. Also, in pushing the air defender further down, there is even less institutional knowledge to pull from and a greater chance the training gets short changed.

The best solution is likely to create a battalion air defense platoon. In light infantry battalions, this would be resident in the weapons company. Stryker and heavy battalions may need to place this in the headquarters and headquarters company. While training on the use of a Stinger is relatively simple, there are many aspects that are more complicated such as target identification, battle drills, and integration with the rest of the organization. To ensure company commanders get their slice, the platoon should be organized like a forward observer section or medical platoon. Each squad would have habitual responsibilities to a line company, leaving the battalion commander with a squad to employ as needed.

However, as the Army considers additional end strength cuts in the face of modernization, recruiting shortfalls, and tightening budgets, the short-term solution may be to dual-hat designated marksmen as air defenders. This would have to come through an update to the MTOE reflecting the position of an anti-air gunner and Stinger system. While infantry doctrine currently calls for a designated marksman and anti-armor specialist per squad, the Army's MTOE does not reflect this. The rifle squad does not have specialized equipment organic to it for either mission. Therefore, it is easy to overlook training for designated marksmen and squad anti-armor specialists when a unit is not resourced nor driven through reporting metrics to conduct the training. For an anti-air concept to work, the Army would need to update its MTOE to reflect the position and the equipment.

Assigning anti-air specialists to squads would get the concept rolling and enable continuous assessment at monthly CTC rotations. To enable this, the Infantry needs to make doctrinal updates that detail training and employment of Stingers at the platoon and company level. Further, the Defense Training Management System (DTMS), the Army's system of record for training and qualification, would need to add Stinger qualification as required training for infantry companies. This way, commanders at echelon could enforce and oversee training. The Infantry could borrow most of its training doctrine from existing manuals but would need to develop employment doctrine unique to its mission. As successive rotations pile up, the Infantry could use data from these events to shape permanent doctrinal updates as well as work with the Center for Army Lessons Learned to spread best practices.

Soldiers with the 173rd Airborne Brigade fire a FIM-92 Stinger during an air defense live-fire exercise alongside soldiers with the Croatian Air Defense Regiment on 8 April 2022.

Photo by SSG John Yountz

Naturally, the air defense artillery community would likely push back on the concept of arming 11-series Soldiers with Stingers. This would be especially true if the solution is creating an air defense platoon within battalions manned by 11Bs. This is not only because Infantry Soldiers would be conducting a core mission of a different branch, but also due to the high risk of fratricide when employing air defense assets. Air defenders as a military occupational specialty are certainly the best trained in employing air defense assets. However, making this a mission of the 14 series is complicated. While the Army intends to grow the air defense community, the focus will naturally be on systems that defend critical assets and not Stinger gunners. Thus, branch and Army priorities could leave infantry units habitually undermanned. It is likely the Army will prioritize long-range Patriot systems and short-range Avenger systems due to their need to protect critical assets on the battlefield. Placing the organization of air defenders in the Infantry's hands ensures that infantry commanders make decisions on priorities.

The key is to make air defense an organic mission of small infantry units without significantly increasing the burden on already overworked commanders and companies. This requires equipment, organization, and doctrinal solutions. It also requires education. Infantry leaders in the Infantry Basic Officer Leader Course and Maneuver Captains Career Course need to learn to employ Stinger missiles in the offense and defense and how to train these teams. In general, this is a small lift compared to many other pressing requirements. Protecting infantry units from the sky not only preserves infantry combat power but likely protects the fires, sustainment, and command elements that exist behind their lines.

It is incumbent on infantry leaders to develop a solution to the problem of enemy red air. This must be a branch-wide solution. Today, enterprising company commanders are developing solutions. However, these solutions are not universal, nor are they necessarily the best solutions. Providing a standardized equipping, doctrinal, and organizational solution will help infantry leaders face what may be a significant threat in the next conflict. It will save lives, preserve combat power, and keep the Infantry doing what it does best: closing with and destroying the enemy.

Notes

[1] CPT Anthony J. O'Connor, "Air Defense with Small Arms," Infantry 77/3 (May-June 1987): 36-38; CPT Robert Kilmer Jr., "Air Defense Training," *Infantry* 72/1 (January-February 1982): 26-27.

[2] CPT Michael I. Parietti, "Organic Air Defense for a Light Infantry Company," *Infantry* 79/5 (September-October 1989): 38-40.

Editor's Note: *As with all* Infantry *articles, the views expressed in this article are those of the author and do not reflect the official policy or position of the U.S. government, Department of Defense, or any element of it.*

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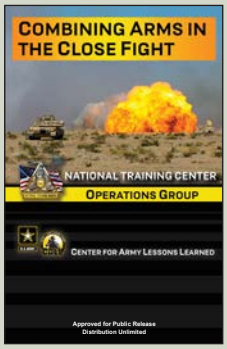
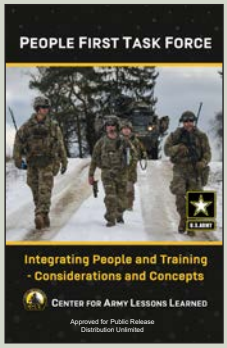
New from the Army Center for Lessons Learned

Combining Arms in the Close Fight



Operations Group, National Training Center (NTC) created this publication to assist units in combining arms to win on the battlefield, and it is organized into three sections. Section I offers three foundational concepts and 18 critical tactics, techniques, and procedures (TTPs) that offer "a way" to think about how to combine arms. Section II focuses on brigade combat team (BCT) sustainment and describes why and how units should design their concept of support and logistics architecture. And Section III offers a series of hard problems for units to consider as they train for large-scale combat operations (LSCO).

Available at: https://api.army.mil/e2/c/downloads/2022/11/04/63200cc0/23-01-738-combining-arms-in-the-close-fight-nov-22-public-release.pdf



People First Task Force

This handbook is a compilation of best practices and tools that can be used by leaders to improve the integration of people and training. The handbook is not regulatory or mandatory; leaders are empowered to utilize the tools in the handbook to complement their own unit-specific People First strategies and initiatives. By integrating people into training, leaders can enhance the cohesiveness of their teams and foster an environment where all are treated with dignity and respect.

Available at: https://api.army.mil/e2/c/downloads/2022/08/18/5be2ea41/22-06-672-people-first-task-force-handbook.pdf

Rifle Company Temporal Overmatch in LSCO

CPT ZACHARY J. MATSON

> *"A great commander must say to himself several times a day: If the enemy army appeared in front of me, to my right or my left, what would I do?"*
> **— Napoleon Bonaparte**

The Joint Readiness Training Center (JRTC) and its world-class opposing force (OPFOR) "Geronimo" at Fort Polk, LA, challenge Army brigades every month across the spectrum of conflict and along each warfighting function and domain. Even if units are particularly well trained and well led, the legendary OPFOR will challenge the rotational training unit (RTU) not just in the mechanical "science" of warfighting, but also in abstract capabilities such as surprise, tempo, and audacity. The 1st Brigade Combat Team (Warriors), 10th Mountain Division deployed to JRTC in January 2022 for rotation 22-03 with the intent to offer a hard fight for the OPFOR throughout its duration in "the box." The 2nd Battalion, 22nd Infantry Regiment harnessed the potential of its subordinate units by adhering to the tenets of mission command and the principles of the offense, and by striking the historically difficult balance between tempo, safety, and control. This article details how rifle companies, enabled by their battalion headquarters (HQ), can offer an equal challenge for the OPFOR on its home turf across the spectrum of warfighting. Rather than debilitating decision-making, the modern battlefield offers infinite opportunities for tactical units to exploit. Anvil Company, 2-22 IN exploited the chaos of multidomain battle during JRTC 22-03 by taking calculated risks and relentlessly maintaining contact with the enemy.

Home-Station Training

Anvil Company's tailored pre-JRTC preparations began immediately following 1st BCT's Expert Soldier Badge testing. Beginning with fire team live-fire exercises (LFXs) and in accordance with JRTC Center for Army Lessons Learned (CALL) Cell suggestions, Anvil Company designed training that forced leaders to react to enemy vehicles and employ attached weapons. Fire team leaders were forced to engage a mounted enemy counterattack, and squad situational training exercises (STXs) challenged squad leaders on reacting to a Russian T80 visual modification and employing an attached Carl Gustav. The squad LFXs assessed squad leaders on employment of an attached M240B and back-blast considerations of the Carl Gustav to defend against a counterattack. Company-designed STX lanes during our brigade-level home-station training focused on squads conducting anti-tank (AT) ambushes independently, and pre-JRTC classroom blocks of instruction refreshed our understanding of minimum arming distance and round types to ensure all Soldiers took this into consideration. Anvil Company simply followed the JRTC home-station battle drill handbook as closely as we could during the training cycle. Empowered by monthly leader professional development (LPD) sessions hosted by the brigade commander and staff, leaders at echelon understood how the Warrior Brigade intended to fight as a team.

The brigade- and division-level home-station annual exercises prioritized time for companies, batteries, and troops to execute their own training plan, which turned out to pay dividends in developing and refining the initiative of our squad leaders to operate semi-independently in support of a company effort. Mountain Peak, the division exercise, validated time and again that squad leaders proactively executing counter-reconnaissance patrols will interdict enemy small units while they are vulnerable. Anvil Company integrated counter-recon patrols as a battle rhythm at JRTC with platoon leadership automatically conducting them whenever the company had to halt. Anvil

Photo courtesy of author

Squad situational training exercises (STXs) challenged squad leaders on reacting to a Russian T80 visual modification.

Photo by SPC Pierre Osias

Soldiers in Anvil Company, 2nd Battalion, 22nd Infantry Regiment, 1st Brigade Combat Team, 10th Mountain Division, conduct a squad live-fire exercise in August 2021.

Company's experience at JRTC during force-on-force showed that the company echelon is used for command and control, sustainment, consolidation and reorganization, and to mass for fires-supported attacks on key terrain, while during movements to contact or hasty attacks and defenses, the squad or section is the preferred unit of action. We found that we needed 360-degree security (provided by the platoons), while reacting to enemy armor was best done with control from the company commander and executed quickly by a squad leader employing an attachment with engagement and reporting criteria. Combined with the emphasis placed on extended dismounted movements, the JRTC home-station training glide path, a willingness to take calculated risks nested with the brigade's concept of "how we fight," and an aggressive patrolling culture, Anvil Company exploited the complexity of the decisive action training environment (DATE) to compete and win in the temporal realm at JRTC 22-03.[1]

A year before the Warrior Brigade deployed to Fort Polk, the JRTC Operations Group CALL Cell published its latest collection in the series "Light Fighting at the JRTC: DATE Is Not a Slow Dance."[2] The title alone offers a clue about the realm in which large-scale combat operations (LSCO) is going to challenge units: the temporal one. What Robert Leonhard outlines in his prophetic text *Fighting by Minutes*, and what the JRTC CALL Cell attempts to assist the RTU in understanding, is that the pace of the future fight is measured in minutes and sometimes seconds, and it is trending towards a tighter connection between information inputs and decision-making.[3] The tightening loop of decisions is a challenge for RTUs that are still under the similar manning and training model that the Army has used for most of the last 20 years. Without a policy change in personnel turnover, operational tempo, or the current Army readiness model, it's growing harder for RTUs to both certify on their mission-essential tasks and grasp the more challenging cognitive competencies required to make decisions that can outpace an adversary. Factoring in the overwhelming amount of installation tasks applied to garrison units and achieving these competencies becomes nearly impossible. All is not lost, however; units can achieve at home station the necessary training required to survive and win in modern combat, but it does require an increased level of competence and commitment at the company, troop, and battery level to make decisions faster than the enemy. These echelons will always have a vital role on the battlefield, but their utility to their platoons and squads needs to evolve to keep pace with modern combat.

Achieving Overmatch in the Temporal Realm

How do maneuver units achieve overmatch in the temporal realm? Working literally from the ground up, the strength of a light infantry brigade is its ability to operate in severely restrictive terrain. Additionally, light infantry units are expected to move on foot for long distances and arrive prepared to fight. The two most effective methods of preparing a light infantry unit to move further and faster than their counterparts are spending the appropriate time at home station conducting forced marches and properly employing the organic sustainment capabilities of the rifle company. The battalion commander manifested the first effort by envisioning a 52-mile leader trek in the Adirondacks. The latter effort was a continued emphasis of the company commander with particular attention paid to the maintenance of the small but vital company fleet, notably the company's mule which is the medium tactical variant (MTV) on its modified table of organization and equipment (MTOE). The company marched to the training area for more than half of the collective training events and incorporated long movements during all other training events. Notably, the battalion training guidance included conducting an extended tactical road march of 22.2 miles with all company-assigned equipment during the training cycle.[4]

Leadership emphasis on fighting light and moving fast became the cultural norm leading into JRTC 22-03. Besides building both mental and physical toughness, an extended or forced road march also provides an example of the time it takes to move large formations and gives commanders a running estimate of attrition during movement. More than any other event, the extended dismounted movements during the training cycle gave all leaders in the battalion a realistic expectation of unit movement times while also making intui-

tive the enduring consideration of soldier load. During our rotation, Anvil Company averaged dismounted movement of 1 kilometer an hour.

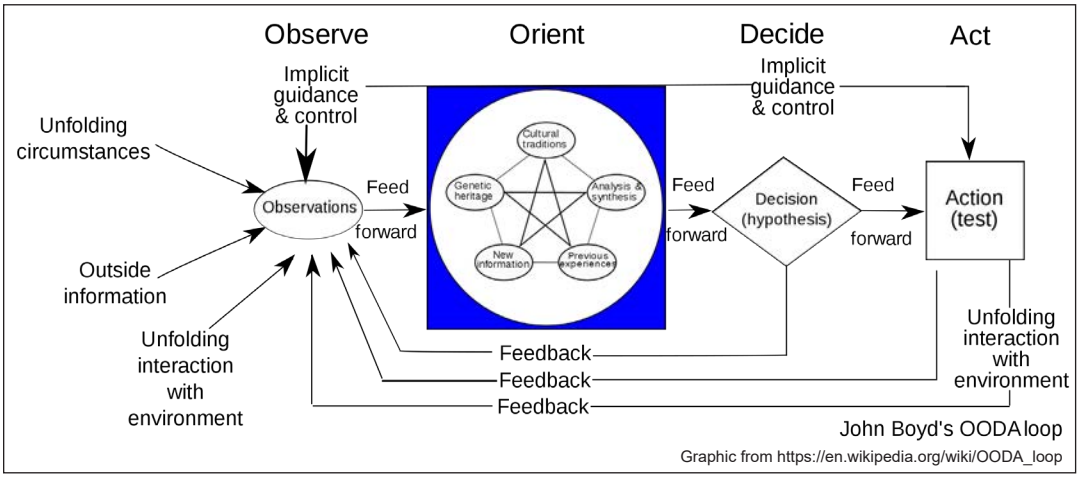
The persistent concern of Soldier load is directly tied to the importance of the company trains, which allowed the company to pack most of its rucks both inside and outside of the Light Medium Tactical Vehicle (LMTV) or in a trailer hauled behind one of the company's high mobility multipurpose wheeled vehicles (HMMWVs). Anvil Company incorporated this method of moving the company during every single training event. The number of rehearsals conducted during the training cycle on packing, loading, unloading, and linking up with the company trains paid dividends at JRTC and single-handedly contributed to our ability to sustain ourselves. LMTV maintenance is the single most important priority of the company executive officer as this single truck allows the company to sustain itself, rather than forcing the battalion to provide for it. Distributed operations are only possible after properly synchronizing the sustainment warfighting function with the maneuver plan. An increased proximity to the battalion HQ also increases risk to the company as battlefield signatures magnify.

The faster and farther a company can move, the faster it can close the decision loop and challenge the enemy in the temporal realm. To further understand the importance and tactical applicability of the cognitive domain and how it relates to the tempo, consider the timeless, although often oversimplified, observe-orient-decide-act (OODA) loop, as described by U.S. Air Force COL John Boyd (see Figure 1).[5] The ground combat manifestation of "getting inside the enemy OODA loop" is showing up where the enemy least expects you. Units achieve success by conducting forced marches, aggressively pursuing the enemy, and mounting relentless attacks, even when in contact. At JRTC, the OPFOR conducts a superior military decision-making process (MDMP), often much quicker than the recently formed battalion and brigade staffs of the RTU. The OPFOR still has a battalion-level plan that features branches and sequels. Moving faster than the OPFOR soldiers can report and execute their respective branch plans is going to deprive them of their inherent advantages and expose the inflexibility in any preconceived plan.

Anvil Company integrated into the 2-22 IN concept by bounding past a sister company that had seized key terrain to secure the western most flank of the brigade area of operations (AO) while maintaining direct contact with enemy forces. To achieve the desired effects at the desired time, Anvil Company was tasked with moving near-continuously for 48 hours to reach our objectives. The ability to plan and execute long movements with minimal rest validates the Infantry Branch's emphasis on its officers volunteering for and completing the Ranger Course.[6] All Anvil officers, including our attached fire support officer (FSO), were graduates of the course and thus were familiar with planning for long foot movements under heavy load. Most Soldiers carried upwards of 85 pounds of gear during the patrol, and the company FSO carried more than 100 pounds, including a coax cable and a dismantled OE-254 antenna that were essential for constructing a field expedient antenna. With just enough pause during the initial movement following joint forcible entry (JFE) to refill water sources and synchronize fires, Anvil Company moved to secure a hilltop that had been assessed as key terrain in the brigade AO. As other battalions in the brigade fixed the enemy in the north, Anvil Company was able to approach this piece of key terrain from an unanticipated avenue of approach, marching through the night to launch a dawn attack on Hill 95.

Enabled by the company mortar section located in the assembly area, we launched our attack on Hill 95 amidst a shower of high explosive (HE) from the artillery battalion as well as our battalion mortar platoon and our own 60mm mortar section. The decision and resources to support this attack were approved and resourced at the brigade level as the commander and S3 were determining when exactly they could shift and provide the invaluable fire support across the entire AO. Using the barrage to cover our advance, we seized the hilltop, defeating a small contingent of OPFOR. Our ability to hold the terrain against attempts to retake it forced the enemy commander to redirect his ongoing assault on adjacent battalions. While our company eventually endured unsustainable losses, the seizure of Hill 95 achieved the desired surprise. The OPFOR commander personally commanded the efforts to retake the hill, an indicator that the OPFOR had not anticipated such a bold maneuver from the RTU.

Figure 1 — OODA Loop



Anvil Company's failure to hold Hill 95 following a successful seizure was a vital collective learning point. It became clear that all leaders still subconsciously took for granted that if we had

communications with higher that we were going to receive assets, such as an air weapons team (AWT) or more indirect fire support, that would help the ground forces. Despite excellent communication between the company FSO and the brigade FSO throughout planning, movement, and actions on the objective, Anvil Company discovered that the transition to the division as a unit of action requires a paradigm shift for subordinate echelons.[7] Leaders at all levels are accustomed to habits formed during the global war on terrorism (GWOT), namely asset allocation for company- and platoon-centric operations that are enabled by battalion and brigade HQ. The growing complexity and pace of the anticipated division-centric LSCO fight will make this impossible. While internalizing this hard-earned lesson, Anvil Company's adherence to integrating fires and maneuver produced tactical advantages that challenged the enemy in the cognitive domain and forced them to make an emotionally driven decision which threw their operational plan off balance. Fortunately, Anvil Company had the support of the battalion HQ to execute our assigned mission by providing mission orders, an enemy and friendly intelligence picture, and an umbrella of indirect fires. Anvil Company's adherence to the principles of the offense and the support from the battalion HQ are far from new ideas, but they provided an already proven relationship between these two echelons.[8]

Communication and Coordination

Following these actions, Anvil Company enjoyed a brief consolidation period before battalion tasked it as the main effort to retake the key terrain of Hill 95. During this period, we were able to refine the common operational picture (COP) with face-to-face adjacent unit coordination with both our Charlie Company, which was located within supporting distance and also anchored on key terrain, and the brigade cavalry squadron's Bravo Troop, which was screening near a high-speed avenue of approach. Our communications capabilities at this point were vital to maintaining tempo. Anvil Company deployed to the box with the Advanced System Improvement Program (ASIP) as its primary FM radio and a PRC-150 as alternate in the high frequency spectrum. Additionally, the brigade's emphasis on home-station training with our HF platforms maximized our ability to disperse during JRTC. Our Joint Battle Command-Platform (JBC-P) located in the command vehicle did not make it to the field during this rotation, and our end user devices (EUDs) were marked for code out, so they remained at Fort Drum in preparation for turn in.

To mitigate the obvious shortfalls, the company deployed to the box with a common-sense plan for being out of communication with higher and adjacent units. The battalion allowed Anvil Company to confidently operate independently as necessary and work through frequent periods of communications blackout and discrete reporting windows. Anvil Company spent a little over 10 percent of our rotation and one of our four multi-hour company movements without communications capability. Instead of potentially losing tempo troubleshooting sophisticated platforms to maintain persistent communication with higher, we continued moving with the intent to establish communications as the terrain permitted. Each minute without communications with higher is a minute lost to an enemy who can move faster than we can in the competition to seize key terrain. Units will always struggle to replicate operating in a denied and degraded communications environment at home station, and they risk wasting time troubleshooting and reacting to jamming, if recognition of jamming is even feasible.[9] Not underestimating the OPFOR, we expected to be jammed during all periods of force-on-force and were prepared to react to this form of contact. During one of our longer movements to seize key terrain, all handheld Global Positioning System (GPS) devices appeared to be much different than our maps and pace counts. Without hesitation, the lead platoon leader assessed that the formation was the victim of GPS jamming, and the lead fire team's compass-man maintained azimuth and pace, negating the impact of the enemy's actions.

Leaders at all levels are accustomed to habits formed during the global war on terrorism (GWOT), namely asset allocation for company- and platoon-centric operations that are enabled by battalion and brigade HQ. The growing complexity and pace of the anticipated division-centric LSCO fight will make this impossible.

With my command truck out of the fight, I maintained an analog COP, while the 1SG maintained the primary personnel status in the field litter ambulance (FLA), and the executive officer managed the logistics COP in the MTV with the rest of the company trains. Availing myself of the opportunity to link up with Bravo Troop and see the brigade digital COP using their JBC-P, I was afforded the opportunity to reorient their 120mm mortars on my assessed likely enemy avenues approach to cover my formation. With our 60mm used effectively to respond to enemy probing or counterattacks and running low on ammunition for suppression missions, Bravo Troop's 120s were a welcome addition to the fire support plan, if even for a day.

Adjacent unit coordination after crossing the line of departure needs to be the concern of the company commander as he or she will most likely have the best understanding of the battlefield. My face-to-face interactions with adjacent units allowed a brief update that kept all surrounding units informed, engaged, and mutually supportive. I chose to devote my time to sharing information and ensuring that assessments were disseminated to the lowest level to allow mission command. While the minimalist approach to mission command has room for improvement, feedback that I received from company NCOs affirmed that they knew what the enemy was

capable of doing or planning to do throughout the duration of force-on-force. My abbreviated running estimates informed by battalion and adjacent unit reporting allowed us a best assessment of the enemy situation, and these were delivered no fewer than six times a day and at least following all enemy contact. Commanders will have to take a risk if they intend to maintain at least some form persistent contact with the enemy or try to achieve the ideal doctrinal level of enemy understanding. JRTC 22-03 validated that if you dictate when you make contact with the enemy, you can anticipate his actions and reactions with more fidelity than passive measures allow. A good American historical case study is that of General Grant's 1864 Overland Campaign against General Lee. Grant recognized the key terrain of Richmond as vital for the Confederate cause, so he threatened the southern capital but kept Lee's Army of Northern Virginia his main effort, forcing Lee to fight him.[10] Like the Union forces in this campaign, 2-22 IN moved Anvil Company as quickly as possible and made direct contact with Geronimo as often as possible by threatening control of key terrain.

A rifle company consisting of somewhere between 75 and 125 Soldiers offers a huge audible and visible signature, and all leaders are challenged to maintain control of a formation this size, especially during periods without communication or limited visibility. During nighttime movements, I was particularly active in patrolling the line and finding subordinate leaders to stay in touch with.[11] Before our dawn attack on Hill 95, we stopped in the middle of a swamp for a couple hours to allow the brigade to develop the situation and shift priority of fires to Anvil. Controlling the tempo of this attack was vital to staying synchronized with the battalion and brigade, and controlled halts as we crept closer to our objective were our best way of achieving this. All battalion training at Fort Drum emphasized the difference between tempo and speed, and we recalled the doctrinal definition of tempo: "the relative speed and rhythm of military operations over time with respect to the enemy."[12]

Halting movement in low terrain during limited visibility carries outsized risks to tempo. I assessed it as more important to maintain control and keep my formation extremely tight because the time a company spends searching for a lost Soldier with a break in contact could threaten the battalion's mission to relieve pressure on our sister battalion that was defending a northern drop zone. Anvil Company's movement to seize Hill 95 mirrored almost exactly that of the 2nd Squadron,12th Cavalry in Vietnam during its movement towards Hue. The 2-12 CAV S2 recalls in his memoir that "in night moves the first aim is to keep people from getting lost."[13] Our need to synchronize maneuver with fires to dislodge a dug-in enemy from key terrain, and our desire to prioritize tempo, meant that we could not afford a single minute lost to a break in contact.[14] Additionally, since this movement took hours and threatened to drain our invaluable ASIP batteries, we also communicated primarily through touch, and like the 2-12 CAV commander, the only radio we did not turn off during movement was the artillery radio.[15] The platoon leaders expertly maintained control of their units, tirelessly trooping their respective formations and further validating their Ranger School experiences.

While preparing to lead the battalion effort to retake Hill 95, Anvil Company Soldiers spent brief moments in their assembly area (AA) preparing their equipment for another uphill fight while I spent a minimal amount of time deconflicting actions on the objective with fellow company commanders. Harkening to techniques and tactics reminiscent of the GWOT's small kill teams, our company formed an advance element consisting of a four-man recon element so we could make contact with the enemy using the smallest element possible.[16] The most senior staff sergeant in the company carried the new M110A1 rifle, and he was accompanied by a platoon radio-telephone operator (RTO) with ASIP, a M249 gunner, and a rifleman. With the minimal amount of guidance including reporting and disengagement criteria, the recon element moved out while the rest of the company finished the troop leading procedures. This small element moving even just an hour ahead of the main body allowed the company to modify our movement technique and formation to get to our probable line of contact (PLC) as fast as possible with minimal risk to force. This simple temporary task organization allowed us to maintain our edge in tempo during the first few days of force-on-force.

Photo by SGT Kevin Dunnaway

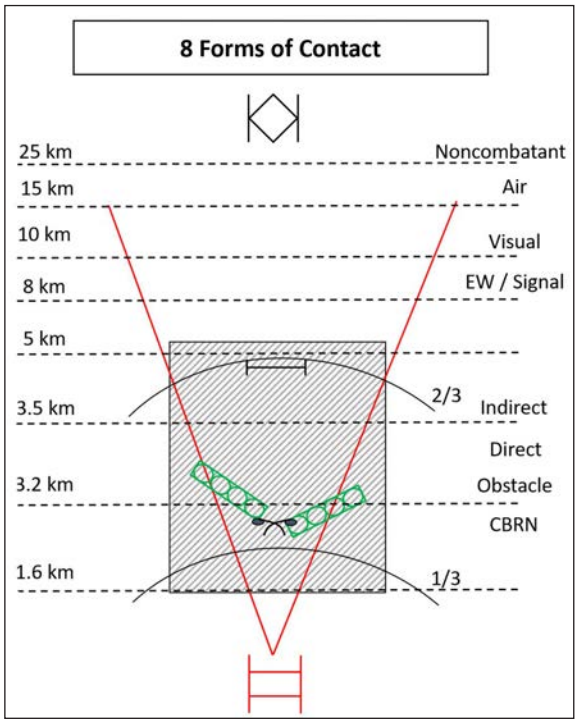
A Soldier with the 1st Brigade Combat Team, 10th Mountain Division engages opposing forces during training on 17 January 2022 at the Joint Readiness Training Center on Fort Polk, LA.

Following the battalion seizure of Hill 95 from the enemy, the brigade prepared to transition to the defense. It took the company most of the day to secure our assigned sector of Hill 95, and we received notification to move out to meet the horizontal engineers at the anticipated engagement area around midnight. Minutes lost in the defense are doubled since you must walk the terrain twice — once to get there and again during a full-dress rehearsal as the seventh step of engagement area development.[17] Knowing each minute the engineers are without guidance is a minute given to the enemy, we picked up our rucks and conducted a 1-mile forced march in the dark within 15 minutes. I led the column and the pace and immediately planted my command post (CP), which consisted of my RTO and the Fires Cell, near a tree. I then dropped my ruck, grabbed a rifleman for security, and moved out in the middle of the night to meet up with the engineer company commander. After confirming linkup, we ran to the furthest point I assessed we could engage the enemy, and I began to request armored vehicle obstacles by providing the engineer company commander with a desired friendly task, purpose, and effect. Working backwards toward my company's direct fire weapons range, we confirmed a likely enemy scheme of maneuver, how I intended to engage them, priority of dig assets, and lastly the obstacles we needed to emplace along the mounted avenue of approach. This hyper-abbreviated planning process runs counter to the conventional approach to planning outlined in both the troop leading procedures and MDMP, which fortunately gave us another advantage on the clock. Though this can seem risky, the battalion commander provided the companies everything they needed to exercise disciplined initiative.[18]

After confirming the engineers had tasks that would take them the next eight hours to complete, I returned to my CP to update battalion HQ. Although I had the horizontal engineers at the moment, these precious assets were to transition to our sister companies immediately following an allotted time block. Not a single minute in the defense was relinquished to fatigue or the enemy, and Anvil Company defeated repeated attempts from all cardinal directions to dislodge us from our position overlooking the single low water crossing in the southern area of the box. We enjoyed the benefit of training with our habitually attached sapper squad. The engineer battalion commander ensured that sapper squads attached to their respective maneuver unit for squad STX, squad LFX, Warrior Peak, and Mountain Peak.[19] The rehearsals and assigned tasks paid off as our first engagement with the enemy destroyed their breaching assets as they attempted to reduce the first obstacle. The JRTC Operations Group recommends that RTU "anti-tank units should remain mobile."[20] Maintaining the principle of flexibility in the defense, the squad leaders fully understood the engagement criteria and destroyed multiple enemy vehicles while the enemy engaged us across multiple forms of contact over roughly 14 hours.[21] Anvil Company survived multiple mechanized attacks on our position, but unfortunately we lost our company trains to enemy aerial-delivered family of scatterable mines (FASCAM) munitions.

Following a successful defense, the battalion wasted no time pondering our losses. The battalion commander immediately directed our Charlie Company to move out across the low water crossing and seize as much terrain as possible towards the west, knowing that the following phase of brigade operations was going to be determined by how much ground we took between direct engagements with the enemy and not forgetting the offensive principle of audacity. Watching Charlie Company move past our position, Anvil Company leaders planned to move the next 9 kilometers without reliable communications because our batteries were depleted after the long hours in the defense. Charlie Company passed our Bravo Company to an objective further west overlooking a key low water crossing defended determinedly by the enemy. Using simple graphic control measures, I defined an AA behind Bravo Company, connected timed phase lines on linear danger areas for our company trains to leapfrog to, and assigned a few linkup points. Anvil Company turned our radios off for hours until we linked up with the battalion tactical command post to receive final coordination for a battalion attack on another piece of key terrain. While not perfect, this plan allowed us to save the precious batteries we had left for planned actions. This long daylight movement transitioned into a full period of darkness two-company fight to seize and hold a key intersection. The company-level energy-saving plan paid off as we had enough battery power to sustain us until our company trains linked up with the forward line of own troops (FLOT) the following morning.

Figure 2 — Forms of Contact



Graphic courtesy of author

During the hasty defense of an enemy counterattack, it became apparent that we had to maintain 360-degree security around the intersection of two high-speed avenues of approach while also quickly employing our anti-tank teams in the hunter-killer role. In the center of the company formation, I was able to dictate to platoon-level leadership to destroy incoming threats, and they in turn led respective anti-tank teams to

destroy all enemy armored vehicles that approached our position. The employment of anti-tank teams led by either a squad leader, platoon sergeant, or platoon leader was the result of following a deliberate home-station training path that reflected the recommendations of the JRTC CALL Cell.[22] Every member of Anvil Company understood the capabilities and limitations of our organic anti-tank weapon systems, most importantly the M3 Carl Gustav.

While this is not a comprehensive review of everything Anvil Company and 2-22 IN accomplished at JRTC 22-03, it simply serves to offer anecdotal experience that worked for an aggressive rifle company enabled by a supportive and equally aggressive battalion HQ. The LSCO environment replicated at JRTC is intended to provide the RTU a worst-case scenario, which the OPFOR achieves with superior results. A LSCO environment will also provide an environment permeated with risk, but commanders that understand proactive and consistent risk management will enjoy the dividend of increased battlefield initiative. Risk management cannot be treated as a discrete event; instead, it is a persistent pursuit.[23] Commanders and units that limit their capabilities due to perceived constraints will never exploit the initiative. Communications issues, unclear enemy situation, or being tethered to a logistics package are all not excuses to wait for orders. Tactical units exist and fight in a realm of minutes, and they cannot yield the most precious thing they have — time — willingly to the enemy. Attack!

Photo by SPC Pierre Osias

Soldiers in Anvil Company, 2nd Battalion, 22nd Infantry Regiment, 1st Brigade Combat Team, 10th Mountain Division, conduct a squad live-fire exercise in August 2021.

Notes

[1] "How We Fight" is the white paper written by the brigade commander and distributed to battalion and company commanders during the training cycle. It emphasized mission command, communications architecture as an extension of mission command, and integration of all enablers and assets in the brigade to fight and win in large-scale combat operations (LSCO).

[2] Joint Readiness Training Center Operations Group series, "Light Fighting at the Joint Readiness Training Center, DATE Is Not a Slow Dance," 15 December 2021.

[3] Robert R. Leonhard, *Fighting by Minutes: Time and the Art of War* (Westport, CT: Praeger, 1994).

[4] Army Techniques Publication (ATP) 3-21.20, *Infantry Battalion*, December 2017, 2-46.

[5] Air Force COL (Retired) John Boyd theorized that "conflict is a series of time-competitive observation, orientation, decision, action cycles … If one side in a conflict can consistently go through the Boyd Cycle faster than the other, it gains a tremendous advantage," according to William S. Lind in his book *The Maneuver Warfare Handbook*.

[6] Department of the Army Pamphlet 600-3, *Officer Professional Development and Career Management*, 3 December 2014. Notably absent from the 2019 edition of this pamphlet is specific branch guidance, but importantly the line: "The Ranger Course is essential in developing the knowledge, skill, abilities required to serve as a rifle platoon leader" (8-3).

[7] Dennis S. Burket, ed., *Large Scale Combat Operations: The Division Fight* (Fort Leavenworth, KS: Command and General Staff College Press, 2019).

[8] COL (Retired) Dandridge M. Malone, *Small-Unit Leadership: A Commonsense Approach*, (NY: Ballantine Books, 1983), 26.

[9] JRTC CALL Cell, "LSCO at JRTC," January 2021, 55. (ADP 3-90, *Offense and Defense*, July 19).

[10] Ulysses S. Grant, *Personal Memoirs of U.S. Grant, Selected Letters 1839-1865* (NY: Library of America, 1990), Overland Campaign.

[11] MG (Retired) Robert Scales, *Scales on War* (Annapolis, MD: Naval Institute Press, 2015), Chapter 12. Scales mentions what psychologists term "pallination," which is the amplifying effect that physical touch has on keeping soldiers' morale high, especially in low visibility.

[12] Army Doctrinal Reference Publication (ADRP) 3-0, *Operations*, 2-43: "Tempo is the relative speed and rhythm of military operations over time with respect to the enemy."

[13] Charles A. Krohn, *The Lost Battalion of TET: Breakout of the 2/12th Cavalry at Hue* (Annapolis, MD: Naval Institute Press, 2013), 210.

[14] JRTC CALL Cell, "BCTs in LSCO," Echelonment of Fires, 16 (ATP 3-09.42, *Fire Support for the BCT*, March 2016, 2-60, accessed via JRTC Milsuite group).

[15] Ibid.

[16] CPT William C. Baker, "The Anatomy of an Ambush: Small Kill Teams in the Contemporary Operating Environment," *Armor* (July-August 2009).

[17] ATP 3-21.8, *Infantry Rifle Platoon and Squad*, April 2016, 3-172.

[18] Field Manual (FM) 3-0, *Operations*, 2017, 1-26.

[19] JRTC Operations Group, "The LSCO Fight at the JRTC," 10. Conduct an Attack: "It becomes clear that BCTs lack a systematic approach to maximizing the various tools of each battalion/squadron and said units have rarely worked together."

[20] JRTC Commander of Operations Group (COG) Strategic Engagement – 3Q, FY22, "IBCTs Kill Tanks."

[21] ATP 3-21.20, *Forms of Contact*, 2-171.

[22] JRTC CALL Cell, "Home-station Battle Drills to Help Achieve Success in Large Scale Combat Operations," 2020.

[23] DA Pamphlet 385-30, *Risk Management*, December 2014, 1-1.

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Eye of the Tiger: Raven Consolidation at NTC

CPT WILL OAKLEY
1LT SHARON MURRAY

The ongoing Russian invasion of Ukraine has both reinforced and redefined the role of unmanned aircraft systems (UAS) in large-scale combat operations (LSCO). With a lower signature and fewer infrastructure requirements than their runway-bound counterparts, small UAS (SUAS) provide tactical echelons with a critical intelligence, surveillance, and reconnaissance (ISR) platform that allows small, dismounted teams to locate targets and observe fires.

The Army SUAS program of record is the RQ-11B Raven, a hand-thrown, Soldier-portable aircraft. Capable of flying missions up to 90 minutes in length within a 10-kilometer range, the Raven has less restrictive ceiling and visibility requirements than the RQ-7B Shadow. It pushes electro-optical/infrared full motion video and accurate targeting data to any One System Remote Video Terminal (OSRVT) within line of sight.

The modified table of organization and equipment (MTOE) and Army doctrine assign Raven operations and maintenance to the company/troop level. As leaders of 2nd Squadron, 2nd Cavalry Regiment observed in a 2018 *Armor* article, this alignment is a vestige of counterinsurgency doctrine unsuited to a LSCO environment.[1] The solution that 2/2 CAV pioneered at the Joint Multinational Readiness Center (JMRC) in Germany is to consolidate and operate Ravens at the squadron level as a dedicated ISR element tasked by the squadron commander as part of the targeting cycle. This article will discuss how 1st Squadron, 3rd Cavalry Regiment (Tiger Squadron) successfully implemented and refined this squadron-level ISR concept during garrison training and National Training Center (NTC) Rotation 22-07.

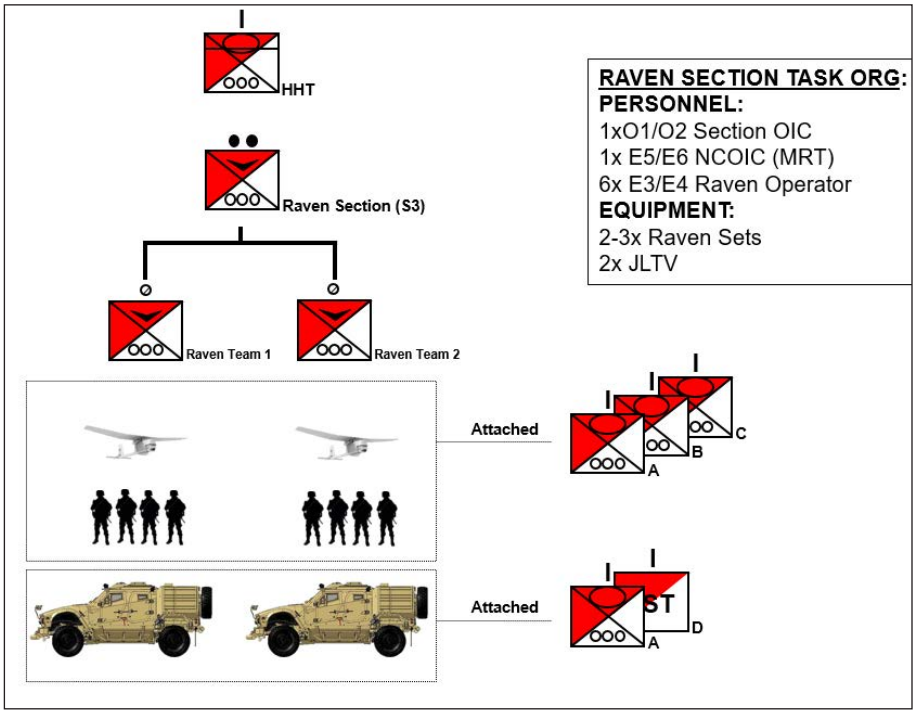
Raven Section Stand-Up

Tiger Squadron is a Stryker infantry squadron with three line troops, each assigned one Raven system and two operators by MTOE. At the outset of the Fiscal Year (FY) 2022 training cycle, Tiger's Raven readiness was in a poor state. Of the myriad tasks and responsibilities assigned to the line troops, Raven readiness and employment fell to the lowest priority. None of the squadron's three Ravens were fully mission capable; in addition, just one of the squadron's six MTOE-assigned Raven operators was trained and current on flight hours, and the unit lacked a Raven master trainer to generate additional operators.

Recognizing that a critical capability had atrophied, the squadron commander authorized the formation of a Raven section as an attachment to the squadron S3 section. Composed of an Infantry lieutenant section leader, an Infantry staff sergeant NCOIC and Raven master trainer, and two teams with three operators each, the section would be fully expeditionary, with two of its own vehicles and all sustainment functions fulfilled through the S3.

Before standing up and manning this element, the squadron needed to restore the readiness of its Raven program. Having consolidated the squadron's systems, the section leader worked with Program Manager-UAS at Redstone Arsenal, AL, and the regimental aviation officer (RAO) to fill all Raven equipment shortages and restore the squadron's SUAS capability. Raven section leadership also planned and executed an operator qualification module and subsequent training events in coordination with the RAO to maintain

Raven Section Task Organization



operator proficiency and flight hours.

By late January 2022, the Tiger Raven section was fully mission capable and integrated with squadron operations and intelligence processes during troop external evaluations (EXEVALs), which served as the regimental certification event prior to NTC. For the EXEVALs' culminating attack, troops were given priority for Raven support. The Raven section operated from the squadron tactical operations center (TOC), where the squadron assistant S2 (AS2), acting as collection manager, issued an information collection matrix to the Raven section leader. The Raven section then traveled as an attachment within the security perimeter of the executing troop and reported observations of enemy activity over Joint Battle Communications Platform (JBC-P) and FM radio via the squadron fires net. The OSRVT allowed the S2 to pull full-motion video feed at the TOC, validating multiple tiers of communication. At the end of the EXEVALs, Tiger Squadron had standardized procedures for Raven section planning, employment, reporting, collection management, and restricted operations zone (ROZ) coordination with the RAO.

Photos courtesy of 1st Squadron, 3rd Cavalry Regiment

The Tiger Squadron's Raven section conducts training in support of troop external evaluations.

Tiger Ravens at NTC

During NTC Rotation 22-07, the Raven section operated according to the model established at the EXEVALs. The section primarily moved with the TOC as an S3 element, but it was capable of being detached with other troops or employed independently. For each phase of operations, the AS2 worked with Raven leadership and the operations officer during mission planning to determine the named areas of interest and essential elements of information best suited for the Raven's airframe and sensor capabilities. The AS2, in her capacity as the squadron collection manager, briefed the plan at the squadron operation order, allowing the Raven section to begin its own mission planning and the often arduous ROZ request process. Then, the Raven section leader synchronized his portion of the information collection plan with the squadron and troop fire support officers (FSOs) at the squadron information collection and fires rehearsal.

NTC also necessitated changes to the Raven communications plan. Because the squadron commander often commanded and controlled combat operations from a mobile tactical command post (TAC) closer to the forward line of troops, the Raven section utilized voice reporting over the squadron command net (FM radio), ensuring maximum dissemination of real-time reporting between disparate command and control nodes. Although OSRVTs at the TOC and mounted to a TAC Stryker were fully operational, line-of-sight challenges presented by NTC's plentiful mountains made FM and JBC-P communications the most reliable reporting mechanisms.

To illustrate how Tiger Squadron tactically employed the Raven section, the Ravens were attached to a troop at the outset of the first battle period (BP) and flew zone reconnaissance in support of that element's screen mission along key enemy avenues of approach through the Central Corridor. During this mission, the Raven section successfully identified two enemy scout vehicles and observed squadron mortar fires on target. During a subsequent BP, the Raven section detected multiple enemy dismounted observation posts along the Northern Wall before successfully identifying an enemy armored formation counterattacking the squadron's area defense at the mouth of Alpha and Bravo Passes. In a separate BP, when the regiment pivoted south to seize Razish, the Ravens traveled behind a troop and searched for irregular threat targets in support of Tiger Squadron's breach and subsequent clearance operations.

In sum, the Tiger Raven section flew 13 flight missions over the eight-day training period, totaling 17 flight hours — 15 hours more than any other squadron in the regiment. Tiger Ravens identified and observed fires that destroyed an enemy reconnaissance section, a tank platoon, and two separate dismounted observation posts. As a consolidated unit reporting directly to the squadron commander and TOC, the Raven section provided a dynamic, responsive ISR option that successfully answered priority intelligence requirements (PIRs) and greatly increased lethality.

Lessons Learned and Recommendations

NTC Rotation 22-07 also uncovered friction points and opportunities for improved Raven employment, including the ROZ process and Raven system limitations.

The ROZ request process presented a persistent impediment to Raven operations. Of the many ROZ requests that the Raven section leadership submitted, only 20 percent received approval. Some of these denials were substantive; for example, other higher-priority aviation assets were in the area, or the ROZ overlapped with an existing air corridor. Other denials were more procedural or administrative, stemming from inconsistent guidance from higher echelons or discrepancies between data submitted on the request versus that called up from the launch and recovery location. One advantage of Raven consolidation, vice operation at the troop level, is that the section leader and NCOIC were able to engage with the RAO directly. This alleviated administrative friction and optimized the request process to ensure ROZ approval. In the future, Tiger Ravens will maintain a close dialogue with the RAO during garrison training to streamline the ROZ process.

The other major friction point was the Raven system itself. Launched like a paper airplane and recovered by crash landing, the RQ-11B platform is a fragile airframe flown with outmoded ground control station software. As a rear-propelled aircraft, it is unduly vulnerable to weather and prone to unexpected crashes; because it must continuously fly forward at low altitude, it can be difficult for even the most adept operators to retain a sensor fix on stationary targets. These issues meant that the Raven section spent an excessive amount of time troubleshooting software issues and recovering aircraft. The Raven's range and loiter limitations also prevented the section from maximizing collection before having to recover and relaunch.

An NTC-specific solution is for units to draw the RQ-20 Puma upon arrival at Fort Irwin, CA. A larger and more stable airframe, the Puma offers a 20-kilometer range and five-hour loiter time — two and three times that of the Raven, respectively. Longer term, the Army should expedite and prioritize SUAS modernization. The Raven replacement for the troop/squadron level should be a quadcopter-style, vertical take-off/landing SUAS platform that offers a similar range and loiter time to the Puma with greater stability, portability, and hover features that maximize the tactical echelons' ability to find and destroy the enemy.

A Soldier in the Tiger Squadron launches a Raven during training in support of troop external evaluations.

One advantage of Raven consolidation, vice operation at the troop level, is that the section leader and NCOIC were able to engage with the RAO directly.

Operating Ravens as a squadron ISR asset was extremely successful for Tiger Squadron during NTC 22-07 and further validated the advantages of Raven consolidation at the squadron level. By concentrating its Raven assets, the unit generates a battalion-level ISR capability using existing MTOE equipment, filling a previous gap between the brigade Shadow and the unit of action. Troops simply lack the bandwidth to train, certify, and utilize the Raven platform successfully during large-scale combat operations. While there are certainly circumstances where troop-level SUAS are beneficial, so long as that SUAS is the Raven, squadrons and battalions will greatly benefit from consolidation to increase lethality in the targeting cycle.

Notes

[1] CPT Peter Kerkhof and LTC Steven Gventer, "Lessons in Small Unmanned Aerial Systems Employment for High-Intensity Conflict at Squadron Level," *Armor* (Summer 2018), accessed from https://www.benning.army.mil/armor/eARMOR/content/issues/2018/Summer/3Kerkhof-Gventer18.pdf.

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"Puma LE," AeroVironment, https://www.avinc.com/uas/puma-le

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1LT Sharon Murray currently serves as the information collection platoon leader in the Regimental Engineer Squadron, 3rd Cavalry Regiment. She previously served as the assistant squadron intelligence officer for Tiger Squadron during NTC Rotation 22-07. 1LT Murray is a 2020 graduate of the Redbird ROTC Battalion at Illinois State University.

Instruction Is Leadership

CPT SHAMEEK DE LANCEY
CPT CHRIS JARRETT

In 2016, I (CPT De Lancey) was a Stryker rifle platoon leader conducting a known distance (KD) range with a Thai counterpart platoon as part of Pacific Pathways. Everything was going according to plan: The ammunition point was set; standards were briefed; preliminary marksmanship instruction (PMI) was completed to standard; and remedial and concurrent training plans were established. We were well into the firing tables when my battalion commander arrived for a battlefield circulation visit.

After an initial inspection of the training, he pulled me aside and asked what manuals and doctrine I had read to prepare for the KD range. I admitted to not reading any training circular (TC) or doctrine in its entirety but attempted to match what I thought was his expectation by referencing chapters and sections on advanced marksmanship and KD firing tables. Visibly dissatisfied with my answer, he replied, "LT, we as professional Infantry officers do not REFERENCE doctrine — we thoroughly study, know, and implement doctrine."

This incident was one of those informal leader development snapshots that has been more valuable and impactful than most deliberate leader professional development (LPD) programs I've experienced. It was the first real time in my young career to that point where doctrine and its importance were conveyed to me. It also viscerally illustrated that the best leaders are committed to simple, consistent moments of instruction to their subordinates. After that discussion, I researched, read, and to the best of my ability applied doctrinal concepts to everything my platoon did, which dramatically increased our capability and enhanced our contributions to the battalion. Additionally, not only did that simple conversation ignite my appreciation for doctrine, but it also ignited an appreciation for instruction as leadership and planted the original seed of my desire to serve as a small group leader (SGL) for the Maneuver Captains Career Course (MCCC) at Fort Benning, GA.

Amongst the myriad of highly attractive post-command broadening opportunities, serving as an SGL at MCCC deserves to be among your top choices. In this position, you'll get a unique and challenging leadership experience; produce specific, tangible contributions to the profession of arms; and be thoroughly developed as a tactical leader, teacher, and field grade officer.

The Small Group Leader

The title is neither a misnomer nor falsely aspirational — as an SGL, you'll be a leader. However, exercising leadership here is markedly different from your experience with U.S. Army Forces Command (FORSCOM) units. Your experience thus far has likely been the responsibility of a few key leaders who are in turn responsible for other junior leaders or small teams, but leadership as an SGL requires a fundamentally different approach. MCCC students are mature and educated rising professionals with prior leadership experience, not younger lieutenants still learning the basics of organization and doctrine. Your goal is no longer about directing your organization to a common goal, but to challenge self-motivated individuals to attain an individual level of expertise in a collective environment.

In practice, this is evinced as the Adult Learning Model, an understanding of group formation, and the art of practicing adaptive leadership — guiding the process of work as you set conditions for the students to reach the desired outcome on their own. Years ago, the term for an MCCC teacher changed from small group instructor to small group leader. The change was not accidental. It was made to reflect that the role is not simply delivering content to individuals but rather guiding the process of student learning, internalization, and teaching the students' own future subordinate leaders. In this way, an SGL's impact distills through current students to reach the lieutenants and NCOs they will command in the upcoming years. Students are actively preparing for their roles as "educators" in their future commands, and SGLs are developing that capacity at the career course. This has always been the approach of effective leadership and proves "if you're not teaching, you're not really leading." As an SGL, you'll get an exceptional opportunity to develop in this key competency.

Your leadership competencies are further developed by an understanding that you are serving a collective seminar (small group), but the learning is distinctly individual. Though you will serve as an instructor for 16-20 students, your fundamental goal is to instill an understanding in each individual mind in the classroom. As a commander or small unit leader, you approached your three to five individual junior leaders to give focused-directed coaching and guidance. As an SGL, you'll have a one-on-one relationship with each individual student, not filtered through junior echelons of leaders. The SGL-to-student ratio violates an operational "span of control" but challenges you with responsibility for far more learning to a far greater number of students. Translating learning outcomes to 16-20 people cannot be approached in the same way as disseminating lessons to your unit, and this challenge personally develops your ability to lead and develop a large group unlike any of your previous experiences.

Serving a greater number of people with a higher level of competency and a greater volume of learning forces you

to be deliberate. To be successful, you must maintain a disciplined focus on what you are there for before determining what you should do. This means bringing your allegiance to doctrine and the future success of your students into alignment, even when your students resist, and finding the right tools to pace the learning. This wisdom is infused into the culture at MCCC from initial to final counseling with the director of tactics. Moreover, you will receive personal coaching and feedback on your ability to lead the adaptive learning process from superiors and peers alike. The certification process for new SGLs is grueling and extremely developmental, but the culture of leadership learning continues to challenge and develop you throughout your time at MCCC.

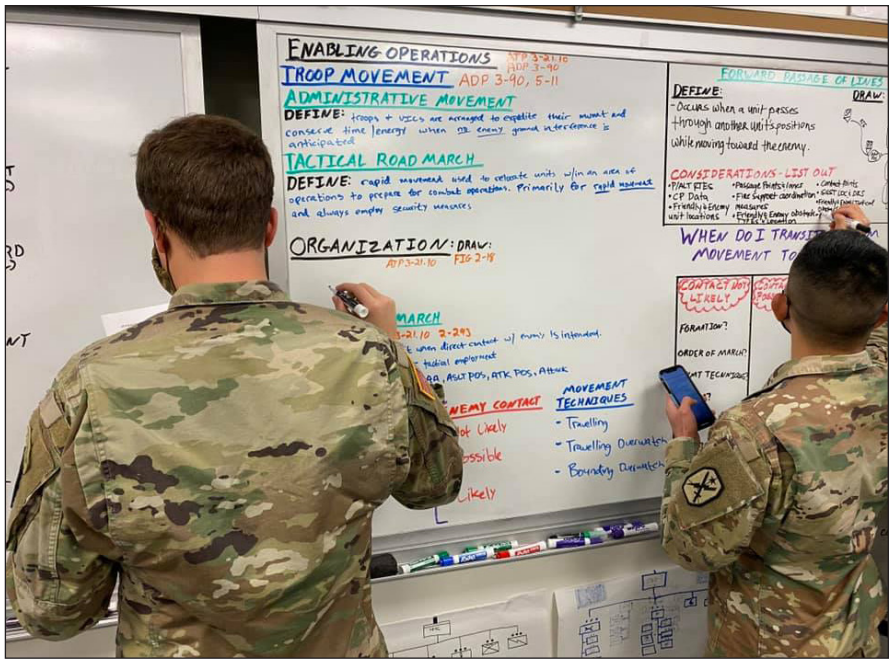

Photo courtesy of 3rd Battalion, 81st Armor Regiment

Maneuver Captains Career Course students participate in a practical exercise to understand the individual concepts of each of the five paragraphs of an operation order.

Contributing to the Profession of Arms

While conquering a new level of leadership as an SGL, you will also be given a wealth of opportunities to contribute to the profession of arms. Most obviously, your role in the development of future company commanders will have an outsized impact across the Army. The SGL cohort is soberly mindful of the 1:20 and 20:120 ratio: One SGL will personally impact about 20 students in his or her seminar, who will then go on to impact the 120 Soldiers in their future commands. If you are reading this as a post-CCC officer, you likely recall your own SGL and the impact they made during your time in their seminar. Your own experience at the CCC shapes the way you approach command in your planning style, tactical competency, and leadership approach. If you care about investing in the next generation of company commanders, there is no better assignment than serving as an SGL. The opportunity to positively impact hundreds of companies, troops, and batteries is immense.

One of the first lessons of the career course is an exercise in how to think critically and creatively. Through doctrine, non-Department of Defense (DoD) reading, and exercises, SGLs attempt to illustrate that the point of CCC is not to dictate what to think but to give students the tools for how to think. These tools appropriately rely heavily on doctrine in the application of planning methodologies and tactical decisions but are rooted in this initial discussion of thinking critically and creatively. Illustrations like the Dunning-Kruger effect and the Marshmallow Test teach students to challenge assumptions and reach fact-based conclusions while simultaneously engaging in creative and collaborative thinking. From day one, students are encouraged to challenge material even as it is being given to them. This process of challenging every piece of new information transforms learning from a passive "receive-mode" process to an active struggle that results in true internalization of the material. It results in rejecting bad ideas and introducing better solutions, which is a critical component of flexibility and adaptive organizational learning. SGLs practice what they preach. Teams of SGLs constantly review, critique, and propose changes to the MCCC through module working groups to ensure the course remains doctrinally correct, tactically sound, and properly accounts for the character of war in the 21st century.

MCCC offers other opportunities to contribute to the profession beyond the classroom. SGLs are commonly asked to review and provide input for doctrinal publications. Within the past six months, we have reviewed and provided feedback for revised drafts of Field Manual (FM) 3-90-1, *Offense and Defense*, and Army Tactics, Techniques, and Procedures (ATTP) 3-06.11, *Combined Arms Operations in Urban Operations*. SGLs are also provided temporary duty (TDY) opportunities to Combat Training Centers (CTCs) and other professional military education (PME) to observe and provide feedback on how the Army teaches combined arms tactics more broadly, which then provides better insight for students and doctrine review. SGLs have an immense amount of autonomy in their classrooms — you will have the freedom to cater to your style and your students' learning needs. However, SGLs also contribute to the actual program of instruction (POI) for the course. In the same way, students are encouraged to challenge and think creatively, SGLs constantly evaluate and critique the MCCC POI to determine if we are teaching the right things in the right way. At the time this article was written, we were working through a complete rewrite of how urban operations are taught to students in the career course.

Your First Student: You

This environment of constant analysis, evaluation, and creativity is not easy for the SGL — but it is exceptionally

developmental. Serving as an SGL directly makes you a better maneuver officer and develops you in the execution of unified land operations. As the adage states, "If you want to master something, teach it." Nothing challenges and develops you more as a maneuver officer than attempting to instruct a room of students you just taught to question everything. This is a positive experience — knowing you will be instructing doctrinal planning and tactics forces you toward a deeper study and appreciation of that doctrine. It is necessary for the sake of your instruction. It also produces a much deeper level of understanding and application in your own mind and models what you expect from your students.

However, this exceptional growth does not occur in a vacuum. Your SGL peers are top-rated individuals who will challenge and develop you. Each SGL team is composed of four Infantry officers, four Armor officers, one Field Artillery officer, one Aviation officer, and a team chief senior. The result is a highly competent, competitive, and experientially diverse team. Your small, combined arms cohort will greatly deepen your understanding and application of maneuver warfare. Everyone has a vested interest in the success of our future company commanders; therefore, everyone has a vested interest in your success.

It is doubtful SGLs are hired for their doctrinal mastery prior to arriving at the Maneuver Center of Excellence. Instead, the cohort of SGLs is made of people who simply care about the success of our students, care about the success of our Army, and have the humility and aptitude to learn. When these talented people form a group, it creates a great atmosphere where peers challenge each other to be the best in doctrine, tactics, and the exercise of leadership. Furthermore, your leaders offer you the clear guidance and latitude to truly develop a better course through each teaching iteration. We have been fortunate to have received some truly exceptional leaders during our time in the Army, but the leaders at MCoE made it the norm.

Lastly, your communication skills will improve. Faced with leading a class every day, you'll become well practiced at communicating effectively and concisely while tailoring to your audience. You'll realize in real time the difference between teaching an individual and teaching a group, and find a lot of fulfillment in watching your verbal messaging and example sink into your students' minds. You'll also improve your written communication skills. The paper you've been thinking of writing since you were a platoon leader will receive the challenge and support needed to come to fruition. Not only are SGLs frequently published, but camaraderie matched with critical and creative thinking make this assignment the perfect place to experiment with new concepts in a safe environment. There is no shortage of people willing to listen and try out new ideas, perhaps even encouraging you to adapt and publish them. You will be in an environment of positive peer-to-peer challenges to learn and grow.

Conclusion

Serving as an SGL is a rewarding experience and should rank among your top choices for post-command broadening. You will experience a unique set of leadership challenges that will directly influence your ability to manage large teams as a field grade leader, and you'll practice and receive feedback on these skills in real time. Your impact on the lives of your students, their future Soldiers, and the tactics of our Army is also a clear and tangible way to contribute to the profession. Finally, you will grow immensely as a maneuver officer and be well prepared for your future education and assignment as a field grade officer. As you approach your upcoming marketplace, map your career timeline, or begin thinking about where you might go post-command, consider your service to the next generation of company commanders as a small group leader at the MCCC.

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CPT Chris Jarrett served as an SGL for 12 months and is currently an Art of War Scholar at CGSC. His former assignments include serving as a SBCT rifle platoon leader, battalion scout platoon leader, and assistant S3. He commanded the Dismounted Reconnaissance Troop and Headquarters Troop of 3rd Brigade, 101st Airborne Division and earned a Masters of Public Administration from Harvard Kennedy School.

What Is Leadership: From the Perspective of a Command Sergeant Major

CSM JESSE J. CLARK

What is leadership? Everyone has his or her perspective on what leadership is. These viewpoints can come from prior leaders, leaders someone has encountered whether positive or negative, or individuals who had an impact during childhood. Regardless, all these examples of leaders had qualities and attributes that made an impact on someone. Leadership is key to an organization being successful or not. In the Army, we have Army Regulation (AR) 600-100, *Army Profession and Leadership Policy*, that lays out the framework of a leader. This is helpful for young leaders to understand what they are expected to be; however, in my 22-year career, I have developed a leadership philosophy that has helped me lead my organizations. This philosophy includes the following areas: putting people first, being present, sharing hardships, maintaining standards and discipline, and prioritizing physical fitness. This may not be helpful for everyone, but I am hopeful that young leaders out there, who are trying to figure out their style of leadership, can take something from my philosophy.

People First

This phrase has so many meanings and is different for everyone. From my perspective being a leader is not about you, it is about those you lead and mentor in your career. Servant leadership is the perfect style of leadership that puts people first. Over the years, I have tried my best to put the people I lead first. This includes recognition, awards, time off, eating last in the field, and ensuring that they are trained the best they can be to go to war. An example of this comes from my current organization. When I arrived, I wanted to do something to recognize a Soldier each week from the battalion that did something awesome. I implemented the "Warrior of the Week." Each company submits a nomination at the end of the week, and I then pick who out of the battalion will be recognized. I then present the Soldier a unit t-shirt on Facebook Live as his or her leader tells everyone why the individual was selected. Additionally, each nominee receives a certificate of achievement. It is awesome to see so many Soldiers recognized for the great things accomplished for the organization. Think about what people first means to you and do it.

If leaders demonstrate that they care enough for their Soldiers and continuously put their needs first, it will build cohesion and trust in the leader. Gaining trust from those you lead can be a huge task, but once the trust is built, it will create a cohesive organization. Be the leader who appreciates those they lead.

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Being Present

For a leader, some duties and responsibilities are required to be successful. One area that I have experienced that is not consistent is being present. Some leaders fill a position but do not do anything to lead their organization. Leaders should get out there and engage their Soldiers, get to know them, and understand what it is that makes them who they are. When you get to know those you lead, it can be rewarding for both you and the individual or group that you are speaking with. Daily engagement with Soldiers is a priority in my organization. Saying "hello" or "good morning" is one way to acknowledge your organization. See how someone's day is going, ask about their family, and ask what their plans are for the weekend. I am a college football fan so I like to talk about football and other sports with anyone I can. This can be so easy to do and does not take much effort but has a huge impact on those who need you to lead them. Always be the leader that you wanted.

Sharing Hardships

It is easy to get caught up in the day-to-day activities and forget about what your Soldiers are doing. When we give a task to our subordinates, whether leaders or Soldiers, we expect them to accomplish that task with minimal involvement from us. This is not always the case, and we must make it a point to change the way we think about how we lead our Soldiers. We need to get involved, not because we do not trust them but because we want to be out there with them. If Soldiers are filling sandbags, help them. We are not above doing these types of tasks at any level. This will continue to build trust and confidence in your leadership. Leaders who share hardships with their organization build a culture that is positive and motivating, and then the organization will follow that leader to the end of the earth if asked. Do not forget where you came from.

Standards and Discipline

In the Army, there are standard operating procedures (SOPs), regulations, and policies that everyone must follow. As leaders, it is our responsibility to enforce these areas and explain why they must be followed. Not enforcing the

standards that have been set forth can lead to indiscipline. We must have disciplined formations to fight and win our nation's wars. Enforcing standards, in my opinion, is where we start building our disciplined formations. Leaders are where the enforcement starts. Understand your unit's SOPs and policies so you can enforce them within your organization. Do not get frustrated or upset at new Soldiers coming to the organizations who do not know how the Army works. It is not just standards you need to teach but also the life skills that will make them better prepared for their future. The more you teach them, the better they are — and the better your organization will be. Be an engaged leader who knows, lives, and enforces standards.

Physical Fitness

Physical fitness is the basis of any military occupational specialty (MOS) in the Army. We must all be able to shoot, move, and communicate on the battlefield. If we are to participate in large-scale combat operations in the future, moving under load by foot is going to be required. Prepare your organization now. Do not wait. Build physical fitness plans that will get your Soldiers ready for conditions that will be physically demanding. Leadership at every echelon should ensure this happens. If someone becomes injured, make sure that individuals get the proper treatment and recovery so they can come back to your organization ready to fight. Leaders are responsible for ensuring their formations are physically fit. Ensure you do it but make sure that Soldiers are getting something out of what you have planned. This is not a task that should be taken off the calendar; it is one of the most important things you do. Be the difference for your organization.

Real-World Scenario

A real-world example that brings all of these areas together occurred from August thru October 2021. As the battalion command sergeant major, my battalion deployed to Kuwait in support of Operation Inherent Resolve. While there, we received a no-notice mission to send part of our element to Qatar in support of a mission that is now known as Operation Allies Refugee. Once we arrived, we led a joint mission to process and move refugees coming from Afghanistan onward to other locations throughout the world. The operation required the ability to put people first by ensuring that we not only took care of those in uniform but also took care of the refugees while we processed them. In order to have a successful mission, it took leaders being present and sharing hardships with the entire organization. The mission was stressful, exhausting, and chaotic; however, because the organization was physically fit and adhered to standards and discipline, it was successful. This is just one example of how my leadership philosophy contributed to success.

Conclusion

As leaders, we need to build a culture of trust and cohesion in our organizations. If an organization's culture lacks trust and cohesion, accomplishing missions will be harder and can lead to indiscipline. Leaders must be subject matter experts in their field and be able to excel at both garrison and tactical operations. If we cannot do both, we will not be able to train, mentor, and lead others to do the same. When I address my organization, I talk about when individuals become a sergeant or second lieutenant they are a leader until they get out of the Army, whether that is in three years or 20 years. This can be in any capacity they find themselves. Be a good leader, know your organization, and do the right things to take care of those you lead. We as leaders never arrive, we continue to grow and develop until the day we get out of the Army. Use your leadership to influence your organization in a positive way. This is how our Army will continue to be the best in the world and answer our nation's call when needed.

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Photo courtesy of 2nd Battalion, 4th Infantry Regiment

Soldiers from 2nd Battalion, 4th Infantry Regiment gather in Kuwait following support of Operation Allies Refugee in Qatar from August-October 2021. While deployed, the unit processed more than 30,000 refugees fleeing Afghanistan.

Mobile Protected Firepower: An Opportunity

LTC BEN FERGUSON
CPT LENNARD SALCEDO

In 2016, defense news sources reported that the Army was interested in developing a lightweight ground combat vehicle to accompany infantry brigade combat teams (IBCTs) and keep them relevant in large-scale combat operations (LSCO) against a near-peer threat.[1] Originally referred to as a light tank, Army officials named the new concept the Mobile Protected Firepower (MPF); this approach was intended to dissuade service members from viewing it as a tank-like vehicle and then employing it the same way as the M1 Abrams Main Battle Tank (MBT). The development of the MPF presents an opportunity to bridge a capability gap that was created when the M551 Sheridan Armored Reconnaissance/Airborne Assault Vehicle (AR/AAV) retired from service. The M551 had earned admiration for its effective operational capabilities — and disdain for its technical shortcomings. As the MPF meets testing milestones and prepares to integrate into IBCTs, commanders at the brigade level and below must ensure the know-how to employ the platform correctly, or they will face a steep learning curve against adversaries, at the cost of Soldiers' lives.[2] The MPF's tactical and strategic potential can better enable the IBCT to execute its mission set while augmenting its ability to defeat a larger spectrum of enemy capabilities. This article will exam the purpose, relevant history, utility, and future for the MPF to improve its prospects of being used appropriately.

Why Do We Need the MPF?

The MPF's purpose is to defeat targets that could compromise the effectiveness of the IBCT. This capability is necessary to defeat enemy prepared positions, to destroy enemy armor vehicles, to close with and destroy enemy forces, and to ensure freedom of maneuver and action for the infantry. The plan is for MPFs, by means of organic protection and firepower, to augment the IBCT's ability to conduct combined arms maneuver with growing technologies. The MPF, with scalable armor packages, provides the IBCT a flexible and tailorable response in contested and various locations to mitigate the enemy's ability to exploit previous capability gaps within the IBCT. With the addition of a light armored force, IBCTs will see improvement in three different planning factors. First, their ability to provide strategic reliability in facing with motorized or mechanized near-peer threats will be enhanced. Second, they will be better able to respond to increased threats with dedicated firepower. Finally, the lethality of IBCTs will be improved through their gaining an organic combined arms maneuver capability comparable to a Stryker brigade combat team (SBCT) and an armored brigade combat team (ABCT).

The MPF provides a unique capability to enable the IBCT to fight as a strategic combined arms team.[3] IBCTs use up-armored, high mobility multipurpose wheeled vehicles (HMMWVs) for mobility and protection, typically armed with a .50 caliber machine gun, Mark 19 automatic grenade launcher, or tube-launched, optically-tracked, wire-guided (TOW) missile. While this system has proven invaluable over multiple decades of service, it will be increasingly incapable of effectively filling the same role in the next major conflict. Even with Common Remotely Operated Weapon Stations (CROWS) and the Improved Target Acquisition System

U.S. Army photo

The development of the Mobile Protected Firepower presents an opportunity to bridge a capability gap that was created when the M551 Sheridan Armored Reconnaissance/ Airborne Assault Vehicle retired from service.

(ITAS), the HMMWV is outclassed by near-peer formations that utilize air-droppable fighting vehicles with improved fire control systems to fire on the move. These near-peer fighting vehicles are armored, maneuverable, and casualty producing; they can mitigate the IBCT's strategic maneuver significantly.

Armor company teams had been a frequent request from 18th Airborne Corps prior to 2018; this would consist of a company team of mechanized infantry and tanks accompanying an IBCT for a Joint Readiness Training Center (JRTC) rotation. These Individual Ready Companies (IRCs) were even aligned for deployments after the Sheridan's retirement left the 82nd Airborne with no armored force to accompany it on contingency missions. Combatant command commanders still have the ability to create these teams from forward brigades, such as the deployment of Bradley Fighting Vehicles to Syria to support allied operations or the deployment of Task Force 1-63 Armor during Operation Iraqi Freedom.[4] This task force deployed to northern Iraq with the 173rd Airborne Brigade in 2003 to conduct reconnaissance in force and to demonstrate coalition resolve. Given that the 173rd and the unit (then stationed in Germany) had trained together, commanders and planners were able to synchronize and work effectively to deter enemy forces from seizing Kirkuk oil fields. These instances demonstrate the ability to integrate these formations, but they were not nearly as efficient as an organic armored asset aligned with that IBCT could have been. The IRC concept and effectiveness do compare with that of a company of MPFs that is co-located within the same division and can frequently train with the unit to ensure successful integration.

Limitations of Current Weapon Systems

The MPF will keep the IBCT strategically relevant in LSCO by providing the capability to defeat these threats and to ensure freedom of action and maneuver. An infantry platoon can employ organic anti-tank weapon systems or rely on the battalion weapons company TOW missile trucks to counter these threats at a significant trade-off.[5] First, these systems lack a maneuverable fire control system. The ITAS and TOW missile, the Command Launch Unit (CLU) and Javelin, and the AT4 are all capable weapon systems that require a dedicated team to operate; they become increasingly difficult to employ when under direct or indirect fires. TOW missiles require the gunner to track the missile onto its target undisturbed for whole seconds that could instead be better spent displacing to the next firing point; Javelins require an appropriate firing position for a top-down attack; and AT4s have no guiding system.

Second, these weapon systems have minimal protection. Their portability enables the infantry to maneuver through restrictive terrain and set ambushes for enemy forces; these benefits quickly become burdens if enemy forces can identify and disrupt maneuvering infantry. While these weapon systems are integral to the infantry platoon, they are no replacement for the protection that the MPF will offer in engaging armored targets or enemy strongpoint defenses. The MPF fills the capability gap by providing a survivable platform capable of delivering vehicle- and bunker-destroying rounds. At 105mm with a variety of round types, the fully stabilized main gun is more than capable of neutralizing bunkers and defeating light enemy armored forces that an IBCT might encounter in theater. Additionally, the MPF preserves the infantry's organic anti-tank assets by directly filling that role. This enables commanders to better reserve their assets for the appropriate situation and so to maneuver their units more effectively.

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The MPF enables commanders to appropriately scale their responses to armed conflicts. Within the current brigade combat team (BCT) configurations, the only MPF-like alternatives are the M1 Abrams MBT or the M1128 Mobile Gun System (MGS). The MGS, while suitable in its initial employment in the global war on terrorism (GWOT), has lost its utility within the SBCT.[6] The Dragoon variant of the Stryker, with its 30mm gun and the CROWS-J upgrade, will enable future SBCTs to have more fighting vehicle-like capabilities and the limited capacity to destroy enemy vehicles when stationary. This upgrade makes the SBCT more formidable, but it still lacks the firepower and fire control system that the MPF can bring to the fight. The M1134 Anti-Tank Guided Missile Stryker, along with the dual role of anti-tank and anti-air capabilities of the Mobile Short-Range Air Defense (M-SHORAD) Stryker, partially mitigate the capability gap left by the Army's decision to divest the MGS in April 2021.[7] The other MPF-like alternative is the M1 Abrams. The venerable M1 is a proven platform capable of destroying all types of targets. However, its increasing weight and logistic requirements make strategic deployments more resource intensive. Until the Army is able to field the Next Generation Combat Vehicle and mitigate some of these issues with current design and technology, it will have to expend considerable resources in moving tanks and armor assets from forward-deployed ABCTs to react to conflicts in different areas of interest and areas of operation (AORs).

Contrasting Improvements Offered by the MPF

Given these considerations, the Army has limited capability for projecting armored combat power to potential theaters of combat. Even if strategic lift assets support the rapid deploy-

ment of tanks, the Pacific theater's dense jungles and various islands or the lack of heavy bridges in Africa could impede the M1's effectiveness. The MPF's lighter weight allows it to be more transportable and more maneuverable in such environments. Thus, commanders and planners can scale their responses in their respective combatant commands to respond to various types of conflicts more effectively. In multi-domain operations (MDO), the MPF is an essential enabler in ensuring that IBCT units retain their freedom of maneuver and are able to contribute to the joint forcible entry maneuver into contact.

The MPF will enable IBCT subordinate units to conduct effective combined arms maneuver. IBCTs, as compared to SBCTs and ABCTs, currently have limited ability to conduct combined arms maneuver against an LSCO threat. The latter formations have dedicated firepower with fire control systems that enable them to maneuver and fight on the move. Based on JRTC rotations that previously utilized armor enablers from other units, IBCTs typically continued to maneuver without IRC tanks until they met the criteria to pull assets forward.[8] Reportedly, battalions were already at 70 percent combat power after initial engagement with indirect and direct fires from the opposing force (OPFOR) infantry and fighting vehicles.[9] The accompanying tank force often found itself unable to occupy templated support-by-fire positions due to its delayed movement, friendly infantry's displacement in the enemy's engagement area, and difficulty maneuvering in restrictive terrain.

One of the MPF's major benefits is the ability to maneuver across restrictive terrain with the IBCT. At lower weights, the vehicle is capable of maneuvering with and directly supporting infantry so that commanders will immediately have necessary capabilities. Their improved maneuverability will present the enemy with a complex tactical dilemma. While the vehicles could still become mired, the MPF's ability to enable friendly forces to defeat armor and strongpoint defenses are worth the risk. HMMWVs have often filled this role, but they are incapable of effectively firing on the move and have significantly less survivability, making them less viable in combined arms maneuver than the MPF. Consequently, maneuver battalions will improve their lethality and ability to win enemy engagements.

Recent Historic Use of Light Armor in Infantry Formations

First fielded during the Vietnam War, M551 Sheridan tanks replaced the M113A1 Armored Cavalry Assault Vehicle (an M113 with three machine guns with turret shields) and M48 Patton tanks in cavalry squadrons. With its lower weight and 152mm rounds, it was expected to perform better as an armored cavalry team.[10] The M551's performance unfortunately failed to inspire total confidence. While maneuvering was easier, crews dealt with design flaws that caused casualties.[11] The aluminum armor made it just as vulnerable to mines as the M113A1 had been and more vulnerable than M48s. Uncased rounds corroborated this, as vehicles hit by mines and sometimes even significant anti-tank fire could cause propellant to spill inside the vehicle, prompting crews to bail out before the enemy could knock the vehicle out. The electronics inside caused further problems in theater, as crews found systems not to be mission-capable when they were in environments with high moisture — again, this was in Vietnam. The doctrine did not match the employment; the vehicle was arguably not as well-suited for assaulting into ambushes as the cavalry team of armored cavalry assault vehicles and Patton tanks.[12]

National Archives photo

An M551A1 Sheridan tank from the 3rd Battalion, 73rd Armor Regiment, 82nd Airborne Division, moves out after being offloaded from a convoy vehicle in Honduras on 1 March 1988.

Following Vietnam, the Sheridan still proved the utility for light armor during Operation Just Cause. The Army retired M551s into opposing force units while maintaining a battalion (4th Battalion, 68th Armor Regiment, later 3rd Battalion, 73rd Armor Regiment) in the 82nd Airborne Division. Paratroopers, together with M551s, deployed to Panama; they operated as a combined arms team against a surprised enemy force.[13] Following a heavy-drop that resulted in one inoperable Sheridan, the platform effortlessly destroyed barriers to enable the infantry to maneuver. Snipers, machine-gun teams, and enemy ambushes failed

U.S. Army photo

The Mobile Protected Firepower brings necessary firepower to the infantry brigade combat team's fight. The 105mm cannon, the coaxial 7.62mm machine gun, and the externally mounted .50 caliber machine are the primary armaments for the MPF.

to decisively engage paratroopers, as the Sheridan would quickly dispose of them with its improved fire control systems and 152mm high-explosive anti-tank (HEAT) or cannister rounds. The strategic deployment of a combined arms teams of fires, infantry, and armored assets enabled a swift end to Operation Just Cause.

3-73 AR demonstrated the utility for mobile protected firepower capabilities in Operation Desert Storm and Operation Desert Shield. Following a massive intratheater air insertion of the entire battalion with the 82nd Airborne Division, M551s easily destroyed strongpoint defenses and secured ports for the 24th Infantry Division and U.S. Marines. These M551s had the tank thermal sight (TTS) upgrade and were able to fight accurately at night, alleviating enemy pressure on the infantry. Machine-gun nests limited friendly maneuver only briefly as 152mm rounds followed by heavy machine gun fire destroyed multiple positions. These defenses would have otherwise reduced combat power and logistical support for friendly forces, if not for MPF-like capabilities.

While the Army knew it needed to replace the Sheridan to keep pace with advancing capability demands, it was nonetheless intent on maintaining the positive capabilities that the Sheridan had provided; it would make significant strides in this effort in the 1980s until the Gulf War. It started with the XM8 Armored Gun System (AGS).[14] The air-droppable AGS could deliver capabilities similar to those of the M551, but it could do so more reliably as it was equipped with the proven 105mm cannon. However, the budget could not support its production in 1996, and the program was cancelled. During GWOT, the Army tested the MGS viability as a replacement for MPF-like capabilities in IBCTs, which ultimately never resulted in the MGS integrating into IBCTs. The Army accepted risk by not replacing the M551 earlier, as GWOT remained the strategic priority for the upcoming years. The once acceptable capability gap became one of the focus points of the Army's modernization efforts as the Army prioritized MDO and LSCO.

Utility of the MPF

Skeptics of the MPF may wonder if IBCTs truly need the MPF in their formations. While historic trends show that appropriate doctrine and employment of armor are paramount to success, senior leaders continually emphasize how the MPF is not a light tank; consequently, commanders do not immediately employ MPFs in frontline battles with other enemy armored forces.[15] The MPF will operate optimally when its use is aligned with the Army Armor Branch mission statement, closing in and destroying enemy by fire, maneuver, and shock effect.[16]

The MPF's mobility can enable light infantry to maneuver more effectively. This platform is more conducive than previous generations to combined arms maneuver, and it can allow for the relief of infantry caught in decisive engagements in restrictive terrain. The horsepower-to-weight ratio allows the vehicle to negotiate various restrictive terrains that would otherwise mire an MGS or an M1 Abrams.[17] The M1A2C Abrams is also approaching higher weights that limit both its mobility on Air Force transports and its ability to maneuver through infrastructures such as European bridges or the current M60 Armored Vehicle Launched Bridge. MPF's mobility would also allow it to displace rapidly to support other maneuver battalions, as well as react to threats to lines of support better than HMMWVs or Mine-Resistant Ambush Protected All-Terrain Vehicles (M-ATVs). The MPF is likely more maneuverable than HMMWVs and M-ATVs as a tracked vehicle, and it is definitely more lethal with its ability to fire on the move; the other vehicles in the IBCT are not designed with such sophisticated fire control systems. While they could probably engage on the move, their effectiveness is limited at best. Situations where tanks cannot maneuver to support infantry assaults will likely become less frequent as MPF crews and leaders learn their vehicles' limits and are able to provide commanders with realistic capabilities so that planners can better determine where the MPF needs to be to make operations successful.

Skeptics may state that the logistic requirements for the MPF could encumber the IBCT's mobility. In these instances, MPF maintenance and resupplies would become a frequent task for MPF leadership and operational control units to manage. But the requirement for more logistic support and planning should not be a factor in why this platform should not be integrated into IBCTs. Leaders from ABCTs and SBCTs will be able to use their experience to help the IBCT better plan for integration along with the appropriate doctrine, standard operating procedures, and mission-specific considerations. Similar to the K-series modified table of equipment, the consolidation and central management of MPFs is paramount to success. Like the weapons company in an IBCT or a weapons troop within an SBCT, central management will enable MPF crews to learn best practices in tactics, logistics, and leadership prior to their attachment to an IBCT. The MPF companies will then be able to deploy with some of their organic logistic support, knowing what they need to request and at what frequency to enable the unit to properly support their operations. This will become drastically more important as IBCTs begin converting light BCTs that maneuver motorized infantry battalions, which need firepower to keep pace with their units. Thus, the MPF's logistic footprint should not be treated as a limiting factor, but a planning factor for leaders to consider and develop both the proper standard operating procedures and the tactics, techniques, and procedures (TTPs) to ensure success.

The MPF brings necessary firepower to the IBCT's fight. The 105mm cannon, the coaxial 7.62mm machine gun, and the externally mounted .50 caliber machine are the primary armaments for the MPF. The IBCT can only benefit from precision firepower that the fire control system is capable of bringing to the fight. The main gun will likely use legacy rounds that the MGS used: HEAT rounds for fighting vehicles, Sabot rounds for tanks, high-explosive plastic for obstacles, and cannister for massed infantry. This sort of firepower can provide commanders with the ability to respond to various threats that would have taken a dismounted anti-tank team or a TOW HMMWV into the fight. The MPF has a unique ability to better react to contact than the other teams. Anti-tank teams and HMMWVs function well in the ambush, but they are drastically less likely to destroy the enemy when responding to an aggressive armored threat. Under pressure, it can be difficult for these teams to properly acquire a target. The Carl Gustav rockets or AT4s may not guarantee an immediate kill, meaning the vehicle could potentially engage friendly forces and reduce combat power. Javelins and TOWs have a higher probability of kill, but they still require the gunners or crew to remain vulnerable to direct and indirect fires. The MPF can fight better on the move, allowing these teams to function under significantly less duress to destroy armored threats.

The MPF will bring better protection than other vehicles in the IBCT, but it is important to note that it cannot bring the same level of protection that a tank might field. Given that the MPF will use scalable armor packages to augment its survivability, commanders must understand that the Mobile Protected Firepower has been deliberately named to not give

The MPF will bring better protection than other vehicles in the IBCT, but it is important to note that it cannot bring the same level of protection that a tank might field.

the impression of a main battle tank. These packages, similar to the urban upgrades that the Abrams received during GWOT (TUSKs, i.e., Tank Urban Survival Kits), will further enable the vehicle to fight alongside IBCT units in cities.[18] Contrary to some opinions, tanks and armored vehicles have fought and will continue to fight in cities. Their commitment to the fight must be well regulated, but MPF-like platforms have enabled more effective and efficient fighting within cities. Rather than avoid this reality, our Army should embrace the concept and continue to refine armor employment within cities and megacities.

The MPF will likely not be able to push through rocket-propelled grenade volleys or survive tank rounds. Instead, it will be capable of offering enough protection to survive enemy fighting vehicles to augment dismounted troops' survivability. The addition of active protection systems, such as the Trophy system, will serve to improve its survivability against anti-tank guided missiles and even against rocket-propelled grenades; together, these can enable the MPF, along with dismounted infantry, to continue the fight both in open and mounted AORs. While the crew is (relatively) safe from small arms fire and higher caliber rounds, the MPF will have the capability to engage with the combined arms team, enabling them to better mass effects in the right times and spaces to defeat enemy attacks and defenses. The MPF can regulate what was once a haphazard fight with the enemy forces, supporting dismounted commanders by providing more options to react to contact and defeat enemy forces.

Shock effect is the element that will truly make the MPF invaluable to commanders at any echelon. The ability to deliver precision direct fires from terrain previously thought of as too restrictive for armor to maneuver through will continually shrink as the MPF integrates and receives upgrades. Enemy strongpoint defenses that would have otherwise pinned infantry units down will continue to dwindle; this is exactly the way history's first tanks broke stalemates in World War I. Next-generation enemy vehicles and upgraded older platforms will become less destructive threats to the infantry as the MPF — and supported infantry or mounted anti-tank teams — will be able to effectively engage and destroy these targets. The multiple tactical dilemmas given by these "spontaneous" combined arms teams will force them to make hard decisions that will allow IBCTs to remain strategically viable against more enemy formations. As the Army codifies the primary method for deploying the MPF to theater, its insertion along with IBCTs will become easier to plan and will begin to integrate shock effect to break the enemy's tempo and conduct successful operations.

Conclusion

Since the end of World War II, the Army has continuously made an effort to maintain MPF-like capabilities. Even as these initiatives dwindled during the GWOT, the need for this capability continues to resonate with IBCT leaders today; it is something that they know will augment their operations and generate options for them to react to contact. MPF is a capability that must be maintained for IBCTs to remain formidable as the Army transitions to MDO and LSCO. After the delay during GWOT, it seems that the Army is working toward closing the capability gap. It is worth thinking about future MPF augmentations in light of what was discussed above regarding the utility of the MPF. What will the Army do to maintain and upgrade overmatch in fire, mobility, protection, and shock effect?

One likely upgrade depends on the ability to integrate more unmanned ground vehicles, unmanned aerial vehicles, and artificial intelligence networks into the force.[19] Robots that could automatically seek refueling stations, conduct resupply, and return to crews is just one of hundreds of opportunities that could secure integration between people and machines. This would undoubtedly put less risk on Soldiers conducting resupply and present less of a target to enemy forces. Unmanned ground vehicles and unmanned aerial vehicles could also be used to mitigate the need for scouts with the MPF or combined arms teams. On-board artificial intelligence could help generate synopses for radio transmissions during engagements or help crews slew the turret to their next most dangerous targets.

The MPF's doctrine development is just as important as its acquisition. It is likely to be used just like an Abrams by virtue of its aesthetic, which could prove detrimental to its integration into the combined arms team. This is no different from commanders in World War II receiving a tank destroyer company and proceeding to use them as though they were Sherman tanks. The accompanying doctrine and TTPs must match the mission set and intent for the MPF, or its misuse may deter future investment into making the platform better suited for supporting IBCT operations.[20]

The IBCT can undoubtedly continue to fight without an MPF platform to support its maneuvers. However, this comes with unnecessary risks that the MPF can mitigate. There is a reason why the MPF is one of many iterations (Stuart, Chaffee, Bulldog, and Sheridan tanks) in the endeavor to have a light armored platform that can deliver precision fires.[21] The ability to field combined arms teams is important in maintaining overmatch with near-peer threats and in responding to various threats. This platform will enable the IBCT to remain tactically formidable and strategically mobile while reducing casualties that would occur if the troops did not have direct fire support to counter strongpoint threats and armored threats. The transition from counterinsurgency operations to LSCO is the perfect opportunity to invest in a capability that will help accomplish the mission, implement a better combined arms team into IBCTs, and mitigate casualties through fire, maneuver, and shock effect in the next armed conflict.

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Notes

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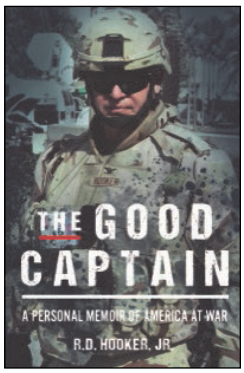
Book Reviews

The Good Captain: A Personal Memoir of America at War



By R.D. Hooker Jr.

Havertown, PA: Casemate Publishers, 2022, 298 pages

Reviewed by BG (Retired) Mitchell M. Zais

Richard Hooker was an Infantry Soldier. When he retired out of the 82nd Airborne Division in Afghanistan, he had been deployed to more conflict zones than any other serving colonel of his day and was the senior paratrooper on active duty, having earned his jump wings 35 years earlier. Part memoir, part military history, and part policy and political studies, *The Good Captain* tells an amazing story of courage and personal sacrifice in a career that spanned over three decades and saw deployments to Grenada, Somalia, Zaire and Rwanda, Bosnia-Herzegovina, Kosovo, the Sinai, Iraq, and Afghanistan.

Not only a combat and field Soldier on his journey from private to colonel, Hooker also served at the highest levels of military and defense policymaking. He had three tours on the White House National Security Council, served as aide de camp to the Secretary of the Army, and as speech writer for the Chairman of the Joint Chiefs of Staff. His story bears witness to the horrors of war from the Soldier's perspective and to the often tragic decision making at the highest levels of national security.

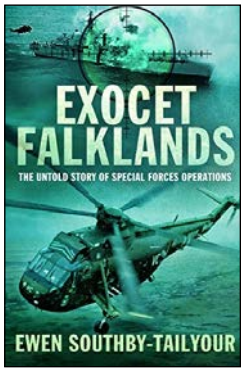
Hooker was born in the Army; his father was also a career Infantryman and paratrooper. Both his sons served as privates in combat, one with the 173rd Airborne Brigade and one with the 82nd Airborne Division, before being commissioned as Infantry officers. Like so many "Army brats," the author grew up with frequent moves and multiple family separations. His own family made similar sacrifices.

Enlisting straight out of high school, Hooker's first assignment was to the 82nd Airborne Division. After attending the West Point prep school and graduating from the academy, he returned to the 82nd. What ensued was an extraordinary 30-year career that took him around the world. Having led Soldiers in war and in peace as an airborne platoon leader, company commander, battalion commander, and brigade commander, his insights and anecdotes serve as a primer on leadership. The sacrifices required by the Soldiers and their families who bear the burden of our nation's conflicts are well documented.

Because it covers the military landscape from the halls of the Pentagon and White House to the killing fields of Africa and the Middle East, *The Good Captain* offers leadership lessons that are applicable from the squad level on the ground to the national level in Washington. Nor is Hooker reluctant to both praise and critique military leaders he served with, the defense bureaucracy, and national security policy.

Most of all, in pulling no punches, *The Good Captain* is exciting and interesting. I found it hard to put down.

Exocet Falklands: The Untold Story of Special Forces Operations



By Ewen Southby-Tailyour

South Yorkshire, UK: Pen and Sword Military, 2014, 2016, and 2021, 314 pages

Reviewed by SFC (Retired) John C. Simpson

The Falklands War began on 2 April of 1982 with amphibious landings by Argentinian forces on the Falkland Islands which had been under British rule since 1883. The military junta then governing Argentina assumed that the British would be unwilling to protect some islands in the South Atlantic and that with the occupation the British would be driven to the negotiating table for a final resolution. They hadn't counted on Prime Minister Margaret Thatcher, however, as she established a War Cabinet on 6 April for the express purpose of retaking the Falkland Islands by force. The conflict later ended on 14 June of that same year with the British victorious over the invaders.

Since then, there has been a great deal of analysis in regard to lessons learned from this conflict ranging from how vulnerable surface ships are from both air-launched guided missiles or torpedoes from submarines to how in an age of air mobility and mechanized warfare British paratroopers still had to march 21 kilometers and the Royal Marine Commandos (carrying 80-pound loads) had to be able march 90 kilometers just to get to their battlefields. And that's nowhere near a comprehensive list.

As anyone who studies military history will tell you though, the full story of a war is seldom known in the immediate aftermath. There is, however, a "sweet spot" in the research where useful information is finally declassified and surviving participants can be interviewed for their firsthand accounts. This all brings us to the subject of this review, *Exocet Falklands*, an outstanding book that definitely benefited from the release of previously classified material as well as firsthand interviews

with personnel from both sides of the conflict that were conducted by the author.

The result is a very readable book with a narrative that weaves together three parallel story lines: the Argentinian effort to do what British intelligence believed impossible and mount Exocet missiles onto their aircraft without technical assistance from French factory technicians; the events behind the planning and mistakes over Operation Mikado; and the comedy of errors that was Operation Plum Duff. This is then followed by details of the "hitherto unknown" (according to the author) — Operation Kettledrum.

Operation Mikado was supposed to be an airfield assault using multiple C-130 transports loaded with special air commandos to destroy the only Argentine aircraft capable of carrying French Exocet anti-ship missiles. It was actually inspired by the successful hostage rescue at Entebbe, Uganda, by Israeli Defense Forces on 4 July 1976. Plum Duff was a reconnaissance patrol in support of Mikado involving an eight-man SAS element that was to approach the target airfield and provide final eyes on target prior to the raid. Kettledrum was a proposed mission for the Special Boat Squadron (SBS) to perform an attack on the mainland at Puerto Deseado in order to destroy any aircraft that they might find.

The lessons to be learned from the planning mistakes documented here are worth the price of the book alone in my opinion. Mikado was never executed, but prior to its cancellation saw the voluntary termination of a senior NCO from the SAS in protest of being assigned a "suicide mission" and the relief of his squadron commander for a perceived failure to maintain morale. It's from studying Plum Duff, however, that we learn the most valuable lessons in the conduct of a long-range reconnaissance patrol. This mission was full of errors practically from the beginning with the team being too large for a recon patrol but too small for a combat patrol.

One error in the planning of Plum Duff that hit home for me was using "you never know" as a substitute for proper contingency planning. Without going into too much detail, the patrol that was only intended to place surveillance on the target airfield was ordered to be ready to destroy the aircraft on the ground if possible. This meant food and cold weather clothing were replaced with explosive charges and detonators. This left each man with four days rations and inadequate clothing for the autumn weather. This would impact the mission after the patrol was dropped off by the helicopter across the Chilean border instead of the planned 45 kilometers from the airfield, which led to them trying to walk more than 160 kilometers.

The author has included two things of extreme value in this book: a 10-page timeline at the beginning and a 12-page epilogue at the end that analyzes the events and decisions made by the British military. I'll leave you with what I personally found to be one of the most useful quotes in the whole text that reinforces the constant need to train the whole spectrum of the skill set and not just the "high-speed, low-drag" things. It was from an SAS corporal who was in B Squadron at the time it was standing by for Operation Mikado:

"We trained and worked as infantry sections for the first time since I joined the Regiment... most of my sergeants didn't have a clue about infantry battle-drills... They couldn't give section or platoon orders and would be dangerous to have around in a fire-fight. I for one wouldn't have followed some of my own sergeants... War was bringing out the worst as well as the best in the SAS. (emphasis added)"

Now, I don't know if you're a notetaker, highlighter, or underliner when reading a book of this type. Myself, I used color-coded adhesive flags to mark the locations of items I found with a particularly useful lesson. This is that kind of book. I think you'll enjoy reading it, and you just might learn something as well. I highly recommend this book.

Future Issue Themes:

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