



Soldiers from 1st Battalion, 66th Armor Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division, ready their armored vehicles for review by Lithuanian President Gitanas Nausėda 27 May 2022 at Kaunas, Lithuania, during Defender-Europe 2022. Defender-Europe 22 is a series of U.S. Army Europe and Africa multinational training exercises in eastern Europe. The exercise demonstrates U.S. Army Europe and Africa's ability to conduct large-scale ground combat operations across multiple theaters supporting NATO. (Photo by Spc. Devin Klecan, U.S. Army)

Defender-Europe 2022

A Combined Arms Battalion's Long-Range Movement across Europe

Lt. Col. Paul G. Lockhart, U.S. Army
Maj. Matthew L. Simon, U.S. Army

In February 2022, as tensions built in Europe over the Russian invasion of Ukraine, the 1st Battalion, 66th Armored Regiment (1-66 AR) “Iron Knights,” 3rd Armored Brigade Combat Team (BCT), 4th Infantry Division, was preparing its equipment for rail operations at its home station of Fort Carson, Colorado. The battalion leadership had recently returned from a predeployment site survey ahead of what was supposed to be a routine rotationally aligned force mobilization. As part of the rotation, the Iron Knights had been selected to participate in the U.S. Army Europe and Africa multinational exercise titled Defender-Europe 2022 (DE22), which would involve a multimodal (road, river, and rail) movement of a combined arms battalion (CAB) across Poland and Lithuania.

However, as war in eastern Europe grew more certain, it became unclear if U.S. Army senior leaders would continue the

exercise as planned. Tactical, operational, and strategic variables were reviewed, and the decision to move forward with DE22 was made, which resulted in a tactical mission having strategic implications for NATO forces, allied nations, and Europe.

Defender-Europe is an “annual large-scale U.S. Army-led, multinational, joint exercise designed to build readiness and interoperability between U.S., NATO and partner militaries.”¹ The Iron Knights’ mission during the exercise would prove to be a test of the battalion’s ability to project combat power into the heart of eastern Europe and the Baltic States and execute elements of the unit’s assigned mission essential task list while also testing interoperability and a multinational command-and-control (C2) structure. This exercise required the Iron Knights to enter a theater of operations, establish command and support relationships with multinational partners, build combat power, and conduct a 1,500 km movement and maneuver with multinational partners through eastern Europe via multimodal transportation. The exercise culminated in a tactical deployment of all battalion assets during a 180 km tactical road march to a U.S. forward operating site at Camp Herkus, Lithuania. The mission’s design was a proof of concept to gather lessons learned on the friction and challenges a BCT-or-larger force may encounter if required to execute combat operations in eastern Europe. This article highlights these lessons learned and the tactics, techniques, and procedures identified and used by the Iron Knights during DE22.

Phase I. Expeditionary Deployment Operations

In February 2022, the Iron Knights loaded equipment on rail at Fort Carson and conducted download a few weeks later at the seaport of embarkation in Charleston, South Carolina. The battalion initiated a readiness push prior to rail operations, increasing the unit operational readiness rate above 90 percent for all combat platforms. A team of Iron Knight soldiers loaded over 375 pieces of equipment onto two ships for movement, which would cross the Atlantic Ocean into the Mediterranean Sea. Equipment arrived at the seaport of debarkation (SPOD) at Alexandroupoulos, Greece, in March 2022, marking the first time a U.S. Army CAB had entered Europe through Greece. The battalion downloaded all equipment for rail movement

Lt. Col. Greg Lockhart,

U.S. Army, is the commander of 3rd Armored Brigade Combat Team (Rear Detachment). He previously commanded 1st Battalion, 66th Armored Regiment, and he has served in Stryker and armor formations throughout his career with deployments to Afghanistan and Iraq as well as tours to South Korea and Europe. He is also a former action officer on the Army Talent Management Task Force and a Human Resources Command assignment officer. He holds a master’s degree in geography from Western Kentucky University and a Bachelor of Arts in international studies from the University of Miami.

Maj. Matt Simon, U.S.

Army, is the chief of tactics for the Armor Officer Basic Course at Fort Moore, Georgia. He served as the battalion executive officer for 1st Battalion, 66th Armored Regiment during Defender-Europe 22 and as the operations officer for the remainder of the unit’s deployment to Europe. He has held a variety of armor and cavalry leadership and staff positions in armor and Stryker formations with deployments to Afghanistan and West Africa, and assignments in Germany and South Korea. A former military science instructor at the U.S. Military Academy at West Point, he holds a master’s degree in military art and science from the U.S. Army Command and General Staff College.

and commercial line haul, after which it transited four European countries prior to arriving at the exercise starting point in Trzebień, Poland.

During Phase I of deployment operations into theater, the Iron Knights self-supported in close coordination with the Surface Deployment and Distribution Command. It was a true proof of concept that required the battalion to test its internal systems and movement processes. The initial movement phase in the continental United States (CONUS) identified points of friction with vehicles and equipment that would likely also manifest in Europe. CONUS operations allowed the battalion to take actions to mitigate those friction points, resulting in greater success in Europe. Three major lessons learned enabled a successful deployment of equipment.

People are our overmatch. A recurrent theme throughout this article is “people are our overmatch.” Assigning the right leaders and soldiers at appropriate points of friction is necessary to successfully execute deployment operations. An officer in charge paired with an experienced noncommissioned officer, with a communication package for deployment nodes at Fort Carson (including the agricultural and sanitation node, container yard, “bronco” staging yard, and motor pool) proved decisive in the ability to successfully deploy equipment to port. The rail yard was controlled by a major (either the battalion executive officer or operations officer), which enhanced the unit’s ability to liaison with echelons above brigade to resolve problems as they arose. Communications then filtered through a battalion C2 node located at the battalion headquarters. Treating rail load as an operation, with appropriate C2, allowed for quick resolution to problems.

The CONUS port C2 node consisted of a post-command captain and first sergeant as well as supporting operators and unit movement personnel. This experience proved invaluable during the successful rail download and subsequent upload of the battalion equipment onto two ships outbound to the port in Greece. The senior captain proved to have the right experience and ability to communicate regarding points of friction as well as to coordinate with multiple echelons of command to ensure proper load and stowage of equipment for the battalion. Furthermore, the experience of the port team (operators and maintainers) allowed for fast

and quick troubleshooting of problems to ensure rapid upload of equipment.

The battalion’s theater port C2 node in Greece consisted of the operations officer, the first sergeant from the forward support company, and a variety of operators and maintainers. A field grade officer as the officer in charge was a V Corps requirement, which proved to be a necessary assignment due to the high level of coordination required with theater movement control teams, customs, and echelons-above-brigade C2 elements. The maintenance team consisted of experienced maintainers, which proved necessary to address issues with equipment being afloat for a month across the Atlantic Ocean. Do not underestimate the experience required of a port detail. It should be comprised of the best and brightest from the unit, as this part of the operation sets the stage for later phases of the deployment. The Iron Knight team of maintainers was able to mitigate and correct faults, allowing operators the ability to drive most equipment onto trains and making download at Camp Trzebień, Poland, significantly easier.

Port maintenance. To resolve minor maintenance issues, the battalion port detail in South Carolina established a relationship with a local supply support activity a few hours away. This should be implemented by all battalions and brigades deploying from CONUS to any destination. This action allowed the battalion to maintain its operational readiness rate prior to loading the ships as well as minimize the use of the battalion’s shop stock list (SSL) materiel at port, which would have required the opening of spare parts and specialty equipment containers. While it is not recommended to execute major maintenance activities at port, minor activities will simplify download and prevent towing vehicles at the SPOD.

Port maintenance in Greece, however, proved to be more complex and required the opening of SSLs and specialty equipment containers. The transport of equipment via sea vessel for an extended duration impacted equipment readiness rates. Due to inactivity, vehicles and equipment began to show power and electronic issues, primarily caused by the damp environment on the ships. While external packing lists were accurate, it was quickly discovered that part lists inside containers were not as accurate. This created a loss in time and work hours at port sorting and locating the right parts. Having the appropriate level of leadership



A ribbon bridge carrying an M1A2 Abrams tank from 1st Battalion, 66th Armored Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division, crosses the Vistula River 13 May 2022 during Defender-Europe 22 at Dęblin, Poland. Defender-Europe 22 is a series of U.S. Army Europe and Africa multinational training exercises in eastern Europe. The exercise demonstrates U.S. Army Europe and Africa's ability to conduct large-scale ground combat operations across multiple theaters supporting NATO. (Photo by Spc. Devin Klecan, U.S. Army)

when loading the SSL and specialty containers would have prevented this issue through the proper labeling of interior storage boxes with parts inside shipping containers. Finally, having the experience necessary to troubleshoot electronics at port proved crucial to the successful upload of rail cars. Experienced maintainers trained in electrical troubleshooting are a must have for port operations at the SPOD.

Deploy yourself, when possible. A self-supported CONUS port allowed for the Iron Knights to identify and route any issues that needed to be communicated to the receiving port team in Greece. The adage “no one cares for your equipment better than you” is absolutely true. While not always feasible due to current constraints with deployment operations, battalions and brigades, when able, should manage the load out of their own equipment. Organic loadout enabled an accurate stow plan to be communicated forward to the SPOD detail as well as the ability to locate and stage the SSL and specialty containers upon arrival to

support maintenance activities during vessel berthing. Self-supported deployment operations enabled the Iron Knights to execute a rapid transition from readiness build to combat operations due to ownership throughout the entire deployment process from the seaport of embarkation to exercise start.

Phase II. Readiness Build and Intertheater Mobility Operations

Ready to fight tasks. The rail transport of combat platforms from Fort Carson to Charleston with follow on sea movement to Alexandroupoulos and subsequent rail movement through Europe to Trzebień posed a series of challenges to equipment readiness. The battalion theorized that the constant fluctuation of climate, both elevation from mountainous and dry terrain to a moisture-heavy sea level, caused weather damage to some combat platforms. Additionally, a series of storms along the four-country rail route (through Bulgaria, Romania, Hungary, and Slovakia) caused a

slight decrease in readiness during equipment staging in Trzebień. The battalion had less than two weeks to rapidly troubleshoot and execute field maintenance to build fleet readiness, test fire all weapons platforms as part of theater requirements, and execute sustainment crew qualification training to certify crews through the coming months. As a result, soldiers and leaders implemented a few strategies to regain the initiative ahead of a historic long-range movement (LRM).

Battle tracking and reporting. Once all equipment was staged at Trzebień, the battalion down-loaded equipment, conducted inventories, and completed preventative maintenance checks and services (PMCS). The battalion enabled its tactical operations center (TOC) to not only validate the tactical network but also to help track maintenance progress and to ensure the unit was on pace to complete all live-fire prerequisites. The rapid setup up of the TOC and the application of the battalion tactical standard operating procedures (SOP) helped monitor ready-to-fight tasks to completion, and it ensured essential C2 systems were operational, and processes were implemented prior to the start of the LRM. Furthermore, due to the scope of the exercise and the role 1-66 AR would play, it was necessary to remain in communication with the battalion's organic brigade headquarters and echelons above brigade supporting the exercise well in advance of the movement.

Where are the parts? Coordination with the brigade headquarters and adjacent battalions for parts sourcing within theater proved to be one of the biggest challenges during the readiness build period. Some parts were available at logistical readiness centers across multiple countries within Europe, while other parts were listed as on hand in SSL containers with adjacent units. A standing procedure for parts flow for the remainder of the rotation emerged during this period for 1-66 AR. As an example, 1st Battalion, 8th Infantry Regiment, had a part on hand for a 1-66 AR Bradley Infantry Fighting Vehicle, while 1-66 AR had a part on hand for a 1st Battalion, 8th Infantry Regiment, M1 Abrams tank. The result would be the establishment of exchange points, where units would transfer parts through rental vehicles at midway points more quickly to enable repairs. Moreover, the 64th Brigade Support Battalion would emerge from the ready-to-fight period sending "box trucks" across theater to locate, sign for, and distribute parts to expedite repair

times. This model would help 1-66 AR achieve the requisite operational readiness rate ahead of the LRM.

Orders production and the rehearsal of concept drill. While the entire battalion was hard at work completing maintenance and live-fire tasks, the Iron Knight staff developed the operations order that would synchronize LRM activities for the next thirty days. The staff completed a full round of the military decision-making process, including the creation of a synchronization matrix and execution checklist for critical events during the LRM. Prior to the first train departing the railhead and the first wheeled serial departing the front gate of Trzebień, the battalion completed a rehearsal of concept drill that encompassed a rehearsal of all phases, critical events, friction points, and contingencies.

Phase III. The Long-Range Movement

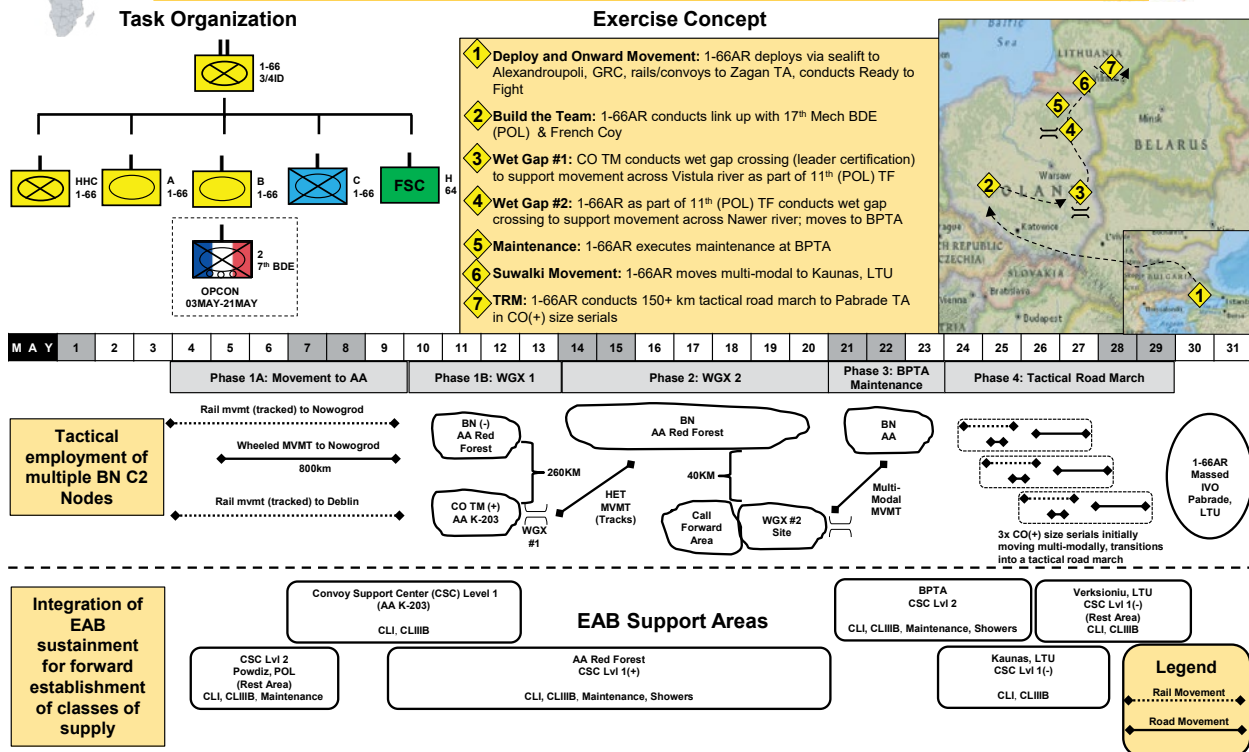
Mobility operations in Europe are challenging and complex for myriad reasons. During the battalion's predeployment site survey in January 2022, the Iron Knights were identified as the number one priority unit for movement assets based on the required mission set during DE22. Circumstances in Europe became more complex, however, and the Iron Knights realized they would have to compete for mobility resources with multiple units as assets were allocated to support the war in Ukraine. While the events in Europe magnified these challenges during DE22, the realism of the exercise for the Iron Knights only increased as it created a real-world scenario of how battalion-and-above units would have to move and fight for resources during wartime operations.

During DE22, the Iron Knights were task organized under the tactical control of the Polish 17th Mechanized Brigade. 1-66 AR participated with its organic CAB elements consisting of the headquarters and headquarters company, two tank companies, one mechanized infantry company, and a forward support company. The 984th Military Police Company (minus) attached to the Iron Knights consisting of a military police platoon and headquarters section. Finally, one French mechanized infantry company consisting of three infantry platoons, a headquarters element, a bridging team, and a security force attachment were assigned under the



UNCLASSIFIED

DE-22 Long Range Movement



Stronger Together!

UNCLASSIFIED

(Figure by Maj. Jonathan Proctor)

Figure 1. 1st Battalion, 66th Armored Regiment Defender-Europe 22 Concept Slide

operational control of the battalion for two wet-gap crossings (WGXs).

Following the completion of all ready-to-fight tasks and a sustainment crew qualification, the battalion departed Camp Trzebień on a 1,500 km tactical wheeled-vehicle movement from Poland to Lithuania with the entire wheeled vehicle fleet and sustainment assets. All tracked platforms travelled via commercial line haul and rail, allowing the battalion to test Polish and Lithuanian infrastructure at six railhead locations. As part of the exercise, the battalion executed two multinational WGXs to test interoperability between NATO allies and partners and a multinational combined arms live-fire exercise led by the 17th Mechanized Polish Brigade. The battalion's culminating event pushed the Iron Knights through the Suwalki Gap to execute a 180 km tactical road march with

the entire fleet consisting of Abrams tanks, Bradley Fighting Vehicles, support and command tracks, and the wheeled fleet from Kaunas Rail Terminal in Lithuania to the battalion's final destination at Camp Herkus in Pabradė, Lithuania (approximately eight kilometers from the Lithuanian and Belarusian border).²

Over the course of the LRM, 1-66 AR stressed the battalion's mission command and sustainment nodes across a sustained distance and duration. Figure 1 depicts the array of forces throughout the LRM and the necessary integration of echelons-above-brigade sustainment to maintain combat power.

The ability to sustain and project combat power also required overreliance and continuous use of host-nation infrastructure (contracting, rail, road networks, and commercial line haul). Additionally, 1-66 AR had to decisively engage its mission

command nodes: the TOC, tactical command post (TAC), company trains command post, unit maintenance command post, and field trains command post. Integrating all C2 nodes was vital to maintain command and control of the formation spread well beyond its doctrinal depth and to allow the battalion

would eventually also handle the remainder of all movements for the Iron Knights during two multinational exercises later in the deployment. Lastly, this same team coordinated all movements for rail and port operations departing theater. Building expertise, nested within the movement and maneuver warfighting function, is crit-

“ Building expertise, nested within the movement and maneuver warfighting function, is critical to successful mobility operations in Europe. Units must build redundancy in the mobility cell and avoid rotating personnel in and out of the mobility operations team. ”

to aggressively attack sustainment to maintain combat power for nearly thirty days of movement.

The successful completion of the LRM marked a historic and strategically significant event for NATO forces and the Iron Knights. The LRM tested the CAB's ability to project combat power over extended distances and across multiple European nations. Although other U.S. Army formations have previously conducted long-range movements throughout Europe, this was the first time in history a U.S. Army CAB projected combat power all the way from the SPOD in Greece into the Baltics. From this experience, there were lessons learned that can improve future unit's experiences in European mobility operations and multinational partnership.

Right person, right job. A reoccurring theme, having the right people coordinating with theater sustainment assets, host-nation forces, and division- and corps-level mobility sections proved to be the path to success. Since the battalion operated under a Polish brigade, the Iron Knights created an internal battalion movement cell. A senior first lieutenant, under the oversight of the battalion executive officer, coordinated all commercial and military mobility assets. The officer was not unit movement officer qualified; however, with prior service experience, maturity, the ability to clearly communicate requirements, and most importantly, the ability to build relationships with people, the first lieutenant ensured all battalion requirements were met. The newly established battalion movement cell coordinated all rail, military, and commercial line haul throughout the exercise, and it

ical to successful mobility operations in Europe. Units must build redundancy in the mobility cell and avoid rotating personnel in and out of the mobility operations team. This negates knowledge gained and relationships established over the course of a rotation. Finally, the creation of a mobility smart book, continuity documents, and SOPs are key to maintaining knowledge of the mobility process. These documents help prevent relearning and allow lessons learned to be passed to incoming units during relief in place operations as they rotate into the European theater. As a result of this experience, the Iron Knight battalion developed a unit movement SOP to support future deployment operations.

March credits. March credits drive movement throughout the European theater.³ Military convoys cannot move without them, and military units are at the mercy of host nations who approve the credits for specified routes and departure times. The Iron Knights learned that there is a deliberate process and timeline in Poland regarding military convoy approval. It would often take at least ten days to approve march credits, and approval for movement would usually come twelve to twenty-four hours prior to required departure times. During DE22, the Iron Knights had to forecast movements within these parameters and quickly learned that unforecasted movements required involvement at the Polish general officer level. Even with this level of involvement, movements were not guaranteed. To minimize friction with the movement process, the Iron Knights deployed a route reconnaissance team ahead of

march credit approval using civilian rental vehicles. The team consisted of, at a minimum, a cavalry scout and an engineer to validate that the selected route would support various vehicle and equipment types as well as movement through choke points and underpasses and over bridges. The results of the route reconnaissance were provided to host-nation partners and submitted as part of the march credit requests. Furthermore, the battalion engineer and an assistant S-3 officer developed deliberate analog and digital overlays that enabled common understanding of each leg of the wheeled movement. This process was crucial to movement during DE22; however, it was not uncommon for local national escorts to deviate from the prescribed route or for the Polish approval authority to change routes prior to departure. Future units should be prepared for this level of friction and understand that host-nation requirements and movements will take priority over exercise movements. These same challenges would likely occur during combat operations if U.S. and NATO military movements are not the priority of the host nation. To mitigate route changes, the battalion redeployed the reconnaissance team to revalidate the new route and identify bypasses as required. Doctrinally, the route reconnaissance task would have been delegated to the scout platoon, or in the case of a BCT, to the reconnaissance squadron. Unfortunately, the battalion could not deploy its organic reconnaissance assets in this way due to the Polish government's attempt to minimize military traffic during the exercise because of real-world requirements farther east. Ultimately, the use of the small reconnaissance team of cavalry scouts and engineers in a civilian rental vehicle proved to be a useful technique when validating routes.

Of note, march credits work differently in all European countries. Upon arrival in the Baltics, the Iron Knights had no issues receiving march credits in Lithuania and Latvia within twenty-four to seventy-two hours.

Communication is crucial. Language barriers and communication equipment hindered the speed of operations during the LRM. More specifically, the battalion had the ability to communicate with NATO secure communication keys and tactical voice bridges (TVB) for U.S. tactical radios to interface with multinational tactical radios. Unfortunately, not all multinational vehicle platforms had this capability. For Polish vehicles that did

have the ability to integrate TVBs, leaders were hesitant to use it. This was likely due to two reasons:

- The Polish were uncomfortable communicating in English over radio. It is believed that this was to avoid misunderstandings during movement as well as during WGX operations. Polish partners preferred face-to-face communication, which required positioning of a U.S. liaison officer (LNO) with them throughout operations. During movement, the battalion initially communicated via cellphone with Polish escort officers who would then require the convoys to stop to allow for face-to-face communication to occur to accurately articulate needs. This slowed operations, and it could have been mitigated through embedded Polish interpreters with the U.S. forces or by having Polish-speaking U.S. soldiers within the formation (unfortunately there were none organic to the battalion).
- It was clear the Polish did not fully trust the TVBs to provide secure radio communications. The battalion determined that the lack of confidence in the TVBs was tied more to limited experience with the equipment than the ability of the technology to provide reliable secure communications. Going forward, it is important for U.S. and NATO partners to increase use of the TVBs to build trust in the equipment, in turn increasing interoperability and capabilities when executing multinational operations.

European infrastructure. Moving a CAB throughout eastern Europe validated that European rail infrastructure and roadways would support an armored BCT or larger force during large-scale combat operations. Below are three observations to enable successful movement of units in Europe over extended distances:

- Coordination with host-nation local police forces and escorts proved to be useful to maintain speed and initiative during DE22. This tactic is especially helpful to units as they move through urban areas and along key routes during combat operations.
- Wheeled fleets using host-nation roadways must aggressively plan rest stops, refuel-on-the-move (ROM) sites, and vehicle recovery sites and incorporate these factors into route reconnaissance planning. Stops need to be accurately communicated to host-nation forces to ensure understanding of ROM and space requirements. Additionally, time-distance analysis from point to point is critical to manage fuel



A Swedish soldier guides an M1A2 Abrams tank assigned to 1st Battalion, 66th Armored Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division, as it crosses the Vistula River 13 May 2022 during a wet-gap crossing at Dęblin, Poland, as part of Defender-Europe 22. (Photo by Spc. Devin Klecan, U.S. Army)

consumption, maintenance, and rest for drivers, and to ensure movements are executed within march credit windows. To maintain tempo, units may require external sustainment support (e.g., refueling assets) to reduce time staged at a ROM site. Unique to the LRM, the battalion determined requirements to have sustainment assets prestaged at ROM sites. Supported by the 16th Sustainment Brigade, these predesignated stopping points were occupied ahead of the main body to maintain pace.

- Although NATO rail gauge exists throughout Poland and now in Kaunas Terminal, Lithuania, there are challenges in moving an entire brigade or division through eastern Europe using host-nation infrastructure. Phasing of units is critical when using rail as appropriate lift assets must be available and properly located at railheads to download equipment. During DE22, the phasing of movement, coupled with contracted lift assets placed ahead of download enabled mission success. In the event of

combat operations however, the absence of overhead lift assets to move a non-mission-capable piece of equipment off a rail car causes significant delays for intertheater movement. Furthermore, railheads and urban areas throughout Poland are narrow and have limited space for movement, staging, and separating rail cars. Overloading railheads and small European communities could cause a bottleneck of both the staging of combat platforms and sustainment assets. The deployment of command nodes to coordinate with host-nation forces alleviates this congestion and may be required to ensure rapid movement and sustainment of combat platforms during large-scale combat operations.

Phase IIIA. Two Wet-Gap Crossings

An extensive amount of literature exists on how to execute a WGX operation and the Iron Knights did a thorough review of these products leading up to DE22, to include a review of resources developed by

the 1st Cavalry Division.⁴ Additionally, the battalion had access to numerous videos posted to the Army Training Network website, and it executed a series of internal and external leader professional development sessions prior to and during deployment to prepare for WGX operations with multinational partners. A leader certification and live rehearsal prior to the first WGX located in the vicinity of Dęblin, Poland, on the Vistula River augmented preparatory training and leader development. The rehearsal was vital to the success of the battalion during both WGX operations and allowed for sound recommendations to the battalion's multinational partners during execution. It is highly recommended that future organizations use this method of preparation prior to a WGX training event.

Upon final certification, the Iron Knights conducted the first tactical WGX across the Vistula River with a mixed company team of combat and support equipment as well as elements of the French mechanized infantry company. Days later, the Iron Knights participated in a second multinational WGX in vicinity of Nowogród, Poland, on the Nawa River, followed by an organic U.S. battalion crossing the following day. During the multiple crossings, the Iron Knights validated many of the friction points associated with executing a WGX highlighted in the Center for Army Lessons Learned article produced by the 1st Cavalry Division, and the battalion also identified lessons learned from a multinational execution perspective.

Communication and C2. As stated earlier, the Iron Knights were not able to use standard communication packages to communicate with Polish partners during the WGX operations. To alleviate this friction, the battalion placed a U.S. LNO with the Polish TOC during both multinational crossings. The LNO communicated with U.S. forces quickly to pass on orders from the Polish higher headquarters. Conversely, the battalion TAC used the LNO to pass information to the Polish headquarters to keep the commander apprised of the crossing operation. Any deviation from the plan required rapid communication as approval to change the plan was held at the Polish brigade level. This placed a significant amount of responsibility on the U.S. LNO and required the right person to effectively communicate actions and intent between multinational forces.

The command relationship and the ability to collocate the French C2 node with the Iron Knight TAC

made communication with the French mechanized infantry company significantly easier. This joint TAC concept worked exceptionally well and prevented placement of a second LNO with French counterparts. When possible, creating a joint command node is preferable to communicate information in real time. Care must be taken when establishing this node to ensure it does not become too large or emit a significant electromagnetic signature. The battalion joint node package included a three-vehicle set (two U.S. and one French) underneath a camouflage net. This enabled communication with the Polish TOC located near the WGX, the battalion TOC in the main assembly area, the wheeled convoy on the main routes, and U.S. and French forces moving from the assembly area to the staging area and across the WGX site.

Terrain management, timing, and route management. Terrain management complicates U.S.-pure WGX operations, and the inclusion of multinational forces further complicated the process. The Iron Knights quickly learned the criticality of communicating size and space requirements for U.S. forces and equipment during WGX operations. Additionally, the battalion had to learn and articulate size and space requirements of attachments and enablers. To put this into perspective, a U.S. bridging company requires the same amount of space as two armored CABs. The French and Swedish bridging units required a similar amount of space. In combat operations, units will not always be able to choose their preferred crossing site or method of crossing. When planning staging locations for a WGX, a map reconnaissance will not be sufficient to determine space allocation for crossing units and enablers. A thorough reconnaissance of the crossing site and the staging areas must be conducted and clearly communicated to the multinational headquarters. Additionally, equipment and crossing speeds need to be factored into the movement equation. This will ensure adequate space, timing, and phasing of forces are accounted for in the crossing synchronization matrix.

Enablers to manage routes, control traffic, and the movement of forces are also critical toward the execution of WGXs. Host-nation security forces, military police attachments, and French security forces managed civilian and military traffic and equipment flow at both WGX sites. This was not easy to coordinate due to the number of multinational partners and



Soldiers from Ares Company, 1st Battalion, 66th Armor Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division, conduct a tactical road march with their assigned vehicles 27 May 2022 from Kaunas to Pabradė, Lithuania, during Defender-Europe 2022. Defender-Europe 22 is a series of U.S. Army Europe and Africa multinational training exercises in eastern Europe. The exercise demonstrates U.S. Army Europe and Africa's ability to conduct large-scale ground combat operations across multiple theaters supporting NATO. (Photo by Michael Lysenko, Lithuanian Land Forces)

different communication methods used. This friction was overcome through placement of LNOs and the consolidation of C2 nodes. Despite the concerted effort to build a streamlined C2 structure, for future WGXs, a common communication network using TVBs or NATO secure communication keys needs to be implemented and utilized to simplify communication and increase interoperability.

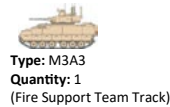
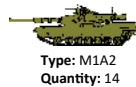
Rehearsals are key. Just like the execution of the rehearsal of concept drill in Trzebień prior to the start of the LRM, the execution of a well-planned combined arms rehearsal prior to the start of the WGXs proved essential in ensuring all U.S., multinational partners, and enablers understood the plan and potential friction points. The number of moving pieces over the four-week period demanded multiple rehearsals be planned by phase of the operation. Additionally, changes

occurred daily for movement timelines, routes, and crossing points due to the size and number of multinational units participating in the exercise. This forced the Iron Knight staff to create general plans with identified friction and decision points, which were then refined during rehearsals. At first, subordinate commanders were nervous they were receiving very generalized fragmentary orders from the battalion. By the end of the exercise, however, it was clear everyone understood the plan and executed competently due to the quality of the rehearsals. This process also gave subordinate commanders ownership of and buy-in to plans and the ability to work through the friction with fellow commanders and the battalion staff.

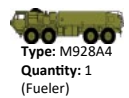
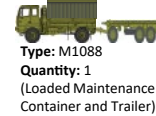
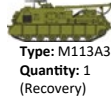
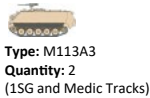
While rehearsals will never capture the entirety of problems encountered during combat operations, the battalion found success including enablers and

Task Organization of an Abrams Tank Company Team

Combat Platforms



Support Platforms



(Figure by Maj. Matthew Simon)

Figure 2. Abrams Tank Company Task Organization during a Tactical Road March

multinational partners in all rehearsals. Partners and enablers were also required to brief their portion of the operation to ensure shared understanding. Rehearsals were executed over large terrain models and focused on critical events as well as friction points for all involved. For the WGXs, this greatly reduced friction with communications, route management, and phasing of equipment movement at the crossing sites.

Well-developed operations orders are important, but they are no substitute for well-rehearsed plans understood by the entirety of the organization. It is critical that staff understand this and make a concerted effort to stick to planning timelines, incorporate all key players, and create shared understanding through well designed and executed rehearsals.

Phase IIIB. The Tactical Road March

Upon completion of the second WGX, 1-66 AR conducted a short maintenance halt in Bemowo Piskie Training Area, Poland, before continuing a multimodal movement (rail and convoy) up to Kaunas Rail Terminal, Lithuania. This final phase of DE22 required the Iron Knights to move through the strategically important Suwalki Gap to a staging point at the terminal. Staging at Kaunas tested the newly installed NATO rail gauge, and the Iron Knights became the first NATO unit to enter the Baltics through this terminal. Following download of combat equipment in Kaunas, the battalion organized into company teams and embarked on a four-day, 180 km phased tactical road march in company-sized serials. The battalion's entire track and wheeled fleet demonstrated

the ability to move along the Lithuanian highway and rural road infrastructure from Kaunas Terminal to Camp Herkus. This direction of travel led the Iron Knights eight kilometers short of the Lithuanian and Belarusian border, where the Iron Knights spent the remainder of their nine-month rotation in Europe.

The tactical road march proved to be one of the most challenging events of DE22 as it required the Iron Knights to execute significant coordination with host-nation military and police forces, complete detailed route reconnaissance, and develop a robust sustainment-on-the-move plan that would test the battalion's ability to self-support utilizing internal sustainment and recovery assets. Innovation was key during this phase of movement as maintenance repairs, the transportation of parts and supplies, and reliance on host-nation traffic control was more robust than the wheeled movements executed days before in Poland. Most lessons learned from the tactical road march apply across all unit types and serve as a starting point for future movements of this kind whether as part of training or large-scale combat operations.

Space is a constraint. Like Poland, the rail infrastructure in Lithuania is limited by the space available to download equipment. As a result, staging space available at the terminal necessitated the phasing of the Iron Knights for the tactical road march. Had the battalion attempted to download an entire CAB's worth of equipment at the rail station, it would have quickly run out of space and sustainment resources. Furthermore, movement along the designated tactical road march route highlighted the minimal space available to execute a ROM, tactical assembly

area operations, recovery, and maintenance. Host-nation infrastructure, urban sprawl, and land and wildlife management all played a role in the movement of the company-size elements (see figure 2) over four days. Units executing future tactical movements in Lithuania, as well as the other Baltic States, need to be aware that terrain will canalize the movement of both friendly and enemy forces should a tactical engagement occur in this region. Terrain becomes restrictive moving in any direction from points of entry throughout the Baltics.

The Iron Knights mitigated risk to mission and risk to force posed by the terrain by phasing the battalion in a doctrinal deployment of both combat and sustainment forces.

Additionally, a thorough route reconnaissance provided preidentified locations coordinated with the host nation for ROM sites as well as assembly areas for rest and maintenance. During a wartime scenario, NATO units must rely on and trust the knowledge of host-nation forces to navigate civilian traffic as well as for route selection. Recognizing that space will be a significant constraint, host-nation forces will provide the best intelligence preparation of the operational environment to ensure rapid movement of forces to objective areas.

Effects on equipment. Unlike a U.S. Army Stryker BCT, which is primarily a wheeled vehicle fleet, a track-heavy CAB has different sustainment challenges during longer range tactical movements. Track pads, for example, began to experience heat issues due to continuous speed on hard surface roads and highway systems. Upon transition of movement from roads to dirt surfaces, track pads began to smolder as the soft surfaces cooled the pads from the constant friction they endured during road movement. To ensure this does not impact combat operations, track pads need to be inspected and deemed serviceable to execute long distances. Lastly, if multiple LRMs are planned, a sustainment and resupply plan must account for replacing track as required. After completion of DE22, track was replaced on most Iron Knight vehicles.

ROM is also another challenge that needs to be factored into tracked vehicle movements. With resupply trains task-organized to each company, fuelers would have to move from the rear of the convoy to the front to conduct refueling. This did create some friction along the narrow roadways while the tailgate resupply method was used. Again, a thorough route reconnaissance to identify

ROM sites is critical to ensuring minimum disruption to traffic flow for either civilian traffic or passing military units. Additionally, track units, specifically tank units, need to ensure all vehicle fuel transfer systems are operating correctly to minimize the number of times units need to stop for ROM operations.

Finally, innovative and expedient field maintenance, along with key positioning of SSL materiel, needs to be factored into any movement plan. Recovery of vehicles proved to be easier at this stage of the exercise. Although the LRM and WGXs tested the ability to self-recover, there were periods where expedient and innovative recovery and maintenance solutions were needed to ensure vehicles reached assembly areas and forward operating site locations. Positioning and moving SSL materiel to execute these repairs proved critical to the movement plan. Most vehicles carried spare parts that commonly break on track vehicles, aiding rapid maintenance on the move. Additionally, maintenance contact trucks as part of the resupply trains carried additional parts and moved quickly to disabled vehicles to troubleshoot. There were instances in which a deadlining fault was identified by maintainers but deemed safe to resume movement. Commanders need to be prepared to accept this risk and trust their maintenance team and operators to make an educated decision quickly to prevent mission failure. While the Iron Knights did not execute this mission during combat operations, the movement was treated as such, and mission command at the company level enabled success. This will be no different during combat operations. Effective and clear communication will be key for commanders to understand the level of risk they are assuming when operating vehicles in a degraded condition.

Phase IV. Consolidation and Reorganization

Upon arrival to Camp Herkus, the Iron Knights executed a deliberate thirty-day after-operations maintenance period. The team conducted a significant technical inspection and PMCS on all combat and support platforms. Innovative and expedient repairs conducted during the movement required follow-up repair in accordance with U.S. Army technical manuals. While most of these repairs were quick and easy, parts flow and availability played a significant role in the time it took to rebuild the fleet readiness. The following lessons learned apply to all units regardless of mission.

More miles equal better readiness. The more you use your fleet the better it will operate. This was especially true of the Iron Knights' combat platforms, which despite some wear and tear, had less power-related issues due to continual use over the course of the LRM. Conducting command maintenance once a week is not sufficient to keep a fleet combat ready. As maintenance is a continual operation, road testing and training must also remain continual to move the fleet as much as possible when at home station. Continual use not only tests the vehicle platform itself, but also the ability to self-recover or use organic recovery assets. If one were to examine the current Russian and Ukraine conflict, a key lesson learned is to train and sustain how you will fight. Do not let the first time a system is tested be when a soldier's life is on the line in combat. Exercise your fleet and systems regularly, even when inconvenient. You will learn exactly what is needed to keep it operational.

Your support fleet is just as important as your combat fleet. U.S. Army senior leaders and commanders at echelon place significant emphasis on combat platforms as they drive metrics related to a unit's overall readiness rating. If all the tanks, infantry fighting vehicles, and artillery pieces function, then "you can fight" is the common vernacular. The Iron Knights would posit that if you cannot sustain or recover your combat platforms, then it does not matter if they work or not. A holistic approach to maintenance programs needs to be developed by all units to ensure support vehicles are equally maintained along with the unit's combat platforms. The recovery of downed sustainment vehicles was the primary factor that slowed operations during the 1,500 km LRM. To aid in this shift, the U.S. Army needs to move away from using pre-positioned fleets at combat training centers. Units training at a combat training center CTC need to ensure their utility vehicles and trailers can shoot, move, and communicate just as well as their combat platforms. PMCS needs to be conducted to standard and enforced for support vehicles. This can be accomplished with a separate dedicated command maintenance day for the forward support company. Maintainers are often overly focused on the unit's combat platforms at the expense of their own vehicles. Creating time for support maintenance activities will ensure proper operation when needed. Finally, the sustainment fleet must be exercised just as routinely as combat platforms to ensure continuous operation and the ability to support the unit whenever and wherever needed.

Conclusion. Key Lessons Learned during DE22

Tactical. Enabler support at WGXs is crucial for a successful crossing.

Enabler support. WGX operations require a significant number of enablers that are not common training partners for CABs. Understanding the capabilities and the roles of these enablers is critical to a successful crossing. Integration of enablers early in the planning process at the division, brigade, and battalion levels will mitigate operation failure. These enablers must be primary briefers during CARs as well as participants in CAR injects to both identify friction or common problems during WGXs. Finally, liaison officer placement with enablers may be necessary, especially if units are working with multinational partners. The LNO, with an adequate communications package, can alleviate confusion and quickly pass information between units that may be delayed due to language barriers or incompatible communications equipment.

Terrain management. Units may not have the luxury of choosing the location of the WGX site. Crossing near urban terrain poses challenges for effectively spacing units to conduct multiple crossing sites. Understanding the space required for enablers such as a multirole bridge company and multinational bridging assets as well as maneuver units is critical during the planning phase of the operation. Terrain needs to be allocated by unit and time-distance analysis conducted to ensure maneuver units do not culminate prior to reaching the WGX site. Enablers such as military police units are critical in controlling force flow to the WGX site as well as coordinating with local law enforcement to ensure seamless travel of crossing units. On the far side of the crossing site, routes and objectives need to be properly spaced to ensure units do not get congested prior to reaching follow-on objectives.

Operational. The DE22 LRM serves as a case study for large-scale combat operations. Operational reach and reliance on host-nation support (readiness, recovery, contracting, multimodal transportation, lines of communication) are necessary to enable mission success when executing operations over extended distances. The availability of assets to move a CAB may be hindered by theater-level operations. Reliance on commercial assets will impact timelines for movement. U.S. Army-level headquarters (theater, corps, and division) must prioritize movements



Soldiers with Cutthroat Company, 1st Battalion, 66th Armor Regiment, 3rd Armored Brigade, 4th Infantry Division, dismount an M2 Bradley Fighting Vehicle and transition into battle formation during a platoon live-fire exercise at Pabradė Training Area, Lithuania, 13 October 2022. (Photo by Sgt. Lianne M. Hirano, U.S. Army)

of subordinate maneuver units to ensure objectives are met in order of priority.

Strategic. Although DE22 was orientated on achieving tactical objectives, movements over historically significant terrain (e.g., through the Suwalki Gap) and validation of allied nation infrastructure all had strategic implications.

A multinational exercise of this scale effectively showed NATO's ability to quickly provide and deploy combat credible forces that are postured within the theater of operations to deter adversaries and reassure partners. This exercise could not have come at a more important time in European history. ■

Notes

1. "DEFENDER-Europe 22 Activities Begin this Month, Includes More Than 11 Nations," U.S. Army Europe and Africa, 3 May 2022, <https://www.europeafrica.army.mil/ArticleViewPressRelease/Article/3017481/press-release-defender-europe-22-activities-begin-this-month-includes-more-than/>.

2. The Suwalki Gap is considered a strategically important piece of terrain on NATO's eastern flank. The corridor moves south to north through Poland into the Baltic States directly between Russia's Kaliningrad to the west and Belarus to the east.

3. "March credits (in Germany and Italy) or movement bids (in Atlantic Resolve countries) are documents that

allow one or more vehicles to move over a controlled route in a fixed time, according to movement instructions. The documents specify the departure time, speed, route and distances between turns." Alex Brubaker and Lucas W. Pedigo, "Moving across Europe for Operation Atlantic Resolve," Army.mil, 5 July 2016, https://www.army.mil/article/169538/moving_across_europe_for_operation_atlantic_resolve.

4. For more on wet-gap crossing, see "Maintaining an Armored Division's Momentum through a Wet Gap Crossing," Center for Army Lessons Learned, 27 August 2020, <https://usacac.army.mil/node/2748>.