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ARMY MAINTENANCE MODERNIZATION

Predictive Maintenance, the Future of OIB Forward Repair, and Tele-Maintenance Operations

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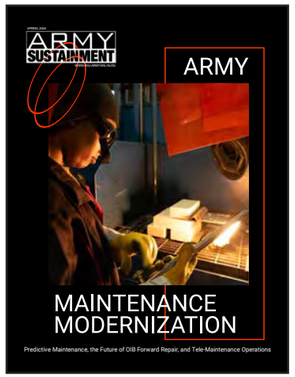

ON THE COVER

Army Maintenance Modernization: Predictive Maintenance, the Future of OIB Forward Repair, and Tele-Maintenance Operations is the theme of the spring 2026 issue of *Army Sustainment*. On the cover, SGT Bianca D. Nauth, a 91E Allied Trades Specialist and student in the Advanced Leader Course, heats a metal part before welding it during training on March 13 at Fort Lee, Virginia. (Photo by Juan F. Jimenez)

This medium is approved for the official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

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Mission: *Army Sustainment* is the Department of the Army's official professional bulletin on sustainment. Its mission is to publish timely, authoritative information on Army and Defense sustainment plans, programs, policies, operations, procedures, and doctrine for the benefit of all sustainment personnel. Its purpose is to provide a forum for the exchange of information and expression of original, creative, and innovative thought on sustainment functions.

Is your formation working on new, cutting-edge initiatives or developments that could significantly impact the entire sustainment enterprise? Your work is crucial, and we want to hear from you!

DID YOU KNOW?

Our new "Did You Know?" section is a platform for units and service members to showcase initiatives that enhance formations and operating procedures. By sharing your successes, you're not just highlighting your hard work, but also helping other units avoid duplicating efforts.

Let's make sure no one has to reinvent the wheel.

READINESS
AT THE SPEED OF WAR

The Army's Sustainment Revolution

■ *By LTG Christopher O. Mohan*

We find ourselves at an inflection point for Army sustainment. The character of war is changing at a pace we have not seen in generations, driven by rapid technological advancement, contested logistics, and the sheer velocity of modern operations. In this environment, maintenance is no longer a back-end function; it is a warfighting capability that directly shapes a commander's freedom of action. To maintain our decisive advantage, we must modernize how we maintain the force, leveraging data, automation, and the full strength of our industrial base to deliver readiness at the speed of war.

For years, we have emphasized the need to transform into a data-centric sustainment enterprise. Today, that transformation is no longer aspirational; it is operational. Predictive maintenance, forward repair capabilities, and tele-maintenance support are converging to create a fundamentally different sustainment ecosystem that represents the future of maintenance in a contested, data-driven fight.

Today, we can harness sensor data, advanced analytics, and machine learning to anticipate failures before they occur. This is not just efficiency; it is operational advantage. Across the force, we are fielding applications that give maintainers and commanders unprecedented visibility into equipment health. These tools allow us to identify trends, isolate systemic issues, and prioritize resources with precision. When paired with enterprise platforms like Weapon System 360, predictive maintenance becomes a strategic capability, enabling us to see readiness risks across the entire Army.

We are also expanding forward repair capabilities that push organic industrial base (OIB) expertise closer to the tactical edge through initiatives like the Operational Readiness Program, a pilot that proactively embeds maintenance teams from the OIB directly with tactical units preparing for deployment. The artisans provide on-site expertise, facilitate targeted fleet vehicle exchange, and train unit maintainers to keep equipment running reliably and through the power of artificial intelligence and machine learning. This is forward repair in action. To ensure this continued capability at the tactical edge, we must prioritize the development and deployment of advanced manufacturing capabilities at every echelon.

In a future fight, distance cannot be a barrier to expertise. Tele-maintenance is transforming how we deliver technical assistance across the globe. AI-enabled troubleshooting tools are already providing 24/7 support to Soldiers, reducing reliance on in-person assistance and accelerating repair timelines. When paired with secure tele-maintenance platforms, our experts can support multiple units simultaneously. This is how we scale expertise across the force and ensure that even in the most austere environments, Soldiers have access to the knowledge they need to keep equipment in the fight.

Transforming sustainment requires continuous investment, strong partnerships with industry and academia, and a relentless focus on empowering Soldiers with intuitive, data-enabled tools. Maintenance modernization is not about technology for its own sake. It is about ensuring that our formations have the readiness, resilience, and endurance to fight and win in a contested world. It is about giving commanders the confidence that their equipment will perform when it matters most. And ultimately, it is about delivering combat power to the point of need — anytime, anywhere.

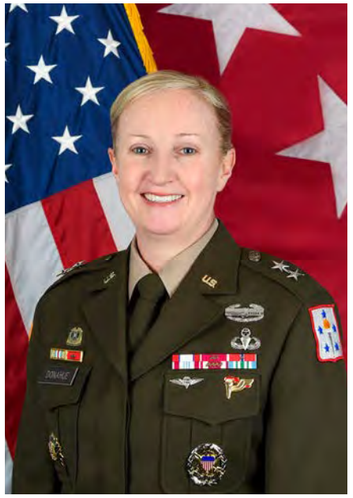
The Army sustainment enterprise is leading this transformation. Together, we will build a maintenance system that is predictive, precise, and prepared for the demands of the future fight.

LTG Chris Mohan currently serves as the commanding general of U.S. Army Materiel Command. He was commissioned into the Army from Appalachian State University in Boone, North Carolina, where he graduated as a Distinguished Military Graduate. His military education includes the Ordnance Officer Basic Course, the Combined Logistics Officer Advanced Course, the Naval College of Command and Staff, and the Army War College. He holds a Master of Science degree in national security and strategic studies from the Naval War College and a Master of Science degree in military strategy from the Army War College.

In this environment, maintenance is no longer a back-end function; it is a warfighting capability that directly shapes a commander's freedom of action.

A New Era in Army Maintenance

Policy-Driven Technological Change



■ *By LTG Michelle Donahue*

MDO Maintenance: Forging Readiness in a Contested Era

In an era defined by renewed peer competition, the Army's ability to generate and sustain lethality in a contested environment is the bedrock of victory. The comfortable assumptions of the past — persistent air superiority, secure communications, and uncontested supply lines — are no longer guaranteed. This new reality demands that our formations be able to fight and win while dispersed across vast distances and under constant threat. In a contested battlespace, existing maintenance challenges like aging infrastructure and personnel shortages become critical vulnerabilities. An adversary will actively target the already strained supply chain, making it nearly impossible to deliver critical repair parts. For units to survive and thrive in multi-domain operations (MDO), they must not only be lethal but also resilient. To support this, our maintenance and logistics enterprise must evolve in parallel. It must transform from a supporting effort into a core component of the warfighting function itself, with the goal of becoming more agile, predictive, and expeditionary than ever before.

To achieve this goal, the Army developed a comprehensive framework known as the MDO Maintenance Concept. This concept serves as the intellectual foundation for our maintenance doctrine, unifying efforts across technology, policy, and force structure. It operationalizes this new approach through three distinct but integrated maintenance levels:

- **Depot Strategic/Forward Strategic**: Revolutionizing the organic industrial base (OIB) by projecting national-level maintenance capabilities and expertise forward, closer to the point of need.
- **Support**: Modernizing the critical link between the strategic base and the tactical edge, ensuring the predictive flow of parts, data, and specialized skills across the theater.
- **Tactical**: Empowering the Soldier-maintainer with the advanced tools, authorities, and real-time data needed to sustain combat power directly in the fight.

Together, these efforts redefine sustainment as a proactive and integrated enabler of victory, not as a reactive support function.

The Analytical Underpinnings of Transformation

To ensure our transformation is comprehensive and correctly aligned, a series of operational planning teams met to design and assess the future of MDO maintenance, identifying potential sustainment operational capability gaps and shortfalls that inform current and future sustainment plans. This deep analysis allowed us to distinguish between immediate, critical needs and valuable enhancements that could be addressed later. Crucially, it also revealed the interdependencies between different maintenance functions, ensuring our approach would be holistic rather than piecemeal.

As a result of this analytical rigor, we are now engaged in a comprehensive maintenance allocation chart (MAC) revision for our most critical platforms — a foundational effort to redefine at what level maintenance tasks are performed, and with what tools. Facing initial data challenges from legacy systems, we developed and validated new analytical processes to build these new MACs, an approach that allows us to test new organizational designs with a high degree of fidelity.

From Analysis to Authority: The Policy Framework

Analysis and organizational redesign are only theoretical without the doctrinal authority to implement them. Therefore, this transformation requires a deliberate update to our guiding policies. Army Regulation (AR) 750-1, Army Materiel Maintenance Policy, and Department of the Army Pamphlet (DA PAM) 750-1, Army Materiel Maintenance Procedures, are currently undergoing a major revision, which is the cornerstone of our modernization and provides the authority to make this change permanent. This revision aims to update language, eliminate outdated terminology, and systematically address findings from recent audits. Most importantly, it will formally incorporate new, more efficient programs into Army doctrine.

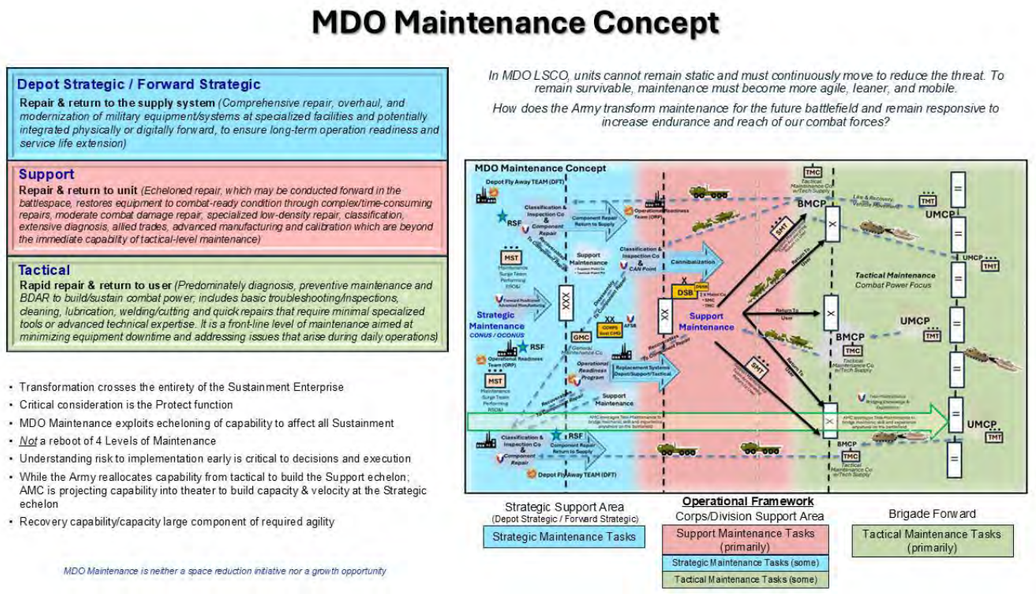
A leading example is the Operational Readiness Program (ORP) initiative. In a direct effort to give time back to Soldiers, this program addresses the Chief of Staff of the Army's concern that the force is over-servicing our equipment. It aims to unburden maintainers by shifting from traditional, time-based service schedules to a more flexible, usage-based model. This new posture is designed to reduce unnecessary maintenance workloads and maximize time for warfighting training. Operationally, this will be achieved through a multi-phased approach where the U.S. Army Tank-automotive and Armaments Command connects depot-level capabilities directly to brigade combat teams.

By embedding depot fly-away teams with units at critical points between training rotations and deployments, ORP not only services the Army's most critical fleets, but also provides an invaluable hands-on training opportunity, increasing the proficiency of field-level maintainers working alongside depot repair specialists and highly skilled maintainers. The ultimate end state is a sustained readiness culture, a more predictable workload for the OIB, and better-trained mechanics at every echelon. By codifying programs like ORP, the updates to AR 750-1 and DA PAM 750-1 will reinforce the responsibilities of commanders, clarify funding, and streamline reporting to improve data accuracy across the enterprise.

A New Paradigm for MDO Sustainment: From Data to Action

With modernized maintenance policy as its foundation, the Army is now able to operationalize a new paradigm for MDO sustainment, shifting from reactive processes to proactive, data-driven solutions. The Griffin predictive aviation maintenance project, steered by the U.S. Army Combat Capabilities Development Command's Artificial Intelligence Integration Center, is a prime example of this shift in action. It is pioneering the use of artificial intelligence (AI) and machine learning to analyze massive volumes of data from equipment sensors and maintenance records. By processing this data, the system identifies subtle patterns that predict when a component is likely to fail, often well before any fault is detected by conventional diagnostics. The goal is to leverage data in this way across the enterprise, providing commanders with greater predictability to schedule maintenance before a crisis occurs, which will increase equipment availability and reduce the overall logistics footprint.

However, projecting advanced repair capabilities forward is only half the solution; these tools are only effective if the Soldier in the field has the authority and expertise to use them. The Right-to-Repair initiative



The MDO Maintenance Concept. (Image by COL Gregory Gibbons and Mr. Jeff Martin)

is aimed at dismantling proprietary barriers to ensure Soldiers have the necessary technical data and tools to fix their own equipment. The Army is already pioneering the use of AI and AI-powered smart glasses to revolutionize vehicle maintenance for the Infantry Squad Vehicle. The expansion of tele-maintenance support and augmented reality can provide a virtual over-the-shoulder connection to subject matter experts around the globe.

Conclusion: Integration Is the Key to Readiness

From deep analysis and foundational policy changes to pioneering new technologies, these distinct efforts are not happening in isolation. Army maintenance is transforming as these foundational efforts converge into a future closed-loop system of sustainment where predictive analytics determine the need, a forward-deployed OIB provides the means, and empowered Soldiers deliver expertise at the tactical edge. The impact of this G-4 policy-driven change will be a profound increase in combat readiness and lethality.

In contested environments — where predictable supply lines become predictable targets — this maintenance paradigm shift will provide commanders with decisive advantages. By anticipating equipment failures, compressing repair cycle times, and regenerating combat power, the Army will be able to sustain continuous, high-intensity operations and outpace any adversary. We will use data, AI, and modern technology to the maximum. Our leaders will drive this change, empowering our Soldiers to become masters of a new technological ecosystem — from leveraging predictive analytics to employing AI-driven diagnostics — directly on the front lines.

This We'll Defend!

LTG Michelle K. Donahue serves as the Deputy Chief of Staff of U.S. Army G-4. She served as the as the commander of the U.S. Army Combined Arms Support Command/ Sustainment Center of Excellence, and as a sustainment brigade commander, support squadron commander, battalion executive officer, battalion support operations officer, battalion S-4, battalion S-2/S-3, and battalion and brigade S-1. She also served as the 56th Quartermaster General and Commandant of the U.S. Army Quartermaster School at the Sustainment Center of Excellence; Deputy Director for Readiness, Strategy and Operations for the Army's Deputy Chief of Staff/G-4; and Special Assistant to the Director, Army Staff for the 2023 Army Transition Team. A Distinguished Military Graduate, she received her commission in the Quartermaster Corps from Duke University in 1996. She also holds advanced degrees from Georgetown University and National Defense University.

FREEING UNITS TO FIGHT

The ERDS Approach to Equipment Management

■ *By LTG Gavin Lawrence and MG Eric P. Shirley*

The dust settles on Fort Campbell, Kentucky, as the last AH-64 Apache helicopter lifts off, signaling the inactivation of an air cavalry squadron. But the mission is not over. Hundreds of pieces of aviation equipment — from sophisticated targeting systems to specialized maintenance tools — remain, representing a significant logistical challenge.

Traditionally, this would trigger a lengthy process of documentation, coordination, and potential delays, diverting valuable resources from the remaining units.

Now, a different scene unfolds: a dedicated Equipment Redistribution and Divestiture Site (ERDS) team arrives. The team establishes a streamlined process to rapidly assess, redistribute, or divest the squadron's equipment, ensuring a seamless transition and maximizing the recovery of vital assets.

In 2025, the Army Transformation Initiative (ATI) and force structure adjustments created significant equipment imbalances across the force, as hundreds of units were marked for conversion, relocation, or inactivation. These conversions inevitably result in the possession of major end items and other equipment that are no longer aligned with new missions. Managing the divestiture or redistribution of this equipment presents a logistical challenge and places a burden on Soldiers who conduct maintenance and inventory.

ERDS is Army Materiel Command's (AMC's) enterprise solution to the growing challenge of maintaining operational readiness in a dynamic environment. This new capability is one of many efforts by AMC to streamline equipment management, free up resources for units impacted by ATI, and refocus Soldiers on their core mission.

While they proved to be successful efforts, R2E and MDRS were designed to support a different Army structure and have presented unsustainable funding challenges.

AMC and U.S. Army Sustainment Command (ASC) have been at the heart of alleviating the burden of excess equipment on Soldiers, from running 14 modernization displacement and repair sites (MDRSs) that provided centralized locations supporting equipment turn-in, to launching the Rapid Removal of Excess (R2E) initiative that freed up valuable storage space and reduced maintenance burdens on units.

Since the inception of MDRS in 2016, units have transferred more than six million pieces of equipment to the Army at sites located around Army installations in the U.S. The R2E business rules introduced in 2024 enabled the Army to reduce over one million pieces of equipment from unit property books over 18 months.

While they proved to be successful efforts, R2E and MDRS were designed to support a different Army structure and have presented unsustainable funding challenges. A new approach is needed to manage equipment redistribution as the Army enters an age of continuous transformation.

ERDS

ERDS represents an evolution in Army equipment management. It is a flexible capability, deploying directly to impacted installations and units when they need it most. A dedicated team of logistics professionals establishes a temporary site to assist units in clearing their property books of equipment slated for divestiture or redistribution within one business day of turn-in. Whereas MDRS was an enduring expense for the Army, ERDS is an agile capability that the Army can strategically fund and deploy when units enter modernization windows.

Excess equipment from inactivating units often surpasses the capacity of local supply support activities. ERDS returns time to Soldiers by streamlining the property accountability process through its year-long focus sites at Fort Bragg, Fort Hood, and Fort Carson, and through mobile ERDS teams available to support installations across the Army.

At the senior commander's discretion, ERDS can support units across all components within a 150-mile radius of each site and provide a scalable solution for Class II non-expendables, Class VII major end items, and Class IX repair parts.

An enticing draw for units is the ability of ERDS to accept Class IX items, which can be quickly accepted by ERDS representatives and redistributed back into the Army's supply chain.

ERDS Basics

Unlike MDRS, ERDS sites and teams do not conduct any maintenance or repair. ERDS teams only confirm that equipment is transportable and compliant with the directed maintenance standard. If not, the unit must repair the end item before it can be accepted by an ERDS representative.

To further simplify the process and increase turn-in velocity, ERDS also reduced the number of documents required for accountability relief. Additionally, an exception to policy (ETP) was signed by LTG Michelle Donahue, Army Deputy Chief of Staff, G-4, to further unburden units by designating top-down vetting of proposed sourcing decisions and as-is acceptance status for all equipment. This ETP removed the requirement for time-consuming technical inspections and refinement of bills of material listings.

By nature, ERDS sites are not designed to be permanent, but to be responsive. For fiscal year 2026, the Army approved and funded operations for three focused sites at Forts Bragg, Hood, and Carson. The Army also funded separate mobile teams that can lift and shift to support other heavily impacted installations.

Best Practices for Divesting Units

Beyond the ERDS operational framework, the program's efficiency relies on unit-level discipline and chain of command involvement. One of the most important factors in a smooth divestment is early, consistent focus on documentation.

A successful divestment begins long before equipment reaches an ERDS site. Maintaining property book integrity early in the process is essential, as even small discrepancies can halt progress. Ensuring that every asset is accurately reflected on accountability records creates the foundation for a smooth, uninterrupted flow of equipment through the system.

Sustaining momentum throughout the divestment process requires active engagement with the Decision Support Tool (DST). Developing a plan, regularly monitoring DST status, and incorporating updates into routine battle rhythm events help prevent vetting delays and keep actions aligned across the formation. Tools like the Vantage ERDS dashboard, which draws data directly from DST and Global Combat Support System–Army, provide leaders with a clear, real-time picture of where equipment stands in the process.

Unit personnel must verify the routing identifier code, ensuring the pass-through unit identification code is designated as ERDS, and must confirm that the second leg (the equipment's final destination) is validated and approved. This acts as the connecting order that moves equipment from the ERDS holding to the gaining unit or depot.

Looking Ahead

ERDS teams have been met with buzz as they have arrived to assist air cavalry squadrons with deactivations and mobile brigade combat teams with conversions. AMC and ASC leadership continue to receive positive feedback from supply sergeants, property accountability officers, and senior commanders as the Army works together to prepare these units for their next mission.

While ERDS is slated to end its mission on September 30, 2026, it represents a fundamental shift toward a more agile and responsive Army sustainment system, capable of adapting to evolving force structure and operational requirements. By optimizing equipment management, ERDS will free up resources for Army units, enhance operational readiness, and enable the Army to maintain a decisive advantage on the battlefield.

LTG Gavin Lawrence currently serves as the deputy commanding general of U.S. Army Materiel Command. He is a graduate of the U.S. Military Academy where he was commissioned as a second lieutenant in the Quartermaster Corps. He has a Master of Arts degree in national security and strategic studies from the U.S. Naval War College, Rhode Island, and a Master of Arts degree in strategic studies from the U.S. Army War College, Pennsylvania, where he successfully completed the Advanced Strategic Arts Program. He has also completed the Massachusetts Institute of Technology Seminar XXI program and University of North Carolina's Institute for Defense & Business LOGTECH Executive program.

MG Eric P. Shirley serves as the commanding general of U.S. Army Sustainment Command. A distinguished military graduate of the University of Arizona, he holds a master's degree in military art and science from the School of Advanced Military Studies. His senior education includes the Army War College Fellows Program at Stanford University and the Joint & Combined Warfighting School. He has commanded at multiple echelons and held key joint and strategic roles, including commanding the 1st Theater Sustainment Command and leading the Defense Logistics Agency Troop Support.

Modernizing Army Maintenance Training

Enhancing Technical Depth and Leveraging Emerging Technologies

■ *By CW4 Chase D. Givens*

The U.S. Army Ordnance School is spearheading efforts to modernize maintenance training across career management fields (CMFs) 91 and 94, ensuring Soldiers are equipped to sustain increasingly complex systems. These initiatives focus on improving advanced individual training (AIT), enhancing technical depth in the Advanced Leader Course (ALC), and advancing warrant officer professional military education (PME). Additionally, the Ordnance Corps is exploring cutting-edge solutions through the Meta pilot program, which integrates smart glasses and artificial intelligence (AI)-driven tools to revolutionize training and tele-maintenance capabilities. Together, these efforts aim to create maintainers and warrant officers who possess the knowledge, tools, and resources to repair equipment effectively, rather than just to replace parts.

Broader Improvements to AIT

AIT has undergone significant improvements to better prepare Soldiers for the challenges of their first assignments. The U.S. Army Ordnance School has shifted its focus from training solely on legacy platforms to teaching the fundamentals of maintaining engines, electrical systems, transmissions, and hydraulics. This foundational knowledge ensures Soldiers are ready to work on the advanced systems they will encounter in operational units, such as the SGT STOUT Maneuver-Short Range Air Defense (M-SHORAD), Armored Multi-Purpose Vehicle (AMPV), M2A4 Bradley Fighting Vehicle, M109A7 Paladin howitzer, and next-generation squad weapons.

The curriculum now emphasizes skills-based training, incorporating hands-on troubleshooting and problem-solving to move beyond routine memorization and basic maintenance tasks. This approach is designed to create maintainers who can independently diagnose and repair complex issues, reducing reliance on field support representatives, logistics assistance representatives, and higher-echelon support to increase unit readiness. Soldiers are trained to think critically and apply their skills to real-world scenarios.

Additionally, the curriculum has been aligned to better prepare Soldiers for maintenance levels 1 through 8 of the Automotive Service Excellence certifications. These industry-recognized credentials not only enhance Soldiers' technical expertise but also support their professional development and career progression. By integrating skills-based training, advanced troubleshooting techniques, and exposure to cutting-edge systems, AIT is producing maintainers who are ready to meet the demands of modern Army operations and sustainment.

Increasing Technical Depth in ALC

ALC has been redesigned to guide junior NCOs from apprentice-level maintainers to journeyman-level technicians, equipping them with the skills needed to repair more-advanced systems. For CMF 91 maintainers, ALC now focuses on developing a deeper understanding of complex systems, including engines, electrical systems, and hydraulics, while emphasizing advanced troubleshooting techniques. This training ensures NCOs are prepared to diagnose and repair intricate faults during large-scale combat operations (LSCO) within multi-domain operations (MDO), where rapid and accurate maintenance is critical to sustaining combat power.

Additionally, the 91Es receive specialized instruction in advanced manufacturing processes, such as additive manufacturing, subtractive manufacturing, and 3D printing. These skills allow them to design and fabricate repair components using cutting-edge technologies, further enhancing their ability to sustain equipment in demanding environments.

By focusing on advanced technical skills and leadership development, ALC ensures that maintainers are not only proficient in their military occupational specialty (MOS) but also capable of stepping into roles that require greater technical expertise and decision making. This transformation strengthens unit readiness and operational effectiveness.

Advancing Warrant Officer PME

The modernization of warrant officer PME is a critical component of the U.S. Army Ordnance School's efforts to cultivate the Army's premier technicians and maintenance leaders. This progressive education model builds on the ALC, ensuring that Soldiers transition seamlessly from journeyman-level technicians to expert-level warrant officers. At the chief warrant officer 2 level, the newly introduced Warrant Officer Intermediate Course (WOIC) expands on the foundational skills taught in the Warrant Officer Basic Course. WOIC focuses on advanced technical skills, preparing warrant officers to provide expert-level support to operational units.

By focusing on advanced technical skills and leadership development, ALC ensures that maintainers are not only proficient in their military occupational specialty (MOS) but also capable of stepping into roles that require greater technical expertise and decision making.

To further enhance the alignment between enlisted feeder MOSs and warrant officer roles, the U.S. Army Ordnance School has created two new warrant officer MOSs: 915S Stryker Maintenance Warrant Officer and 915T Track Maintenance Warrant Officer. These MOSs are tailored to provide specialized expertise in maintaining Stryker and tracked vehicle systems. By equipping warrant officers with advanced technical knowledge and reducing the need for extensive self-study and on-the-job training, these changes ensure that warrant officers can contribute effectively to their units from day one.

Warrant officers are now trained to support and sustain the Army's most advanced equipment, including the lightweight counter-mortar radar, SGT STOUT M-SHORAD, Long-Range Hypersonic Weapon, Land Phalanx Weapon System, Night Vision Device–Next, Sustainment Transport System Satellite Communications, AMPV, M2A4 Bradley Fighting Vehicle, and M109A7 Paladin howitzer. This exposure to cutting-edge systems ensures warrant officers are prepared to lead maintenance operations in complex environments.

Meta Pilot Program: Integrating Emerging Technologies

The Ordnance Corps is taking significant steps to modernize maintenance training through the Meta pilot program, which focuses on integrating smart glasses and AI-driven solutions to enhance training and tele-maintenance capabilities.

The program began on April 24, 2025, at Fort Lee, Virginia, where Meta representatives collaborated with the U.S. Army Combined Arms Support Command to analyze maintenance variability and environmental factors. Using Meta's Aria smart glasses, personnel captured video data of maintenance tasks, hand movements, and environmental conditions, integrating this data with technical manuals to explore its application across extended reality platforms.

On September 17, 2025, the pilot expanded to Joint Base Lewis–McChord, where experiments simulated remote assistance during ISV maintenance tasks. Army personnel streamed first-person video and audio to remote experts, who provided real-time guidance. The experiments compared voice-only guidance, video-enhanced interactions, and in-person expert assistance, identifying challenges such as component identification in densely packed areas and proper tool selection.

The pilot program demonstrates the potential of AI-driven tools to simplify training, improve communication, and accelerate learning. The sky is the limit for how we can harness the power of these AI tools, not only to improve training but also to develop technology that could guide maintainers through troubleshooting and repairs in time-constrained situations where setting up a maintenance support device and following step-by-step instructions in the interactive electronic technical manual is not feasible.

Meta plans to refine prototypes by focusing on targeted tasks and benchmarking performance using advanced AI models like Google's Gemini. These efforts aim to modernize Army maintenance operations and enhance sustainment capabilities for the future.

Conclusion

The school is enhancing AIT with skills-based training and exposure to advanced systems, increasing the technical depth of ALC to develop journeymen-level technicians, advancing warrant officer PME to cultivate expert leaders, and integrating emerging technologies through the Meta pilot program. As a result, the Army is producing maintainers and warrant officers who can sustain readiness in the most complex operational environments.

CW4 Chase D. Givens currently serves as the career management field (CMF) 91 ordnance warrant officer proponent at the U.S. Army Ordnance School, Fort Lee, Virginia. He is an action officer for the accession, career development, and education of all CMF 91 ordnance warrant officers in the Army. His most recent assignments include serving as a training developer for 915A, 915S, 915T, and 919A military occupational specialties and completing a one-year Training with Industry assignment at Caterpillar Defense. His civilian education includes a Master of Science degree in global supply chain management from the University of Alaska Anchorage.

OIB MODERNIZATION IN ACTION

The Impact of Cold Spray

■ *By Courtney Guasti, Noah Lieb, and Kari Thompson*

Logistics and operations, data-driven decision making, transformation and modernization, maintenance and readiness, and advanced manufacturing — these are the key themes Army senior leaders are discussing for the future of Army sustainment. These can also be descriptions of the future of the organic industrial base (OIB) and their capability for forward repair. The Army's OIB is at the forefront of modernization, leveraging advanced manufacturing technologies to enhance sustainment capabilities and reduce the logistical footprint. Among these innovations, cold spray technology is revolutionizing how the Army repairs and maintains critical assets, enabling rapid, cost-effective solutions that improve readiness and reduce the logistical footprint that is necessary in multi-domain operations (MDO). Letterkenny Army Depot (LEAD) is exploring the transformative impact of cold spray technology and its integration into forward repair operations.

Issues such as corrosion present a significant operational and financial challenge, accounting for billions of dollars in annual maintenance and impacting equipment readiness throughout the Army. Everyday wear and tear of Army weapon systems requires a suite of technologies to clean, inspect, repair, and ultimately protect the systems from myriad environmental conditions. Over a system's lifecycle, metal substrates corrode due to physical damage or degradation caused by harsh environmental conditions (such as temperature, humidity, and salinity), leading to cracking, pitting, and weakened integrity. Current maintenance practices require surface preparation (such as sanding, grinding, and cleaning) to remove the corrosion down to base metal prior to repair/rebuild, at best, or, in the worst-case scenario, replacement of the entire component or assembly. The time spent waiting for a replacement part to arrive from the original engineering manufacturer, warehouse, or depot is a liability the Army can no longer afford. Cold spray technology collapses this timeline, enabling skilled artisans to restore critical components in a matter of hours.

To improve Army sustainment and reduce costs, the Army's Corrosion Control and Prevention Executive (CCPE) office is partnering with LEAD to facilitate a field-capable, deployable cold spray program for forward-support operations and repair to replace and build back base metal. LEAD's cold spray program has proven its value by restoring high-value military components, resulting in significant cost savings, reduced repair times, and a direct increase in materiel readiness.

Cold Spray in a Nutshell

Cold spray is a material deposition process that uses a carrier gas like nitrogen or helium to propel metal powders at supersonic speeds through a specialized rocket nozzle. When these particles impact on a component's surface, the immense

kinetic energy causes them to bond instantly, building up a solid metal layer. Think of cold spray like a high-speed paint sprayer to rebuild metal surfaces.

What makes this process unique is that it is fundamentally cold. Unlike welding or other thermal sprays that melt materials, cold spray deposits particles in a solid state. This avoids creating heat-affected zones, which can warp a part or alter its microstructural properties. Because of this, cold spray makes it possible to repair components made from heat-sensitive alloys like aluminum, magnesium, and titanium, which would be impossible to fix with hotter methods.

This technology provides a rapid and efficient way to build up material, allowing maintainers to quickly repair deficiencies like pitting, dents, or cracks. Similar to repairing pot holes in a road where new asphalt is poured into the hole without removing the entire road, cold spray can do the same with metal parts in that it fills these pits, dents, and cracks with new metal and restores the part so it can be used again. With deposition rates as high as 45 kilograms per hour, the process can restore a part that would have otherwise been scrapped, saving significant time and money. This is especially valuable for legacy systems where replacement parts are rare, expensive, or no longer in production.

To ensure consistency and reliability, the U.S. Army Research Laboratory (ARL) has developed military specifications that standardize both the cold spray process and the metal powders used. This has allowed the technology to be successfully demonstrated across numerous depots, shipyards, and maintenance facilities on a wide array of systems, including aircraft, ground vehicles, and ships.

The adaptability of cold spray systems is a key advantage. They can be mounted on large robotic gantries for depot-level work or configured as portable systems with handheld nozzles. This portability enables *in-situ* repairs, allowing maintainers to fix a component directly on a large aircraft or ship without the costly and time-consuming process of removing it.

The Return on Investment

LEAD, located in Chambersburg, Pennsylvania, repairs and modernizes air and missile defense and long-range precision fires systems to enable MDO for U.S. and allied forces. Key weapon systems such as the Phased Array Tracking Radar to Intercept on Target missile system, the High-Mobility Artillery Rocket System (HIMARS), the Terminal High-Altitude Area Defense system, and a wide range of tactical wheeled vehicles and power generation equipment are serviced by LEAD's engineers, technicians and artisans.

LEAD began its cold spray program in August 2024 as part of its modernization efforts through a partnership with ARL, the CCPE office, the Missile Defense Agency, and Pennsylvania State University to further advance its cold spray capabilities and expand locations. LEAD uses current commercial-off-the-shelf systems for both in-depot and on-site repair. To overcome logistics and contested environments, the CCPE invested in a nitrogen generator to allow the forward repair team to be self-sufficient and remove the need for outsourcing nitrogen as the carrier gas. The capability for repairs via cold spray can reduce system downtime, the labor required to disassemble assets due to configuration and accessibility of components needing repair, and overall repair time by enabling on-site, *in-situ* repair.

The cold spray program has already demonstrated a remarkable return, with an initial investment of $82 thousand generating direct cost savings of $6 million to repair 13 parts. These savings stem from avoiding the full replacement cost of complex and expensive military assets and extending continued operation until a replacement can be acquired. The calculated cost savings are based on asset value alone and do not include transportation and labor costs when assets are shipped back to the depot.

The highest cost savings were in the repair of a HIMARS, where artisans successfully restored the cabin floor. This single repair application avoided a full component replacement, saving $750 thousand and reducing downtime by 18 months. Similarly, the technology is routinely used to refurbish equipment and machinery used at LEAD, targeting equipment longevity and extending the life of repair systems to reduce depot lead times.

Operational Impact

Operationally, the impact is even more significant. This technology reduces the repair turnaround times, with documented time savings ranging from a week to a year and a half for a single major component. With the ability to use mobile units to perform on-site repairs, the program minimizes the logistical burden of returning deployed assets to depot locations. Currently used for non-structural parts, the goal is to expand cold spray applications to structural components through enhanced standardization.

Along with the reductions in cost and repair times, perhaps most critically, this technology fundamentally reduces the logistical footprint required to sustain a formation. Every component repaired forward is one less replacement part that must be ordered, packaged, and shipped across vulnerable air, land, and sea routes. In an MDO environment where adversaries actively target supply chains, shrinking this logistical tail is a matter of survival, not just efficiency. Furthermore, cold spray provides a powerful solution to the long-standing problem of parts obsolescence. By restoring legacy components that are no longer in production, the Army can extend the service life of critical weapon systems and reduce its dependence on fragile, often non-existent, supply chains.

LEAD is planning on-site visits for cold spray repairs to weapon systems within the U.S. Indo-Pacific Command area of responsibility due their highly corrosive environment. The CCPE is actively working to transition this capability from specialized artisans at the depots to forward repair maintenance teams, ensuring its benefits are realized across the entire enterprise.

Conclusion

Looking ahead, cold spray offers leaders unparalleled operational flexibility. The move toward portable, expeditionary systems means this capability can be deployed alongside combat units, providing a degree of self-sufficiency previously unimaginable. Its significant return on investment, where modest expenditures on repair can prevent the multi-million-dollar replacement of an entire system, frees up vital sustainment funds for other operational priorities. As the technology matures, it paves the way for a future of on-demand additive manufacturing on the battlefield.

Ultimately, cold spray is more than just a better repair method; it represents a philosophical shift in Army sustainment. It empowers the Army to move from a replace-and-return model to a repair-and-reinforce mindset. Instead of relying on slow and often costly traditional methods, the Army can now proactively address corrosion and minor damage, extending the service life of critical assets.

Cold spray technology is just one piece of the puzzle in a future maintenance concept. Its continued development will lead the modernization effort, turning science fiction into realized, in-field applications. This is the future of Army sustainment.

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TELE-MAINTENANCE AT THE TACTICAL EDGE

Making Informed Maintenance Decisions in the Pacific

By MAJ Sean McLachlan

Operating in the Pacific requires units to approach maintenance support as a strategic problem, even at the brigade combat team level. Vast distances, limited lift, and constrained vessel space mean units cannot always deploy with a full bench stock, supply stockage list, or authorized stockage list. In many cases, formations move across the Pacific with only the most essential Class IX repair parts. Large portions of the region also lack mature Class IX distribution infrastructure, and only recently have select locations begun to carry theater-authorized stockage lists. As a result, when equipment fails forward, getting repair parts to the point of need becomes an immediate and often frustrating challenge.

This challenge is compounded when strategic stocks are already strained. At the same time, the distance from depot-level capability makes it difficult to obtain timely pass-back maintenance support from enterprise maintainers. Faced with long-lead-time parts and operational pressure, tactical units naturally begin to consider forward fabrication as a solution. Tele-maintenance is an emerging capability at the tactical level that is reshaping how units approach maintenance in contested, distributed environments. Rather than defaulting to forward fabrication or extended wait times for parts, it enables formations to deliberately evaluate repair options, weigh risk, and determine when temporary repair, permanent repair, or fabrication is the most effective course of action.

This article outlines how tele-maintenance provides rapid access to enterprise expertise to diagnose root causes of equipment malfunction, support battle damage assessment and recovery, assess the availability of critical Class IX repair parts across the Army, and inform commanders and maintainers on when fabrication is appropriate.

The Problem

The 2nd Mobile Brigade Combat Team (2MBCT), 25th Infantry Division, recently encountered this

problem firsthand when an M119 howitzer became "not mission capable" (NMC) in the Philippines during Operation Pacific Pathways 2025. The failure involved the cannon's recuperator and its associated bracket assembly. Our initial effort focused on legitimate maintenance actions: salvaging any NMC parts that could be repaired, identifying available Class IX stocks in Global Combat Support System–Army, and coordinating movement of replacement components into the Philippines. Operational reality set in quickly, however. There were (and still are) no authorized recuperator repair kits, special tools, or approved procedures for field-level maintenance on that component. By design and regulation, all recuperator work is depot level. Furthermore, the bracket assembly was also damaged beyond repair.

Searching Army wide for Class IX stocks of these parts was disappointing. National-level shortages limited our options. Our formation was not the priority for release of those assets, and even with approval, the parts would not have arrived in the Philippines in time to participate in the rest of Pacific Pathways. Only after confronting these timelines and constraints did forward fabrication emerge as a potential course of action. Commanders understandably pressed for options to accelerate a return to service, and leaders and maintainers began asking whether the bracket or recuperator could be fabricated forward using available division manufacturing assets. At the tactical level, however, neither the forward maintainers nor the sustainment leadership had sufficient experience with recuperator or bracket repair to fully understand what was technically feasible, legally permissible, or operationally safe.

Rather than proceed on assumptions, we engaged our Army field support battalion to establish an enterprise tele-maintenance event. Through that engagement, we shared detailed video, photographs, and system data with program offices, lifecycle management commands, and engineering experts across the maintenance enterprise. The objective was twofold: to gain a clearer understanding of the root cause of gun failure and repair options, and to determine whether strategic Class IX stockage or reprioritization could support the brigade. That collective assessment brought clarity quickly. The enterprise assessment demonstrated that forward fabrication was not viable due to a convergence of technical, statutory, and capability limitations. Tele-maintenance enabled leaders and maintainers to clearly understand those constraints and to avoid pursuing unsafe or unauthorized repair paths.

Technical Authority and Data Limitations

The initial instinct to fabricate the damaged bracket did not survive detailed scrutiny. While the bracket appeared workable on the surface and could theoretically be reverse engineered, 2MBCT lacked the technical authority and certified data required to fabricate safely. The computer-aided design file was owned by the program office and not initially releasable, meaning any locally produced component would rely on reverse engineering the part rather than approved, specific technical data.

Material Science, System Balance, and First Article Testing.

Material considerations made forward fabrication particularly risky. The original bracket was cast aluminum, while a fabricated replacement would likely have been machined from solid T6360 aluminum, increasing its strength by approximately 15% to 20%. Although this may appear advantageous, artillery systems are engineered as balanced assemblies in which components are designed to fail predictably and protect adjacent parts. Increasing the strength of a single component alters load paths and redistributes stress to seals, welds, and other interfaces, accelerating wear or inducing failure elsewhere in the system.

Even if a fabricated part appeared dimensionally correct, the unit could not conduct the multilayered first article testing (FAT) required before installation. FAT validates fit, system interaction under recoil forces, heat, cyclic stress, and repeated firing. Without that testing, a fabricated component, particularly one stronger than the original design, could introduce unsafe conditions during live firing. Tele-maintenance enabled enterprise engineers to explain these system-level risks clearly before an untested component was installed, preventing the creation of a hidden hazard within the weapon system.

Forward Capability Constraints

Even if forward fabrication had been technically permissible, executing it at the tactical level remained impractical. Allied trades capability within a brigade combat team is extremely limited by design, and deploying an allied trades team to support a single battalion for an extended period would have been operationally inefficient and unsustainable. For a light formation operating in the Philippines, moving a mobile welding support system with the required welding equipment, power generation, and consumables would have imposed a significant burden on the unit deployment list and competed directly with combat-essential equipment for scarce sealift space.

More fundamentally, effective allied trades operations require a dedicated support area with space, power, security, and sustainment depth. That infrastructure more closely resembles a brigade support area than a forward logistics element operating thousands of miles away from its company and battalion in Hawaii. In this case, 2MBCT simply did not possess the forward capability to safely execute fabrication at scale. This reality reinforced a broader lesson for Pacific operations: additive manufacturing and forward fabrication are not substitutes for echeloned sustainment; they are enterprise tools that require the right conditions to be employed effectively.

Depot-Level by Design: The Re-cuperator

The recuperator itself eliminated any remaining ambiguity. By statute and design, it was a depot-level component. The technical data package was not releasable; even if it had been, 2MBCT could not have reproduced pressure-bearing seals. Compounding this reality, national-level prioritization of limited recuperator stocks made near-term replacement unlikely.

Tele-Maintenance as the Decisive Enabler

It was at this point that tele-maintenance demonstrated its value most clearly. The Army did not have to deploy a depot team, retrograde the weapon system, or concentrate personnel and equipment unnecessarily. Instead, forward maintainers connected with experts from program offices, lifecycle management commands, and seasoned armament maintainers across the Army. Through shared video, imagery, and technical context, enterprise experts provided guidance on what actions were feasible. The outcome was not a dramatic forward repair, but something far more valuable: clarity, safety, and realistic expectations that allowed commanders to make informed decisions.

The clarity provided through tele-maintenance prevented reactive, assumption-driven maintenance decisions at the tactical edge. It removed pressure from maintainers to improvise solutions outside their authority or capability and gave commanders a precise understanding of what was broken, what options truly existed, and how operational timelines would be affected. In this context, tele-maintenance functioned as much as a command-and-control tool as it did as a technical one.

Tele-maintenance is not a mechanism to conduct depot-level work remotely. Its value lies in ensuring repairs occur at the correct echelon and that fabrication is pursued only when it is technically sound, legally authorized, and operationally supportable. By allowing enterprise experts to reach forward without physically deploying, tele-maintenance preserves distributed posture, prevents unnecessary retrograde movement, and protects scarce lift and sustainment capacity. These advantages are amplified in the Pacific, where distance, limited infrastructure, host-nation considerations, and constrained strategic lift define the operating environment. Tele-maintenance enables units to remain dispersed across island chains while still accessing enterprise expertise, reducing the need to consolidate personnel or equipment and minimizing additional operational risk.

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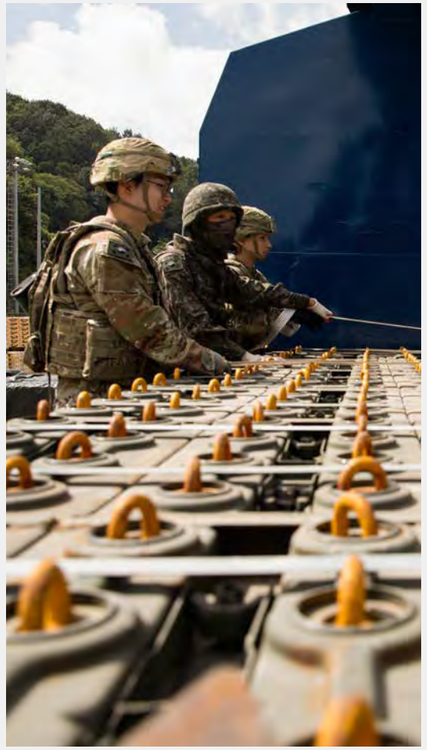
MDA, 6TH ORDNANCE BATTALION



The Forward Edge of Army Munitions Maintenance

By CW4 Michael K. Lima

On South Korea's western coastline in the bustling seaport city of Pyeongtaek, U.S. Army Garrison Humphreys stands as the Army's home in Korea. Located just 40 miles south of Seoul, Camp Humphreys has evolved into the largest overseas U.S. military installation. The garrison centralizes American military power on the peninsula, with the headquarters of U.S. Forces Korea (USFK), the Eighth U.S. Army, and the 2nd Infantry Division/Republic of Korea (ROK)-U.S. Combined Division. Beyond its garrison role, Humphreys serves as a critical power-projection platform, ready to "fight tonight" in the Pacific region. Operating from its headquarters in Daegu Enclave, the 19th Expeditionary Sustainment Command (ESC) stands as the U.S. Army's largest forward-deployed ESC. Tasked with sustaining combat power throughout the ROK, the command serves as the logistical synchronizer for the peninsula through its sprawling network of supply, maintenance, and transportation units.

Nestled in a corner of Camp Humphreys sits a little-known organization called MDA, which stands for Maintenance, Demilitarization, and Ammunition Peculiar Equipment–Activity. MDA is a detachment to the 6th Ordnance Battalion (6th OD BN), a U.S. Army unit focused on ammunition and logistics that falls under 19th ESC. The Army table of distribution and allowances organization was created for specific, unique missions. With about a dozen assigned general schedule (GS) civilians and local national employees, the small unit provides forward repair, munitions demilitarization, and Ammunition Peculiar Equipment (APE) support, which is often found only in the U.S. Army's organic industrial base (OIB), the critical network of arsenals, depots, and ammunition plants responsible for building, repairing, and modernizing conventional munitions and missiles to sustain warfighters. Under the Single Ammunition Logistics System–Korea (SALS-K) memorandum of agreement, the U.S. Army and the ROK program oversee the distribution, storage, and operations of ammunition in South Korea. This partnership ensures the readiness and joint sustainment of USFK and ROK forces by streamlining logistics and leveraging shared resources for ammunition supply, including maintenance, demilitarization, and ammunition-specific equipment.

Maintenance

All military equipment naturally suffers from wear and tear and occasional damage during handling and use, necessitating routine maintenance to ensure mission readiness. Munitions are no different; their complexity and sensitivity to environmental conditions demand careful management to maintain effectiveness. In this context, organizations such as the Missile Defense Agency must establish a robust support system to manage the entire lifecycle of forward-positioned munitions.

The MDA section conducts approved depot-level maintenance on a wide range of advanced munitions for various platforms, including Guided Multiple Launch Rocket Systems, Army Tactical Missile Systems, and the Phased Array Tracking Radar to Intercept on Target systems. Field maintenance handles immediate tasks to keep equipment operational for the warfighter. Traditional depot-level maintenance involves a comprehensive overhaul and rebuilding of components. MDA supports forward element repair teams conducting depot-level maintenance locally to ensure long-term reliability of munitions.

To facilitate these complex operations, the organization relies on a vital reach-back capability to the Joint Munitions Command and the U.S. Army Aviation and Missile Command. This technical reach-back provides the legal and engineering authority needed to perform specific or routine maintenance tasks beyond those covered in standard field manuals. These authorized procedures are carefully documented within formal maintenance standard operating procedures, ensuring each repair is carried out to approved specifications and that all munitions remain safe and lethal in contingency operations. When munitions cannot be repaired, they are rendered unusable by dismantling or destroying the explosive materials onsite rather than returning them to the industrial base.

Demilitarization

The SALS-K logistics cost-sharing agreement establishes a critical financial and operational framework for munitions management within the Korean theater of operations. Under this agreement, USFK service components are mandated to submit comprehensive annual forecasts of their budget requirements for munitions operations. The planning phase ensures that resources are allocated, with a strategic emphasis on demilitarization as a priority support category. By recognizing these requirements in advance, the agreement provides a funding availability that alleviates the management of ordnance throughout its lifecycle on the peninsula.

U.S. Army Soldiers and Republic of Korea Army soldiers perform railhead prodecures in an exercise conducted by 6th Ordnance Battalion sted by 1st Signal Brigade at Jeonui-myeon, South Korea, Aug. 27, 2025. (Photo by SSG Reginald Harvey)

To maintain financial accountability, the agreement requires thorough reporting following the initial forecast. Each Service component is required to submit a SALS-K expenditure estimate quarterly, which is then paired with a detailed report of the actual monthly expenses incurred. This dual-layered reporting mechanism allows real-time adjustments to budget allocations and ensures funds are used directly in alignment with the projected demilitarization goals. This fiscal oversight is essential for managing the high costs associated with hazardous material handling and specialized labor.

The operational execution of these tasks provides a model for partner relationships with the host nation. This primarily involves the Republic of Korea Army (ROKA) Explosive Ordnance Disposal (EOD) unit, under Ammunition Support Command. By performing demilitarization and EOD operations locally on the Korean Peninsula, the program generates significant savings for U.S. taxpayers by eliminating costs of shipping unserviceable munitions back to the continental U.S. (CONUS) and reducing the burden on the organic base for these same operations. Beyond the fiscal benefits, MDA coordinates with U.S. EOD units, primarily Army and Marine Corps, for demilitarization of unserviceable assets on the Korean Peninsula.

These joint operations have fostered deeper partnerships among ROKA and Army EOD forces, paving the way for advanced U.S.-ROK EOD training, such as the Korea Explosive Ordnance Disposal Exercise. Additionally, challenges include specialized training and equipment, which are often limiting factors in ammunition operations.

APE

APE encompasses a highly specialized suite of systems and machinery engineered for the safe handling, maintenance, and disposal of military munitions. This equipment supports the entire ammunition lifecycle through critical operations such as surveillance and maintenance. By using tools, munitions personnel can perform periodic inspections and repairs to extend munitions stockpiles while ensuring all components remain safe for storage and operational use.

APE plays a vital role in the maintenance and demilitarization process by testing, safely disassembling, and recycling munitions. This specialized technology allows for the recovery of scrap metal and the rendering of hazardous components inert through precise mechanical methods. The approved APE 1410M1 deformer and APE 1408M1 Small Arms Ammunition Safety Certification Unit, made for brass casings .50 caliber and below, are two examples of how APE supports Army ammunition operations outside the organic industrial base. This function is essential for compliance, since metal recyclers are mandated to ensure U.S. Department of War-stamped munitions are not reloadable and will refuse any cartridge cases that have not been properly deformed.

Recognizing these technological benefits, USFK and the ROK Ministry of National Defense established the Demilitarization Facility within the ROK. This facility integrates modern APE to dispose of unneeded munitions in the Korean Peninsula. This collaborative effort serves the mutual interests of both nations by strengthening safety standards and advancing sustainable defense logistics in the region. Tooele Army Depot is a Center of Industrial and Technical Excellence for the depot-level maintenance it performs in support of APE. MDA, 6th OD BN, in Korea is the operational support center for a multinational-funded organization that provides recognized expertise in APE military activities.

Conclusion

The MDA section, 6th OD BN (Ammo), 19th ESC, at Camp Humphreys is the critical forward edge for Army munitions. It connects the Korean theater of operations with the CONUS-based U.S. Army OIB. By bringing together local depot-level maintenance and specialized APE, along with fiscal resources under the SALS-K agreement, this unit ensures that critical munitions and missile systems are always ready for combat operations without the heavy burden of shipping across lines of communications. The teamwork between GS civilians, local nationals, and their ROKA counterparts enhances the Korean Peninsula's role as a self-sustaining center for munitions excellence and Army maintenance modernization. This approach strengthens readiness, reduces costs, and improves cooperation between the two nations with the same regional adversaries for large scale combat operations.

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Featured Photo
U.S. Army Soldiers and Republic of Korea Army soldiers secure ordnance on a rail car during a railhead exercise conducted by 6th Ordnance Battalion at Jeonui-myeon, South Korea, Aug. 27, 2025. (Photo by SSG Reginald Harvey)

The Importance of TACOM Maintenance Deep Dives Across 2nd Mobile Brigade Combat Team

By MAJ Bobbi Walden

In today's operational environment, amid new Army structure changes, mobile brigade combat teams face a unique challenge. The Army continues to field new vehicles and weapons systems across formations. At the same time, the brigades continue to operate with the same number of maintainers, all while managing new demands, integrating additional equipment, and sustaining legacy systems. This combination increases the demand for technical knowledge, diagnostic skill, and disciplined maintenance practices. To meet this demand, 2nd Mobile Brigade Combat Team (2MBCT) leverages maintenance deep dives led by U.S. Army Tank-Automotive and Armaments Command (TACOM) as a critical enabler of readiness across the brigade.

TACOM partners closely with the Army Field Support Battalion -Bragg (AFSBn-Bragg) to sustain operational readiness for XVIII Airborne Corps and units at Fort Bragg, North Carolina. As one of the Army's major lifecycle management commands, TACOM provides direct support to units stationed at Fort Bragg through its forward-positioned logistics assistance representatives (LARs). The LARS serve as the bridge between national-level sustainment expertise and tactical-level execution.

TACOM's presence at Fort Bragg ensures that units have immediate access to technical support for a wide range of systems, including tactical vehicles, small arms, artillery, and Soldier support equipment. These experts are embedded with the AFSBn and work together with brigade maintenance teams to troubleshoot complex issues, guide diagnostics, and accelerate readiness. The LARs assigned to Fort Bragg are seasoned professionals with decades of experience who specialize in specific platforms and systems. Their ability to provide on-the-spot technical assistance, interpret technical manuals, and navigate sustainment systems makes them indispensable to unit-level maintenance operations.

TACOM LARs ensure that Fort Bragg's formations are empowered to maintain and sustain their equipment at the highest levels. Their presence enhances the effectiveness of maintenance deep dives, accelerates code-out processes, and builds long-term technical competence across the force. Without TACOM LARs, units would struggle to keep pace with the increasing demands of modernization, leaving formations less prepared to sustain complex systems and more vulnerable to readiness shortfalls.

As units modernize with Army transformation initiative changes and adapt to evolving mission requirements, the expertise provided by TACOM and its embedded LARs becomes increasingly essential. This support is especially critical as maintenance formations face growing system complexity without a corresponding increase in personnel. While the number of maintenance personnel from fiscal year (FY) 25 to FY26 has stayed relatively the same, the complexity and quantity of systems have increased. The continued integration of new vehicles, weapons, and sustainment platforms has added even more to the maintainers' workload.

To meet this challenge, 2MBCT conducts quarterly maintenance deep dives in partnership with TACOM. The brigade selects a vehicle type or system to focus on, and battalions present their toughest cases: the equipment they cannot repair, diagnose, or code out. TACOM's LARs provide onsite support, delivering hands-on troubleshooting and documenting unresolved issues. The process enables units to either restore equipment to full mission-capable status through improved expertise or complete the documentation required to initiate divestiture. By conducting the maintenance deeps dives, 2MBCT maximizes the effectiveness of available personnel by improving technical competence and sharpening diagnostic skills.

TACOM LARs now play an even larger role in this process. These subject matter experts act as force multipliers, bridging gaps in technical expertise that may not exist at the unit level. By embedding with battalions during deep dives, LARs troubleshoot problems in real time and share knowledge that extends far beyond the immediate repair. Their capabilities include advanced diagnostics, fault isolation, repair verification, and sustainment planning. LARs also serve as liaisons to the broader TACOM enterprise, helping units navigate complex logistics systems, order hard-to-find parts, and escalate issues that require higher-level support. Their presence ensures paratroopers learn to understand system behaviors, diagnose root causes, and reduce repeat faults rather than simply replacing parts. This mentorship model not only improves readiness but also builds a culture of technical excellence within the formation.

A recurring challenge in brigade maintenance operations is the overreliance on ordering replacement parts instead of troubleshooting and

TACOM's presence at Fort Bragg ensures that units have immediate access to technical support for a wide range of systems, including tactical vehicles, small arms, artillery, and Soldier support equipment.

repairing the original component. Deep dives directly confront this issue. Through hands-on instruction and guided problem solving, maintainers learn to diagnose faults step by step rather than defaulting to part replacement. This approach conserves critical Class IX repair parts, reduces costs, and develops Soldiers into maintainers who can handle complex issues with confidence and independence.

This shift in mindset, from replacement to repair, has far-reaching implications. It fosters a deeper understanding of system functionality, encourages critical thinking, and promotes resource stewardship. With limited budgets and increasingly strained supply chains, the ability to extend the life of existing equipment through skilled maintenance is a strategic advantage. TACOM deep dives cultivate this capability by creating an environment where learning is hands on, iterative, and directly tied to operational outcomes.

Brigades also face a systemic issue with the limited number of technical warrant officers in every specialty available to lead advanced troubleshooting. Every battalion has an assigned automotive warrant, but brigades are authorized only one computer and electronics warrant and one armament warrant to oversee the brigade's entire stock. Authorized positions and actual assignments often do not align, further limiting available expertise in these specialties. Automotive warrants must manage the fleet, computer and electronics equipment, and armament. This broad responsibility forces them to act as jacks-of-all-trades, focusing on major problems while leaving less time to address smaller but still important issues. At the same time, new warrants and junior NCOs may not yet have the experience to take on the hardest cases.

TACOM deep dives close this gap by providing on-demand expertise, giving warrant officers opportunities to grow professionally, and allowing NCOs to build the confidence they need to lead maintenance formations. Each event serves not only as technical training but also as leader development.

Leader development is critical to maintain operational readiness. By working alongside TACOM LARs, junior leaders gain exposure to advanced diagnostic techniques, learn how to manage complex maintenance workflows, and develop the judgment needed to make informed decisions under pressure. These experiences accelerate their growth and prepare them for future leadership roles within the Army's maintenance enterprise. Moreover, the collaborative nature of deep dives fosters a sense of shared purpose and mutual respect between Soldiers and civilian experts, reinforcing the idea that readiness is a collective responsibility.

Another critical benefit of TACOM's involvement is their ability to accelerate the code-out process for excess and legacy equipment. TACOM provides direct assistance with procedures and paperwork for submission to the property book officer, ensuring accuracy and speed. As 2MBCT continues to modernize with new equipment, there is no established process for turning in legacy items. Previously, the brigade benefited from streamlined divestment through modernization displacement and repair sites (MDRS), centralized hubs designed to receive, assess, and redistribute displaced equipment during modernization efforts. However, with MDRS no longer available, the process has become more complex and time consuming. As a result, the brigade often holds onto non-mission-capable or outdated platforms longer than desired due to uncertainty in disposition or a lack of technical knowledge to code them out.

TACOM deep dives bring in the expertise needed to validate equipment status, ensure administrative requirements are met, and push excess material into proper divestment channels. This reduces the burden on maintenance formations, clears motor pools of mountains of excess, and allows leaders to focus resources on the systems that matter most for current missions. The ability to rapidly and accurately assess non-repairable equipment also improves accountability, reduces clutter, and enhances the overall efficiency of brigade operations.

Ultimately, maintenance deep dives are about more than fixing non-mission-capable vehicles; they represent a deliberate investment in both people and readiness. When asked his opinion of deep dives, COL Derek Noel, 2MBCT commander, emphasized: "Many of our code outs require TACOM's approval, and their deep dives ensure the paperwork is correct from the start. This expedites the process, builds leaders, empowers warrants and NCOs, and keeps this brigade ready for the next fight."

While TACOM LARs and other subject matter experts provide invaluable advisory support, 2MBCT would benefit even more if these professionals were authorized to physically touch the equipment during deep dives. Direct hands-on work accelerates troubleshooting, builds credibility with paratroopers, and allows experts to model best practices. It also confirms technical findings on the spot and reinforces training in ways that advice alone cannot achieve. Restoring this capability would make deep dives even more effective and ensure knowledge transfer remains practical and theoretical.

The value of TACOM's involvement cannot be overstated. Their ability to integrate institutional knowledge with tactical execution creates a powerful synergy that enhances every aspect of brigade maintenance. Whether diagnosing a hard-to-find fault in a sniper rifle, guiding a young NCO through a hydraulic issue on a heavy expanded mobility tactical–truck, or helping a unit divest of a legacy light medium tactical vehicle, TACOM's presence ensures that 2MBCT remains agile, lethal, and mission ready.

2MBCT continues to meet the Army's uncompromising standards of readiness through training maintainers, strengthening relationships with AFSBn and TACOM, and clearing out excess equipment. These efforts ensure operational efficiency and sustained preparedness across the brigade. As the Army modernizes its fleet and adjusts its force structure, the value of TACOM's maintenance deep dives will only grow. These events ensure 2MBCT remains agile, lethal, and capable of executing its missions no matter the challenge.

MAJ Bobbi Walden serves as the support operations officer for 2nd Mobile Brigade Combat Team, 82nd Airborne Division. She has a Master of Business Administration from Mid-America Nazarene University and master's degree in operational science from the Command and General Staff College.

Featured Photo
A U.S. Army Tank-automotive and Armaments Command (TACOM) logistics assistance representative and members of the 1-325 PIR maintenance team work together to diagnose a sniper rifle during TACOM Weapons Maintenance Deep Dives at Fort Bragg, North Carolina, on October 30, 2025. (Photo by CW4 William Ortiz)

Sustaining the Final Mission

Contaminated Remains Operations and the Future of Army Mortuary Affairs

■ *By CPT Alexander J. Young*

The Army has spent more than two decades acknowledging a difficult but necessary truth: it does not possess a fully mature, end-to-end capability to recover, process, transport, and repatriate chemically contaminated human remains. While this challenge may appear rare, it represents a critical sustainment function tied directly to trust between the Army, its Soldiers, and their families.

In response to this capability gap, the 54th Quartermaster Company (Mortuary Affairs) partnered with the Joint Mortuary Affairs Department (JMAD) to identify and document key observations and lessons learned during Mortuary Affairs Contaminated Remains Mitigation Site (MACRMS) and Interim Remains Decontamination System (IRDS) training. Concurrently, the Army developed a recommended solution: the fielding of the IRDS to support the company's mission-essential task list, specifically, the establishment and operation of MACRMS. These systems collectively represent the Army's interim solution to a long-standing gap in its contaminated remains capability.

However, recent collective training exercises reveal a sobering reality: possessing the equipment does not guarantee the ability to sustain the mission. As sustainment demands grow more complex, contaminated

remains operations expose systemic challenges in training, logistics, and institutional ownership that senior leaders must address.

Why Contaminated Remains Matter to Sustainment

Since World War I, the Department of War has not been required to repatriate chemically contaminated remains during combat operations. This fact often leads to the assumption that contaminated remains operations represent a low-probability concern. Recent operational history challenges that assumption.

Chemical weapons demilitarization missions, global biological response operations, and the growing willingness of adversaries to employ chemical agents indicate that future conflicts may occur in contaminated environments. In such scenarios, contaminated remains operations are not only a mortuary affairs responsibility but also a sustainment challenge involving logistics, transportation, force health protection, and public trust.

The Army must recover contaminated remains, package them safely, transport them without exposing additional personnel, reduce contamination, and support final disposition. IRDS and MACRMS provide the framework to do so. Execution, however, reveals where sustainment friction emerges.

Lessons from MACRMS Execution

During fiscal year (FY) 25 collective training rotations, MACRMS operations highlighted gaps in equipment accountability and maintenance. Sustainment relied heavily on operational contract support rather than unit-level ownership. When equipment degraded or required servicing, units lacked the organic capability to rapidly restore readiness. This condition underscored a critical sustainment reality: fielded equipment does not automatically translate into operational readiness.

From a sustainment perspective, this construction presents risk. Contaminated remains operations allow little margin for error. Equipment failures delay processing timelines, increase exposure risk, and degrade operational confidence. A system that depends on contractors for core readiness functions is vulnerable during contested or austere operations.

Sustainers understand this lesson well: equipment readiness must be predictable, inspectable, and owned by the formation responsible for execution.

Training Is Perishable and Time Bound

MACRMS operations require deliberate integration of multiple specialties, including mortuary affairs Soldiers; chemical, biological, radiological, and nuclear specialists; medical personnel; and Armed Forces Medical Examiner System teams. These tasks are procedural, slow by necessity, and unforgiving of shortcuts.

Yet, funding for MACRMS and IRDS-related training is projected to expire at the end of FY25. Without continued investment and oversight from the JMAD, skills will atrophy. Unlike routine sustainment tasks, contaminated remain operations cannot be relearned quickly during crisis execution.

Recent IRDS training observations further confirmed that this capability depends on annual funding, specialized external support, and aging equipment, which complicate sustainment predictability as the force continues to shrink.

From a sustainment lens, this represents a classic readiness problem: a low-density, high-consequence capability that degrades quietly until it is urgently required.

Transportation and Final Disposition Remain Unresolved

Chemically contaminated human remains are classified as hazardous material under federal transportation standards. This classification requires specialized packaging and trained escorts during air and ground movement. Despite these requirements, no standardized joint escort certification currently exists across the Services.

The challenge compounds upon arrival in the continental U.S. While IRDS and MACRMS reduce contamination to safe levels for transportation, no final burial site has been formally approved for contaminated remains. As a result, the sustainment system can successfully move human remains out of the theater but lacks a defined end state.

From a logistics perspective, this represents an incomplete supply chain movement without destination clarity.

MACRMS Is a Company-Level Sustainment Mission

One of the clearest operational lessons is that MACRMS is not a platoon-level task. Processing contaminated remains requires continuous operations, deliberate work-rest cycles, and synchronized command and sustainment oversight.

Attempting to execute MACRMS with a single platoon rapidly leads to fatigue and increased risk. Effective execution demands a company-level task organization capable of integrating multiple sustainment functions simultaneously.

This reality becomes more concerning as the mortuary affairs force continues to shrink.

Force Structure and Sustainment Risk

In FY26, the Army's only active-duty mortuary affairs unit, the 54th Quartermaster Company, was reduced from approximately 251 Soldiers to 165, shrinking from eight mortuary affairs platoons to five.

At the same time, contaminated remains operations remain among the most sensitive and politically consequential missions the Army may execute.

Without deliberate sustainment planning, capability erosion will occur gradually through reduced training frequency, equipment degradation, and loss of institutional knowledge.

Implications for the Sustainment Community

Addressing these challenges requires more than doctrinal acknowledgment. The Army must do the following:

- Institutionalize MACRMS and IRDS training as recurring collective tasks.
- Assign clear unit-level ownership for equipment sustainment.
- Establish standardized escort training aligned with transportation regulations.
- Align force design assumptions with company-level execution requirements.
- Resolve final disposition policy to complete the sustainment chain.

These actions align directly with the sustainment principles of predictability, continuity, and integration.

Conclusion

Mortuary affairs operations represent the Army's final obligation to its Soldiers. In contaminated environments, that obligation becomes a complex sustainment mission involving logistics, transportation, force protection, and public trust.

The Army has developed an interim solution. It has validated portions of the concept through training. What remains is the institutional commitment to sustain capability as the force evolves.

If the Army waits until contaminated remains operations are required during large-scale combat, it will be too late to rebuild proficiency. Sustainment leaders understand that readiness must exist before demand, not after.

The final mission deserves nothing less.

CPT Alexander J. Young is a logistics officer currently serving as the company commander of the Army's only active-duty mortuary affairs unit, the 54th Quartermaster Company (Mortuary Affairs). He is responsible for the operational planning and execution of Mortuary Affairs Contaminated Remains Mitigation Site and Interim Remains Decontamination System training in support of contaminated-remains operations. He also prepares platoons for mortuary affairs missions in the U.S. Central Command area of responsibility and incorporates downrange feedback from rotational deployments. He holds a bachelor's degree in operations and project management and has completed the Joint Fatality Management Course (4V).

Featured Photo
SFC Claudia Ratliff, a 92M Mortuary Affairs Specialist with 1st Armored Division, simulates putting a tag on a mannequin at the morgue during a mass casualty situation exercise, April 23, 2025, at Mihail Kogalniceanu Air Base, Romania. (Photo by CPT Leyda Kanzler)

ASU WRITING COMPETITION WINNER

TELE-MAINTENANCE

Predictive Readiness and Forward Repair in the Operationally Independent Brigade Fight

By 2LT Denzell N. Beecham

[Editor's note: In this article, OIB is used to mean operationally independent brigade. The Army typically uses it to mean organic industrial base.]

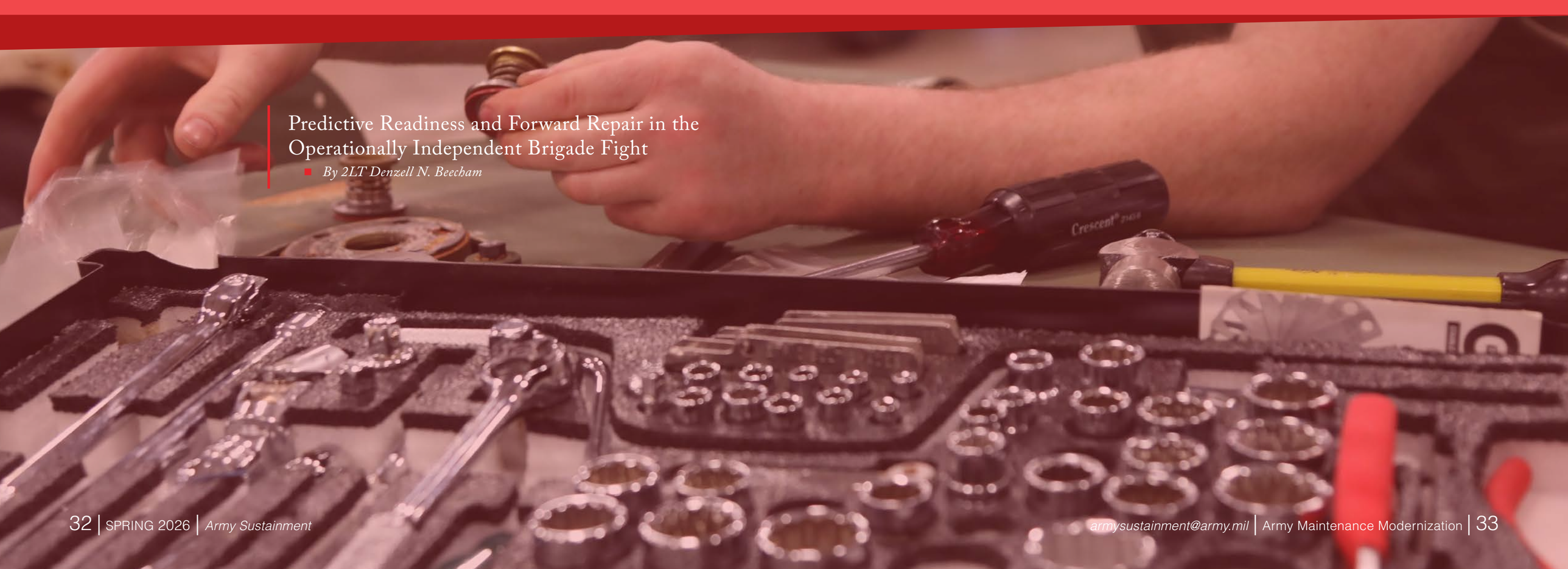
The Institutional Challenge of Maintenance Modernization

Modernizing Army maintenance is not primarily a technology problem. The Army already possesses advanced diagnostics, predictive maintenance systems, and data-driven readiness tools. The real shortfall is institutional. Maintenance modernization will fail unless tele-maintenance is treated as an operational capability that is deliberately taught, exercised, and embedded within professional military education. These observations are informed by the author's experience in sustainment units and recent completion of the maintenance module within the Logistics Basic Officer Leader Course at Army Sustainment University (ASU).

Predictive maintenance, forward repair in operationally independent brigades (OIBs), and tele-maintenance are often discussed as separate initiatives. In reality, they form a single system. Predictive maintenance provides information; OIB forward repair requires action under constraint; and tele-maintenance connects expertise to the point of execution. When these concepts are not deliberately integrated through education and training, the Army risks fielding advanced tools that cannot be effectively employed in combat.

Tools Are Advancing Faster Than Education

The Army has made real progress in predictive maintenance. Sensors and enterprise systems increasingly allow leaders to anticipate failures instead of reacting to them. However, predictive data alone does not create



readiness. Data must be interpreted, trusted, and acted upon, often by junior leaders operating forward with limited time, personnel, and expertise.

At the same time, the OIB concept assumes brigades are capable of operating with reduced external support. Forward repair is intended to preserve combat power, reduce evacuation timelines, and extend endurance. In practice, forward repair remains constrained by limited manpower, finite technical expertise, and restricted access to higher-level maintenance capabilities.

This creates an unresolved tension. Predictive systems identify problems early, but they do not answer who confirms diagnostics, who provides advanced expertise, or how commanders manage risk when evacuation is not an option. These decisions are too often left to improvisation in motor pools or during deployments rather than being deliberately taught and rehearsed in professional military education.

Tele-maintenance allows forward units to access subject matter experts, sustainment commands, and specialized maintenance capabilities without relocating personnel or equipment.

Tele-Maintenance as an Operational Capability

Tele-maintenance addresses this gap, but only if it is treated as an operational capability rather than a technical convenience. Tele-maintenance is not simply remote troubleshooting or video assistance. Properly employed, it extends maintenance expertise across distance, time, and organizational boundaries.

Tele-maintenance allows forward units to access subject matter experts, sustainment commands, and specialized maintenance capabilities without relocating personnel or equipment. Expertise is centralized, while execution remains decentralized. This model aligns with contested and resource-constrained environments where movement is limited, and sustainment nodes are vulnerable.

Informally, Soldiers have always relied on this concept. Junior maintainers routinely reach back to experienced leaders, technical manuals, or trusted networks to solve complex problems. A senior maintenance NCO the author previously served under consistently emphasized that difficult maintenance problems are solved through access to experience, not just tools. Tele-maintenance formalizes this behavior and scales it across formations, replacing informal workarounds with deliberate and repeatable processes.

Enabling Forward Repair in the OIB Fight

Forward repair in OIB formations cannot rely on organic self-sufficiency alone. No brigade can carry the full range of expertise required to diagnose and repair increasingly complex systems. Attempting to do so overextends maintainers, lengthens repair timelines, and increases risk.

Tele-maintenance enables a more realistic forward repair model. Forward maintenance elements focus on execution, while higher-echelon or specialized experts provide diagnostic validation, repair guidance, and risk assessment remotely. Predictive maintenance supports this model by identifying failures early, allowing tele-maintenance to be employed proactively rather than reactively.

This approach reduces unnecessary evacuation, preserves limited forward repair assets, and improves commanders' ability to manage operational risk. Most importantly, it aligns sustainment operations with the realities of contested logistics rather than idealized assumptions.

The Role of Military Academic Institutions

Despite its operational relevance, tele-maintenance remains underdeveloped within professional military education. Military academic institutions, and ASU in particular, shape whether modernization concepts are operationalized or remain theoretical.

Tele-maintenance must be introduced early in officer education. At the Basic Officer Leader Course level, students must learn not only what maintenance systems exist, but how to employ remote expertise as part of routine sustainment planning. Officers must understand when tele-maintenance is appropriate, how to integrate it into decision-making, and how to assess risk when diagnostics and guidance are provided remotely.

Instruction must move beyond system familiarization. Scenario-based training must place students in realistic OIB maintenance problems involving degraded communications, limited repair parts, predictive alerts, and competing operational demands. In these scenarios, tele-maintenance becomes a leadership and judgment tool, not a technical novelty.

Finally, military academic institutions must serve as experimentation hubs. ASU is uniquely positioned to connect operational units, sustainment commands, and emerging technologies through pilot programs and structured feedback. By incorporating lessons learned from exercises and deployments into curriculum updates, ASU can ensure maintenance education evolves with the operational environment rather than trailing it.

Conclusion

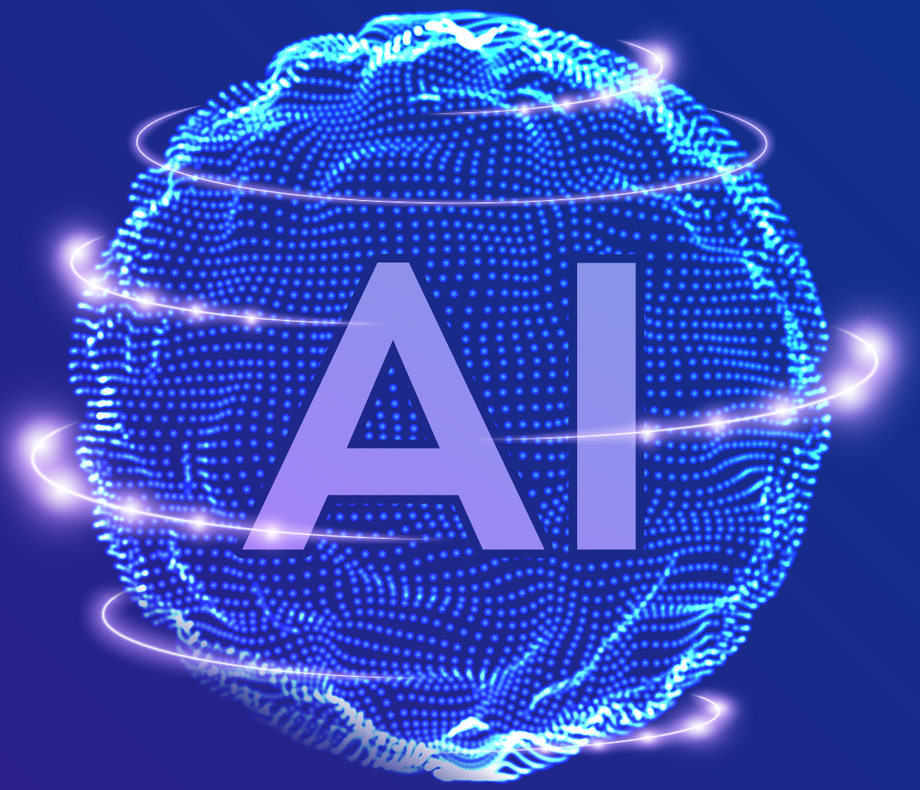
The Army does not lack maintenance modernization initiatives. It lacks an institutional framework that aligns predictive maintenance, forward repair, and tele-maintenance into a coherent operational approach. Tele-maintenance is the connective tissue that turns predictive insight into readiness and enables OIB formations to operate without unrealistic assumptions of self-sufficiency.

ASU and the professional military education enterprise are central to closing this gap. By institutionalizing tele-maintenance as an operational capability that is taught, exercised, and refined, ASU can prepare future logisticians to employ maintenance modernization decisively in combat. In doing so, ASU does more than educate. It shapes the conditions for operational success.

2LT Denzell N. Beecham is a logistics officer currently attending the Logistics Basic Officer Leader Course at Army Sustainment University. He previously served as an enlisted transportation management coordinator, which involved movement operations, sustainment planning, and coordination across multiple echelons. He holds a bachelor's degree from Grand Canyon University. His civilian professional background includes work in the logistics and transportation industry, supporting operations, customer coordination, and process improvement.

Featured Photo
A Soldier with the 377th Support Maintenance Company provides maintenance to equipment at Equipment Concentration Site 67, Fort McCoy, Wisconsin, Jan. 9, 2026. (Photo by Kaleen Holliday)

Automating Reporting for Better



Low-Cost Sensors Key to Real AI Benefits

By LTC David J. Paddock and CPT Jeremy Kilbride

Scenario: Too Close for Comfort

CPL Lee returns from mission and pulls his truck into the motor pool. The vehicle's onboard sensors retain captured fault codes, environmental exposure, and operating conditions. A low-power, encrypted recorder preserves Lee's verbal observations locally, but no radio traffic is generated. Human memory and manual entry are removed from the reporting chain at the point of contact.

As the vehicle enters the maintenance bay, adaptive camouflage netting suppresses thermal and radio frequency signatures, but more importantly, it marks the transition from operator-reported sustainment to sensor-verified sustainment. Cameras identify the platform and configuration. Near-field communication (NFC) and radio frequency identification (RFID) sensors pull vehicle history reports, diagnostics, crew identifiers, and maintenance status directly from the vehicle and the maintainers' wristbands. The system does not ask a Soldier how long a repair takes or what tools were used — it measures it.

These sensor feeds converge on a local artificial intelligence (AI) stack running on an edge server. Fault codes, maintenance history, environmental exposure, voice annotations, previous mission profiles, and even operator usage are fused automatically, generating a ranked fault assessment. Maintainers receive wrench-ready diagnostic guidance on their tablets through low-power mesh or LiFi links, but no data are pushed upward yet.

The diagnosis suggests corrosion in a wheel speed sensor caused by repeated water crossings. The system already knows this vehicle is mission critical for the next day. Instead of a human initiating phone calls or spreadsheets, the sustainment network evaluates regional inventories, identifies recoverable components on battle-damaged platforms, and generates a controlled exchange recommendation. Approval is routed and executed with minimal human mediation; parts are scanned, inventories update automatically, and the vehicle's readiness state changes in real time across command dashboards.

Throughout the process, sensors continue to collect automatically and continuously. RFID wristbands log man-hours precisely. Tool issuance and part movement are recorded at the moment they occur. When the repair is complete, no one reports success — the system observes it.

Only at a scheduled window does the system communicate beyond the local area. Sensor-aggregated data are compressed and transmitted in a brief, narrowband satellite burst. What moves upward is not raw data or human estimates, but validated sustainment outcomes: readiness restored, parts consumed, labor expended.

At higher echelons, these sensor-derived outputs enable something previously impossible at scale: trend recognition untethered from subjective reporting. AI models ingest maintenance outcomes across units and identify abnormal failure rates tied to specific components and operating conditions. When a vendor's wheel speed sensors begin failing disproportionately after water exposure, the system detects the trend before it becomes a crisis. Notice-to-maintainer alerts are queued automatically, triggering inspections the next time affected vehicles enter service — without relying on memory or tribal knowledge.

At the strategic level, sustainment leaders no longer ask, "What are units reporting?" They ask, "What are the sensors showing?" Stockage models adjust dynamically, shifting parts forward based on projected operations and sensor-validated demand. Contracting preferences update in response to observed performance, not anecdote.

Across the formation, commanders retain freedom of action not because sustainment became more automated, but because it became more accurate. Sensors replaced the first layer of human reporting, allowing AI to operate on reality instead of approximation. Technology enabled this shift, but sensors made it meaningful.

Current Capabilities

The story above is only a slight embellishment of technological capabilities that exist today. NFC tags are essentially stickers with embedded circuitry that allow for two-way communication and storage of small amounts of data. Mesh communication exists within Army formations already, allowing Android Team Awareness Kit-enabled devices to broadcast reports and other data to all devices on the network. The AI Integration Center (AI2C) has already implemented applications that broadcast data from users or sensors and that automate reporting by leveraging voice-to-text models on existing systems. This style of mesh communication paired with low-cost sensors presents an opportunity for sustainers to automate large swaths of logistics data collection and reporting.

Through a blend of low-cost sensors, dynamic sustainment AI, ruggedized collaboration, and spectrum-disciplined communications, sustainers in the near future will synchronize sustainment at echelon, regenerate combat power, and execute mission command without drawing unwanted attention, preserving and reconstituting combat power while staying hidden in the electromagnetic battlespace. At the center of this vision are low-cost sensors, which transform sustainment data from subjective human inputs into objective, real-time truth, and in doing so unlock the full value of AI. Many of these sensors are already in widespread use across industry to streamline sustainment and maximize profits.

Garbage In, Garbage Out

Sustainment has long been identified as one of the warfighting functions most likely to benefit from the increasing prevalence of AI. The sustainment community has a deep pool of data to train AI models, much of it unclassified and readily accessible. The gap is not data availability, but data quality. Sustainment information is routinely compromised when human judgment, memory, incentives, faulty data entry, and fragmented systems shape what is reported. These inaccuracies are rarely malicious, even when intentional. Reports are adjusted to avoid scrutiny, protect force structure, reconcile accounts, or compensate for incomplete information. Leaders misinterpret data during entry, delay reporting under operational pressure, or make assumptions to fill gaps. Redundant systems that only partially share data compound the problem, fragmenting information across multiple databases. The result is a sustainment enterprise built on estimates rather than observable truth.

This environment is fatal to AI. Algorithms trained on delayed, subjective, or distorted inputs generate recommendations that appear precise but are fundamentally flawed. Efforts to modernize sustainment without addressing how data are collected simply accelerate bad decisions.

Low-cost sensors bypass this problem entirely. By automating data capture at the point of action — reading fuel levels, logging part usage, and tracking man-hours through wearables — sensors remove the first layer of human subjectivity from the reporting chain. They replace approximation with measurement and create the conditions under which sustainment AI can function as intended.

An Aged Model

Low-cost sensors are a viable potential solution but have not been widely adopted for a variety of reasons. Soldiers still manually measure the volume of fuel in a tanker with a wooden stick, report maintenance hours based on self-reporting, and manually maintain supply stocks in a base of operations container. In an era when shoppers at Walmart can find an item's exact location on their phone, the Army maintains clerks to manage inventory in a model from the 1950s, including annual wall-to-wall inventories (presumably because we steal just as often as we lie).

We offer excuses for our reluctance to adopt new systems and practices: sensors may be insecure; they may not work with our network; they may reduce our ability to operate in a denied, degraded, intermittent, or limited environment; they are not rugged enough, etc. But many of these objections mask a deeper cultural resistance. Commanders worry that too much transparency will expose inefficiencies. Senior leaders fear the political consequences of reporting ugly data. Sustainers themselves are reluctant to automate tasks that form the basis of their military occupational specialty (MOS) identity. We have found reasons to avoid adoption,

and we are delaying movement into the intelligence age because of our excuses. The Army is driving forward with AI adoption, but the development of those models relies on accurate, timely data.

The sustainment community must quickly adopt and integrate low-cost sensor technology into our formations. We must tolerate the risk of unflattering reports and accept that certain career fields will be disproportionately impacted by the automation provided by modern sensor technology. We must adopt these technologies in concert with deliberate AI development efforts to ensure that the data provided integrate with our current automation systems and with the data requirements of the AI developers.

A Need for Leadership and Risk Tolerance

Sensor technology is not sufficient to bridge the gap. Commanders must assess the appropriate level of risk tolerance for sustainment planning. Logisticians have long espoused that civilian logistics models translate poorly to conflict; the impact of a late Amazon delivery pales in comparison to the impact of losing the initiative in an assault due to a delayed fuel delivery. Our mistakes are measured in lives lost, and logisticians have long been acutely aware we are the first to be excoriated when a plan fails.

That risk aversion has translated into inefficient models. It has produced archaic processes like wall-to-wall inventories, manual fuel accounting, and gapping mechanics from the parts needed to complete maintenance actions to improve command supply discipline at the cost of efficiency and enabling modernization. In an organization with an annual budget that exceeds $175 billion, we require commanders to directly approve repair components that exceed $500, with no specific means of evaluating the efficacy or efficiency of the maintenance actions those parts enable. We criticize the tactical risks of commercial logistics models but burden ourselves with bureaucratic and administrative process that we inevitably carry with us to conflict. This bureaucratic inertia is precisely what sensors disrupt: they do not ask permission to measure fuel, or hours, or parts usage — they just do it. But until commanders deliberately choose to embrace this disruption, the Army will continue carrying analog habits into a digital fight and will apply industrial processes in the intelligence age.

Sensors can mitigate many of the cultural aversions that drive these processes by automating reporting processes and accountability and better evaluating the actual impact of sustainment investments.

Combined with local AI stacks, sensors can reduce the need for constant reporting traffic by allowing data to be collected, analyzed, and acted upon at the point of need. This would dramatically decrease the unit's electromagnetic spectrum signature. Higher headquarters would be provided with sustainment needs instead of subordinate data. The result would be a sustainment system that operated faster and with greater autonomy, remained far harder for adversaries to detect, target, or disrupt in the electromagnetic battlespace, and generated redundancies when faced with disruptions.

And the power grows when data become predictive. With reliable sensor feeds, AI can forecast tomorrow's failures, adjust stockage levels in real time, and even preposition units based on projected operations rather than static estimates. When a systemic fault is identified — like a vendor producing subpar wheel speed sensors — notice-to-maintainer messages can be generated automatically, alerting every impacted vehicle as it enters service. Instead of reacting to shortages, commanders would be given foresight and informed decision points. Sustainment is a source of operational advantage, not a constraint.

More important, accurate data change the commander's decision space. With sensor-fed sustainment AI, commanders could set dynamic risk thresholds, deciding when to cannibalize, when to surge forward logistics, when to execute a repair, and when to deliberately run equipment to failure. These decisions are not abstract — they shape the operations officer's scheme of maneuver and the intelligence officer's assessment of enemy targeting opportunities.

Sustainment AI is not just a logistics tool. It is a warfighting tool. Low-cost sensors can enable this by creating a continuous, trustworthy flow of sustainment data in contact. They can give commanders the confidence to act, not based on estimates, but on the real condition of vehicles, fuel, weapons, and Soldiers at that moment. Sensors are not only an efficiency enhancer — they are a survivability enabler. And in the transition, they can provide the AI development teams the reliably accurate data needed to train models.

A Time for Change

The Contested Logistics Cross-Functional Team conducted a simple but telling experiment: transfer data directly from four M1A2 SEPv3 tanks into a Mission Command Information System (MCIS). Doing so required a special software upgrade, days of hands-on work with each platform, and a carefully configured mesh network — just to pass a handful of fault codes into the Tactical Data Platform. Once there, an AI-enabled MCIS could answer only basic queries about fault frequency and meaning, and at day's end it generated a short situation report summarizing what was collected. The experiment proved that we can move maintenance data from platform to decision maker, but it also revealed the limits of our current approach: without low-cost sensors automatically generating accurate, high-resolution data at the platform, even our most advanced AI-enabled systems are left with too little to analyze, too late, and at too high a cost in Soldier time. The Army does not lack AI — it lacks the automated data streams required to make AI matter.

The path forward is clear: rapid experimentation, adoption at scale, and tolerance for the cultural disruption sensors will cause. Some MOS roles will change or shrink, but automation can also free sustainers from administrative burdens to focus on the problems AI cannot solve. We cannot afford to wait for perfect technology or perfect data. We must build models, refine sensors, and adapt processes in parallel — and we must do so quickly.

Transformation in Contact (TiC) provides the ideal framework for this shift. TiC is about adapting while under pressure, iterating in the fight rather than waiting for perfect conditions in garrison. Low-cost sensors and sustainment AI models embody this principle: they can be fielded incrementally, validated in real-world conditions, and refined in direct response to the demands of contested logistics environments. By embedding sensors at the points of maintenance, supply, and transportation and coupling them with local AI stacks, units can transform sustainment practices during operations — accelerating decisions, reducing reporting burdens, and minimizing electromagnetic signatures. The more sensors we field, the more quickly the sustainment enterprise adapts under fire, and the sooner sustainment modernization is not deferred to future force design but becomes a living element of TiC, giving commanders the ability to regenerate combat power in contact and experiment with new sustainment concepts in real time.

The good news is that the sustainment enterprise does not need to build this transformation alone. The Army already has organizations designed to help accelerate the adoption of low-cost sensors, integrate data standards, and scale AI tools across the force. The AI2C is postured to provide exactly the assistance sustainers require. AI2C's partnerships with program executive officers, cross-functional teams, and U.S. Army Combat Capabilities Development Command give sustainers an institutional bridge to technical expertise they do not organically possess.

LTC David J. Paddock is a logistics officer and currently serves as the lead capability developer at the Artificial Intelligence Integration Center at Carnegie Mellon University. He holds a master's degree from Air University. He has served as a maintenance control officer and forward support company executive officer in 1st Brigade Combat Team, 10th Mountain Division, at Fort Drum, and as a commander of a distribution company in 210th Fires Brigade in Camp Casey, Korea. He is also a graduate of Ordnance Basic Officer Leader Course and the Air Command and Staff College.

CPT Jeremy Kilbride serves as an autonomous systems engineer for the Artificial Intelligence Integration Center in Pittsburgh, Pennsylvania. He commissioned in 2018 as an ordnance officer. He holds a Master of Science degree in artificial intelligence engineering from Carnegie Mellon University.

LOGISTICS SCENARIO EXERCISE

AMMUNITION ON THE MOVE

By CPT Andrew Schiller and CPT Kyle Frego, Captains Career Training Department

Situation

Your brigade engineer battalion is in the final phase of preparing for a large-scale field training exercise (FTX). As part of pre-FTX certification, Alpha, Bravo, and Charlie companies must complete required demolition and a company situational training exercise (STX). Ammunition distribution is a critical enabling task, and the battalion commander has emphasized zero tolerance for delays or accountability errors.

Mission

You are the distribution platoon leader of Echo Forward Support Company, responsible for planning and executing all Class V movements for the battalion. Your distribution platoon sergeant and 89B Ammunition Specialist are your primary staff for this mission.

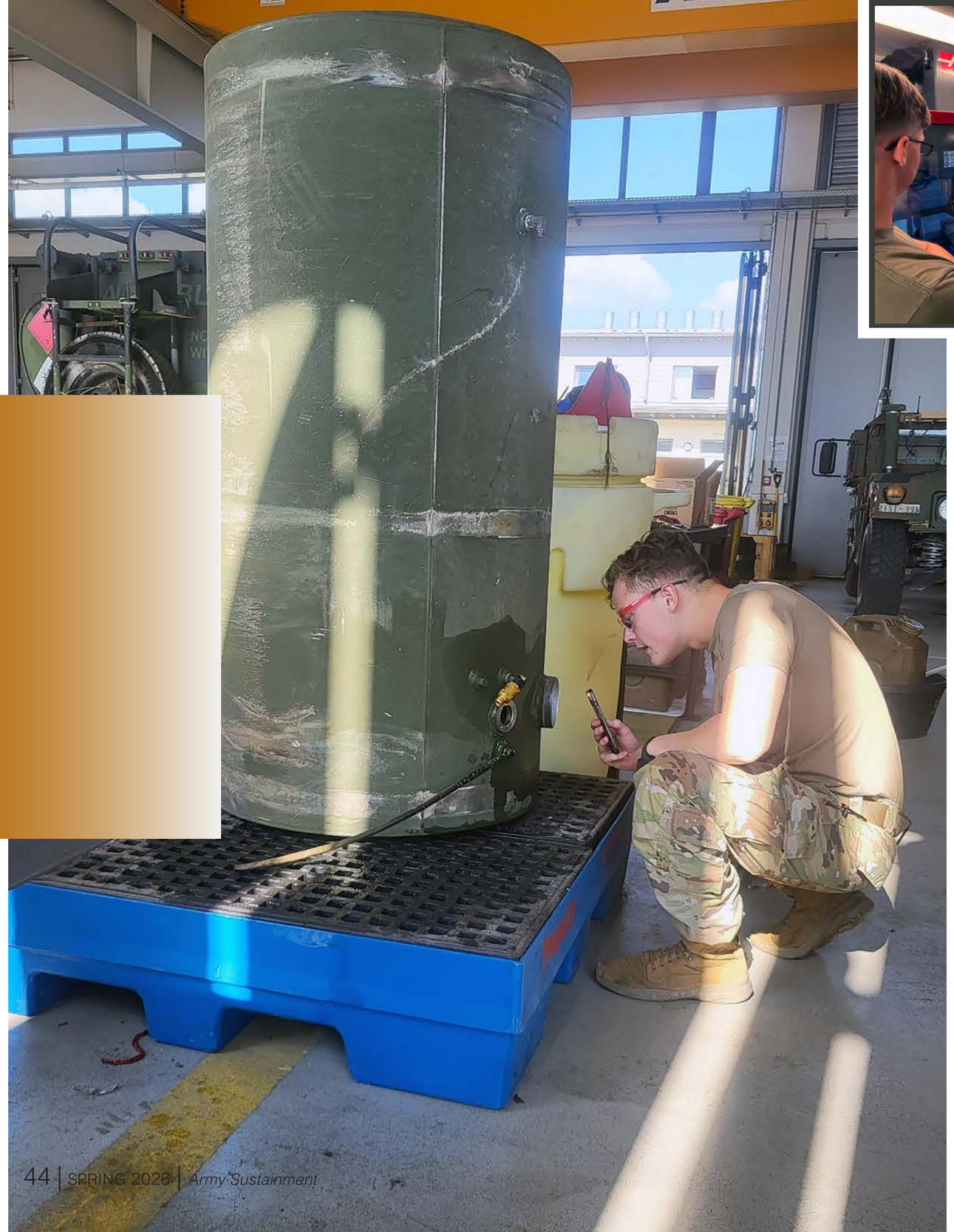
Coordinating Instructions

Alpha and Bravo companies are scheduled to conduct a combined demolition range, while Charlie Company will be executing company STX lanes on a separate training area. Due to conflicting timelines and restricted route access across the training site, the distribution platoon has been tasked to conduct a single logistics package (LOGPAC) to each company's location. Alpha and Bravo will receive their support at the demolition range, and Charlie will be resupplied independently at their STX lane site. You lead a standard distribution platoon, with at least three DD Form 626, Motor Vehicle Inspection-certified load-handling system systems with associated container roll-in/roll-out platforms and one Joint Light Tactical Vehicle. Below are the DOD identification codes (DODICs) and quantities you have drawn from the ammunition supply point (ASP):

DODIC	NSN	QTY
M023	1375-01-389-3854	60
M456	1375-00-180-9356	60
M130	1375-01-192-9174	60
M757	1375-00-926-3985	60
M670	1375-00-028-5246	60
M060	1375-00-926-4108	60
M032	1375-00-028-5142	60
A080	1305-00-005-8005	6240
A111	1305-00-752-8087	4000
A598	1305-01-078-4879	3000
L594	1370-01-557-8527	10

Challange

Using the DODICs provided, create a LOGPAC convoy layout that identifies how many vehicles are required and which DODICs will be transported on each vehicle to support Alpha and Bravo companies' demolition range and Charlie Company's STX lanes.

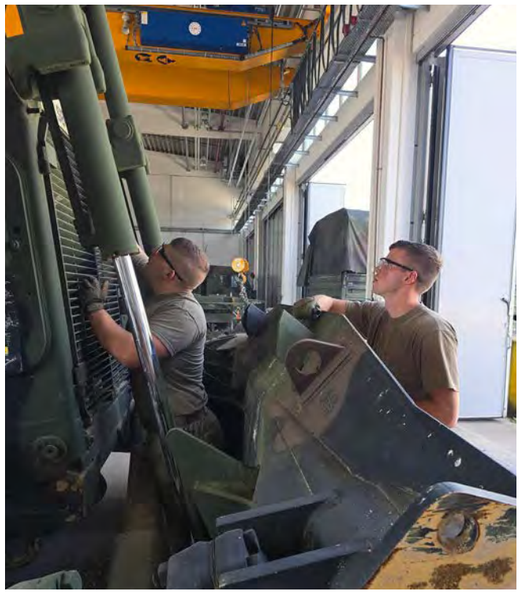


An Army of Maintainers on One Objective

Integration of Reserve Component SMCs into Active-Duty CSSBs

■ *By MAJ Albert Farley III and 1LT Ya Xing He*

With today's numerous challenges from both China and Russia, the U.S. Army is placing unprecedented emphasis on readiness across all echelons. A critical part of the overall Army readiness is its equipment readiness, for which maintenance operation plays a decisive role.



Among the Army maintenance organizations, support maintenance companies (SMCs) are uniquely positioned to assist echelon above brigade (EAB) units. Since 93% of the Army's SMCs belong to either the U.S. Army Reserve (USAR) or the National Guard (NG), successful integration of Reserve Components' (RCs') SMCs into the Army's overall maintenance power is crucial for the Army's readiness to dominate its adversaries in competition, crisis, and ultimately armed conflict.

The 758th SMC, a reserve unit from Ohio, was mobilized in 2024 and deployed to the U.S. European Command (USEUCOM), joining other regionally aligned forces (RAF) for Operation Atlantic Resolve. While in theater, the 758th SMC was attached to the Regular Army's (RA's) 18th Combat Sustainment Support Battalion (CSSB), 16th Sustainment Brigade, 21st Theater Sustainment Command. Throughout its nine-month USEUCOM rotation, the 758th SMC's successful integration into the 18th CSSB and the resultant boost in theater maintenance capability highlighted RC SMCs' critical role for the Army's maintenance excellence, providing valuable lessons for sustainment

leaders across all three components: the RA, the NG, and the USAR.

SMC: the Maintenance Workhorse for EAB units

Structurally, an SMC is composed of three platoons: automotive armaments, electronic maintenance, and ground support equipment. Additionally, there is a company headquarters consisting of operation section (e.g., supply, communication, etc.) and maintenance control section. All active-duty SMCs and four NG SMCs possess organic test, measurement, and diagnostic equipment (TMDE) platoons. Typically attached to a CSSB, an SMC's primary objective is to provide general support via field-level maintenance, limited wheeled vehicle recovery, and welding and fabrication capabilities to customer units identified by the CSSB, usually on an area basis.

Despite having the same goal of sustaining maintenance, an SMC is equivalent to neither a brigade support battalion's (BSB's) field maintenance company nor to the maintenance platoons of various forward support companies (FSCs) attached to their assigned battalions in a brigade combat team (BCT). Unlike FSCs, an SMC is incapable of providing maintenance to major combat systems, such as the M1 Abrams, M2 Bradley, or M1256 Stryker, since those major systems' maintainers are in either an FSC's maintenance platoon, a CSSB's attached maintenance surge teams, or the field maintenance section within a combat logistics company under the light support battalion in a mobile BCT per the Transformation in Contact initiative.

Regarding the priority of support, an SMC differs from a BSB's field maintenance company for its focus on general support to EAB entities, including transiting-through units, on an area basis. In contrast, a BSB's field maintenance company prioritizes general support to its BSB units within the brigade support area while reinforcing maintenance for low-density commodities such as communication, electronics, and armaments to FSCs. In contrast to a BSB's field maintenance company's general support-reinforcing relationship within the BCT's hierarchy, an SMC prides itself in both its breadth and depth of maintenance coverage via general support.

Importance of RC SMCs Amid the Shift to Division Fight

As the Army refocuses on large-scale combat operations (LSCO) and multidomain operations, the emphasis on division-level combat power necessitates the reflagging of 10 RA and eight NG CSSBs to division sustainment support battalions (DSSBs), heavy or light. In contrast to a CSSB, whose only organic subordinate is its headquarters and headquarters company, a DSSB has four organic companies, one of which is its division support maintenance company (DSMC).

Structurally, a DSMC is equivalent to an SMC with an organic TMDE platoon. Nevertheless, under a garrison setting, with only one active-duty DSMC per division at its home station, a huge disparity exists between the overall equipment maintenance requirement versus the actual maintenance Soldiers available for work. Consequently, commanders are inadvertently forced to selectively allocate their maintenance manpower in garrison, resulting in a tiered priority of support among its customer units. As demonstrated by the 524th DSSB's case study published in the summer 2024 edition of *Army Sustainment*, despite having the same scope and scale of support as its CSSB predecessor, the nature of its divisional-oriented command and support relationships has resulted in an astounding 53.7% deficit in annual maintenance man-hours for its DSMC. In contrast, employment of a division sustainment brigade in LSCO will require mobilization of additional units, including CSSBs with SMCs to fully meet the maintenance requirements of the division. These CSSBs, the majority of which are from the reserve components, operate via general support relations with all units in its area of operation (AO), following the CSSB's guidelines. Therefore, deployment of a CSSB with attached SMC plugs the maintenance manpower shortage and thus is necessary to ensure continuity and responsiveness of maintenance support in AOs with significant non-divisional EAB units, or with a multitude of diverse units transiting through the AO.

Given that the LSCO division's fight requires integrating various non-divisional enablers, SMCs attached to CSSBs remain crucial to the theater's overall equipment readiness. Consequently, RC SMCs are becoming increasingly relevant simply because of their sheer numbers. By 2030, for every single active-duty SMC, there will be one equivalent counterpart — with organic TMDE capability — in the NG, plus another 12 more RC SMCs, minus organic TMDE capabilities. Therefore, the successful integration of RC SMCs into active-duty CSSBs throughout the conflict continuum is paramount.

Due to the heightened op tempo after the full-scale invasion of Ukraine, USEUCOM sustainment requirements prompted the Army to reactivate the 95th CSSB at Baumholder, Germany, in 2023, and to assign it the 317th SMC, the only RA SMC in Europe, away from the 18th CSSB at Grafenwoehr. Hence, a force tracking number (FTN) was established for an RAF SMC attached to the 18th CSSB to augment its maintenance capability. From July 2024 to April 2025, the 758th SMC served as the RAF SMC at Grafenwoehr, Germany. For the 758th SMC, this is its first mobilization in more than a decade after its previous deployment to Iraq in 2007.

Mission-Oriented, Doctrinally Correct Force Posture for the Deployed SMC

Leadership's priority is to understand its mission. As outlined in the operation order and its deployment FTN, the objective for 758th SMC's USEUCOM mobilization is to sustain theater equipment readiness. Therefore, the mobilized SMC's leadership must align its priorities with the objective of providing maintenance capabilities to customer units to sustain equipment readiness across its AO. By observing tenets such as mission command and the eight principles of sustainment, the 758th SMC tailored its force posture, fulfilling its obligation to all customer units throughout its mobilization.

After receiving the initial deployment warning order in 2022, the 758th SMC conducted several exercises, including a trip into "the box" with an RC CSSB at the National Training Center, Fort Irwin, California, and company field training exercises at Fort Knox, Kentucky. These exercises drastically improved the unit's mission-essential tasks in base defense and Soldier resilience. However, the lack of military occupational specialty (MOS) training hindered the 758th SMC's ability to execute its core maintenance missions. Particularly for Soldiers in low-density MOSs, such as 91J Quartermaster and Chemical Equipment Repairer, a lack of MOS-specific training has, plus the actual shortage of deployable Soldiers, have persisted over the years. For instance, while the 758th SMC's modified table of organization and equipment lists three slots for 91J, there was only one 91J Soldier ready to deploy. For the sole deployable 91J Soldier, who started as a private in the company and eventually advanced to staff sergeant, she has only performed MOS maintenance tasks at the schoolhouse, rather than at the unit during weekend battle assemblies or annual training. Even for high-density MOSs, such as 91B Wheeled Vehicle Mechanics, their MOS proficiency has also atrophied over time, because their primary MOS experience was conducting basic Level 10 preventive maintenance checks and services (PMCS) on the company's organic rolling stock during battle assemblies.

Recognizing the capability gap between MOS-specific proficiency and the demand for the theater equipment readiness, 758th SMC's leaders realized the importance of MOS competency. They implemented a multi-pronged approach throughout the mobilization to address the deficiency while sustaining maintenance combat power for the CSSB.

Train as You Fight

As the strategic context in USEUCOM fluctuates between competition and crisis, and drawing from the latest LSCO lessons from Ukraine, the 758th SMC has adapted itself to mimic how the 18th CSSB operates in theater. From establishing dispersed, multi-nodal maintenance sites to setting up an expeditionary weld shop with the forward repair system next to the customer's M88 tracked wrecker, the 758th SMC worked with 1st Army Division East during its pre-deployment training at Fort Hood, Texas, to sharpen its proficiency. The armament section chief organized mobile repair teams to offer 24/7 coverage for customer units in theater. With dispersed

shops in permanent buildings and an armament repair shop set, plus mobile teams equipped with gage kits and tool sets in M1097 trucks responding to customer units' urgent request for maintenance support amid their live fire exercises in the field, Soldiers sustained readiness and practiced maintenance operation in an expeditionary setting.

Train to Maintain

Unfortunately, RC Soldiers' MOS proficiency slowly deteriorates due to a lack of hands-on training during typical battle assemblies, partly because commanders must balance a multitude of demands from higher headquarters. Hence, it is critical to train to maintain Soldiers' MOS capability with all resources. The 758th SMC tapped into its Soldiers' civilian expertise, yielding drastic improvement to MOS proficiency.

RC units commonly include in their ranks military technicians (MILTECHs) who are federal civilian employees and are required by law to maintain reserve military status, and other Department of the Army civilian employees (DACs). There are MILTECHs who work in RC regional Army maintenance support activities or equipment concentration sites, doing the same job on the civilian side as their military MOS, focusing all their work hours on their MOS-specific jobs, rather than splitting time between maintenance-related tasks and general Soldiering tasks like their active-duty peers. By setting up teams led by those MILTECHs and DACs who mentor junior Soldiers with their MOS wisdom, the 758th SMC enables cross-leveling of domain knowledge throughout its mobilization.

The Citizen-Soldiers in RCs provide a pool of civilian skills that SMC leadership needs to discover and translate into combat power. A private first class in the 758 SMC's ground support equipment platoon works on the civilian side as a licensed heating, ventilation, and air conditioning (HVAC) technician with multiple certificates. Realizing his talents from his civilian education and work experience, leadership encouraged the private to mentor all other 91C Utilities Equipment Repairer in their MOS proficiency. At first glance, it might astonish observers that a 91C staff sergeant was consulting a private on how to braze copper tubing around sensitive electronics, yet both Soldiers benefited from the knowledge symbiosis: the staff sergeant polished his MOS proficiency, while the private gained firsthand Army leadership experience.

Fight to Train

The 758th SMC took the initiative to seize training opportunities. It did this by following the 18th CSSB commander's intent on reviving the skills of correctly diagnosing and repairing, instead of merely replacing damaged parts under allocated maintenance expenditure limits. These skills had gradually diminished when the old Level 30 direct support maintenance merged into field-level maintenance back in 2005 during the transition to current two-level, field verse sustainment maintenance processes. When Maintenance Activity Vilseck, a local office of the Theater Logistics Support Center – Europe, experienced backlogs of load testing, the allied trade section took the initiative to design, fabricate, and implement a lift apparatus, enabling the CSSB's organic loading testing capability for various pacing items, such as M984 wreckers and all-terrain lifter Army system 10K forklifts. Assisted by the 18th CSSB support operation, the 758th SMC's maintenance control team sourced commercially available components from stateside vendors for the apparatus. Consequently, the 758th SMC generated new maintenance combat power for the CSSB while simultaneously practicing fundamental MOS skills for multiple sections.

Besides fighting to train its own maintainers, the 758th SMC also involved low-density maintenance MOS Soldiers from other companies within the CSSB and its Soldiers in support MOSs to strive for additional training opportunities. After synchronizing with leadership across the CSSB, the 758th SMC incorporated the lone 91C Soldier in the 23rd Ordnance Company and several 91D Power Generation Equipment Repairers in the 493rd Quartermaster Petroleum and 221st Field Feeding companies into the SMC's respective maintenance team to refresh everyone's MOS proficiency with hands-on workloads. On the other hand, the CSSB's S-6 team took in an RAF SMC's 25U Signal Support System Specialist to enhance her proficiency in tactical and operational communication. For its single 74D Chemical, Biological, Radiological, and Nuclear (CBRN) Specialist, the 758th SMC tasked her with calibration on the SMC's CBRN detectors alongside the DACs at the Vilseck TMDE shop.

The 758th SMC also adjusted its weekly battle rhythms, shifting the day of PMCS for its organic equipment from the traditional Monday to Thursday. By having all maintainers ready on Monday to address any questions raised by customer units' operators during their motor pool Mondays, the 758th SMC's Soldiers were exposed to various platforms, enhancing their breadth of MOS domain knowledge. Consequently, the customer units received continuity, integration, and responsiveness. As customer units engaged in sergeant's time training on Thursdays, the 758th shifted a majority of its Soldiers to conduct internal PMCS, while still preserving a skeleton crew of experienced maintainers for all commodity shops in anticipation of any urgent customer requests.

Counterarguments abound regarding how RC SMCs must operate while attached to RA CSSBs. Disagreement emerged when leaders have conflicting views on the unit's actual priority. Nevertheless, since the overarching objective for the 758th SMC as USEUCOM RAF is to sustain theater equipment readiness, it is evident that the unit's priority is general support via maintenance sustainment to EAB customer units on an area basis. Hence, SMC leaders should reach consensus and, if necessary, leverage appropriate intervention from the CSSB to empower overall mission success.

Reserve SMC: Ready Today to Shape Tomorrow's LSCO Fight

As the Army readies all echelons amid the paradigm shift to LSCO, maintenance is playing an increasingly crucial role in achieving dominance on tomorrow's battlefield. As with the latest Army 2030 Force Structure Initiatives and its Transformation in Contact, the Army maintenance enterprise is steadfastly evolving to meet the challenges posted by LSCO. By successfully mobilizing RC SMCs to active-duty CSSBs throughout the conflict continuum, the Army can unlock the full potential of maintenance capability while ensuring reserve maintenance Soldiers are ready today to shape tomorrow's fight.

Author's note: Special thanks to Mr. Jeffrey Martin, deputy director, Fielded Force Integration Directorate, Combined Arms Support Command (CASCOM), Ms. Amber Smith, director, Analysis, Assessment, and Integration Directorate, CASCOM, MAJ Albert Farley, then 18th CSSB executive officer, CW4 Daniel Bish, then 758th SMC automotive chief, CPT Robert Wooldridge, 310th Sustainment Command (Expeditionary) public affairs officer, and 1LT Suzi Lee, 23rd Ordnance Company platoon leader, for their generous contributions and critique to this article.

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1LT Ya Xing He is a petroleum officer in the support operations section, headquarters and headquarters company, 354th Quartermaster Group of the U.S. Army Reserve. When he wrote this article, he served as the maintenance control officer for the 758th Support Maintenance Company, a reserve unit out of Whitehall, Ohio, during the unit's mobilization to Europe in support of Operation Atlantic Resolve. He was commissioned via Officer Candidate School at Fort Benning and completed the Basic Officer Leadership Course in the Ordnance branch at Fort Lee. He has a Bachelor of Science degree in mechanical engineering from the Ohio State University.

Featured Photos

Left: SPC Kingery, a 91B Wheeled Vehicle Mechanic, inspects a repaired fuel tank before installation at U.S. Army Garrison Bavaria, Grafenwoehr, Germany. (Photo by public affairs office of the 758th Support Maintenance Company, 310th Expeditionary Sustainment Command, U.S. Army Reserve)

Middle: SGT Workman, a certified machinist in his civilian job, mentors SGT Carroll, a 91E Allied Trade Specialist, to operate a computer numerical control mill inside a metal working and machining shop set at U.S. Army Garrison Bavaria, Grafenwoehr, Germany. (Photo by public affairs office of the 758th Support Maintenance Company, 310th Expeditionary Sustainment Command, U.S. Army Reserve)

Right: SGT Bonham and SPC Dech, 91L Construction Equipment Repairers, work on a D9 dozer at U.S. Army Garrison Bavaria, Grafenwoehr, Germany. (Photo by public affairs office of the 758th Support Maintenance Company, 310th Expeditionary Sustainment Command, U.S. Army Reserve)

Be Ready Day One!

"While not all problems are logistics problems, they inevitably all have a logistics problem set." – RADM Chris Stone, Director of Strategic Plans, Policy, Logistics (J4/J5), U.S. Transportation Command

The Joint Logistics Planners Course Advantage

By COL (Ret) Steve Erickson, LTC Brian Johnson, and MAJ Avraham "Avi" Behar

The Joint Concept for Contested Logistics is clear: we must be ready for contested logistics in every phase of military operations. Even on our best day, we are contested at the operational and strategic level on our highways, railways, and ports, even before the introduction of bad actors in cyberspace. Joint logistics education is critical to meet this coming demand. The Joint Logistics Course (JLC) opens students' minds to how Service authorities and responsibilities contribute to the joint force problem set. The Joint Logistics Planners Course (JLPC) identifies military solutions to those problem sets faced by combatant commands (CCMDs) and joint task forces (JTFs), applying Service resources combined with unified command plan authorities to achieve national objectives. At the end of these two courses, students are "ready day one" to produce actionable logistics plans in doctrinal formats used by the Joint Staff and the Department of War (DOW). Synchronizing logistics in joint planning is not optional; it is required.

Picture this: A newly assigned CCMD staff planner joins an operational planning team (OPT) and is tasked with developing a logistics plan for a high-stakes contingency operation. With no training in joint logistics planning, they struggle to translate strategic guidance into actionable sustainment requirements, adjudicate authorities, and prioritize scarce resources. The result? Delays in decision making, misaligned priorities, desynchronization with the scheme of maneuver, and a commander unable to act decisively.

This scenario is all too common and is exactly why the JLPC was created. JLPC trains logisticians to produce immediately usable and actionable staff products under pressure of time and security classification constraints. They include concise risk identification with practical mitigations, prioritizing requests so tradeoffs are visible and contain timelines, funding sources, and next steps to enable CCMD and JTF planning execution without delay.

The course sponsor, VADM Dion English, Director of the Joint Staff J4, clearly states "To effectively deter aggression, our logistical capabilities must be as formidable as our combat power. This requires a deep and continuous investment in the education of our logisticians, ensuring they are not just suppliers, but strategic thinkers who can anticipate the needs of the joint force in a contested environment. Well-educated logisticians are strategic deterrents in their own right, capable of building resilient and adaptable supply chains that can withstand and recover from any disruption."

The joint force requires planners who understand joint authorities, prioritize scarce resources, and convert logistics risks into actionable decisions. By addressing logistics friction that narrows options and slows tempo, JLPC trains planners to translate strategy into synchronized sustainment solutions. The 10-day, Secret-level course compresses judgment, authority adjudication, prioritization, and risk communication skills, enabling graduates to contribute immediately to OPTs, joint planning groups, and JTF/CCMD staffs.

JLPC progressed from concept to an approved course that meets joint force needs in just one year. This significant achievement was a collaborative effort involving the Army Sustainment University, the Center for Joint and Strategic Logistics for curriculum advice, U.S. Transportation Command (USTRANSCOM), the Defense Logistics Agency (DLA) for scenario realism and subject matter expertise, and U.S. Africa Command (USAFRICOM) for theater context.

How JLPC Differs from the JLC

JLPC and JLC exist on the same educational spectrum. The curriculum is not mutually exclusive; it is *supporting*. In a way, JLC is the peanut butter to JLPC's jelly; each is outstanding on its own, but together they are dynamic!

JLC is instructor-led and gives a broad, foundational orientation in two weeks to understand joint doctrine, enterprise roles, and Service capabilities.

JLPC is student-led and hands-on (30% lecture and 70% application). Prerequisites include JLC and Joint Professional Military Education Phase I, waiverable when appropriate. Where JLC builds understanding, JLPC builds immediate staff employability and deliverability.

Course Structure and Learning Design

Design Intent

Modern joint operations require logisticians who translate strategic guidance into theater logistics objectives, identify and apply authorities, prioritize scarce resources, and present risk in commander-focused terms. JLPC enhances joint logistics education by closing the gap between Service-centric training and the multi-domain, multi-agency realities of joint planning.

Format and Approach

JLPC emphasizes practice leveraging doctrinal anchors to set the frame. Most student time is scenario-driven planning with time-bounded injects, subject matter expert (SME) panels, and iterative coaching. Student teams lead planning while faculty observe, coach, and grade against concise rubrics tied to observable behaviors.

Real Inputs, Cross-Functional Realism

The scenarios for JLPC were developed in collaboration with the Joint Enabling Capabilities Command (JECC) and leverage JECC Planners Course (JPC) scenarios. The JECC USAFRICOM scenario has been adapted to be joint logistics planner centric. A crisis planning scenario inspired by current and previous USAFRICOM logistics problem sets was also added to the curriculum. Students begin with mission analysis and course of action (COA) briefs produced by recent JPC graduates. Those peer-authored, cross-functional inputs intentionally reflect non-logistics perspectives. Working from imperfect, real-world products forces logisticians to translate operational aims and assumptions into prioritized logistics requirements and then fit those requirements into the scheme of maneuver.

Phases and Clear Outcomes

Learning in JLPC progresses through tightly linked modules, each mapped to observable behaviors and assessed with practical deliverables designed for students to practice the exact tasks they will perform on a CCMD staff.

The joint force requires planners who understand joint authorities, prioritize scarce resources, and convert logistics risks into actionable decisions.

Strategic Context and Operational Environment — Students frame the theater, identify authorities and constraints, and translate strategic guidance into prioritized sustainment tasks. This phase produces a theater logistics analysis and feeds into staff running estimates to show students how their framing informs commander decisions.

Planning — Students apply theater priorities across the joint planning process (JPP): conducting logistics support analyses, developing COAs, producing a concept of logistics support and drafting Annex D and supporting estimates. This phase further develops students understanding of the delineation of authorities between CCMD and services while reinforcing their linkages to overarching national objectives.

Chairman's Special Areas of Emphasis — Students address contested logistics and survivability, Joint Materiel Priorities and Allocation Board (JMPAB) tradeoffs, and military assisted departure (MAD) planning while practicing authority adjudication and interagency coordination. The output of this module is a contested-logistics, crisis-focused MAD plan that identifies authorities, assigns interagency tasks, and recommends prioritized mitigations. Each phase builds on the last so graduates leave with a connected set of skills: theater framing that leads to executable plans that embed risk JTF and CCMD priorities and crisis products that show how those priorities survive stress.

Behaviors That Matter, Realism That Counts — Why do we focus on measurable behaviors and Secret classification-level realism? We measure observable actions and train inside realistic, classified constraints. Clear behavioral checkpoints let faculty give targeted feedback, let students practice the exact moves they will make on a staff, and ensure assessments map to commander expectations. These examples are not theoretical — using Joint Risk Assessment Methodology (JRAM) language and linking actions to the authorities matrix are the concrete skills we test. Running exercises at the Secret classification level forces decision making with real information limits, speeds judgment formation, and produces products commanders can use immediately.

The Evolution Leading to the USTRANSCOM Pilot — What We Tested and What We Learned

As mentioned, JLPC evolved through iterative pilots that sharpened scope, tradeoffs, and outcomes. Below is a concise, chronological account showing how each step was built on the last and why those changes mattered.

Inception

The joint force identified a distinct training gap, and we were directed to create JLPC. At the beginning, we clarified how JLPC differed from existing courses: focus on theater framing, staff-level sustainment actions, and observable outcomes rather than broad doctrine review.

Pilot 1 (September 9–20, 2024)

We tested the initial course structure by leveraging joint service academic, CCMD, and DLA subject matter expertise. The pilot validated the core concept and identified friction points in group dynamics and inconsistencies in faculty intervention, leading to uneven student experiences. Addressing these gaps and aligning instructor expectations, timing, and scoring improved feedback consistency and made performance measurement more reliable.

Pilot 2 (December 2–13, 2024)

Using lessons learned from Pilot 1, we introduced contested logistics concepts, incorporated relevant and applicable strategic documents, and added multinational command relationships to make coordination and authority issues explicit. The prerequisites ensure everyone starts with the same baseline skills. These changes transformed exercises from abstract tasks into real decision-making challenges, compelling students to justify choices as they would in an operational staff environment.

Pilot 3 (April 28–May 9, 2025)

At this juncture, we incorporated the chairman's special areas of emphasis — contested logistics, JMPAB tradeoffs, and MAD planning — and introduced ADVANA and Maven Smart System (MSS) as the course's primary sources for logistics planning and data mining. This made scenarios more challenging, requiring students to reconcile competing priorities using live data and produce clear outputs. Using ADVANA and MSS reduced manual data mining, enabled faculty to identify and correct mistakes earlier, and provided students with hands-on experience using the tools and products they will employ on real staffs.

Pilot 4 (September 2–12, 2025)

The final validation emphasized exportability and realism: we demonstrated mobile training team delivery, conducted the course at the Secret level, and introduced a crisis-focused MAD planning scenario. Final curriculum edits addressed remaining gaps, resulting in a packaged, classified-capable course that can be taught reliably across locations. Each pilot enhanced the connection between learning objectives and measurable outcomes.

USTRANSCOM Hosts the Final Operational Test

USTRANSCOM is DOW's truly global CCMD, the single manager for deployment and distribution

capabilities central to JLPC's core dilemmas. Hosting the culminating pilot provided domain-relevant injects, access to SMEs, and realistic discussions about closure, throughput, and allocation trade-offs that are hard to recreate in a classroom.

What We Tested

The final operational test (or pilot) validated curriculum content, tested instructor pacing and rubric reliability, and confirmed the effectiveness of the mobile training team model. Conducted from September 2–12, 2025, the pilot used current USAFRICOM documents and notional planning orders. Students produced doctrinal joint staff products while faculty provided real-time coaching and formal feedback after each major exercise.

Key Observations

- Strategic Context: Students demonstrated doctrinal literacy and effectively framed the theater. However, they struggled to translate this framing into prioritized logistics tasks that enable rapid commander action.
- Planning: Mission analysis sometimes did not convert diplomatic, legal, or political constraints into actionable logistics planning factors. Materiel prioritization under constrained lift and competing CCMD requests yielded different team outcomes. Iterative injects and immediate feedback led to clear improvements.
- Society of Automotive Engineers/MAD: Contested-environment injects prompted practical survivability ideas and exposed uneven familiarity with interagency roles and responsibilities. MAD exercises forced teams to surface assumptions and demonstrate authority linkage and interagency coordination steps.

Representative Exercise: Cuban Missile Crisis Reframed

This module had students apply modern JRAM to a historical case study of the Cuban Missile Crisis. Starting from historical objectives and modern doctrine, teams prioritized and identified military and non-military (strategy) risk. The exercise produced clear trade-off analysis and showed how doctrine applied to historical context sharpens judgment when recommending risk acceptance, avoidance, or mitigation.

Instructional Takeaways

Short, focused corrections by faculty, SMEs, and senior leaders produced the biggest gains: 10-minute micro lessons on authority adjudication or prioritization sequencing immediately clarified expectations and improved outputs. Pre-assigning critical roles based on a commodity or joint logistics function reduced handoff friction and raised product quality and timeliness. Instructors used the pilots to sharpen their own sustainment judgment, standardize scoring, and practice faster, more targeted interventions.

Senior Leader Feedback

The JLPC pilot at USTRANSCOM exceeded expectations, yielding significant improvements in student outputs and faculty practices. Senior leaders, including RADM Chris Stone (Director, USTRANSCOM J4/5), actively shaped the curriculum, emphasizing that logistics issues often arise from non-logistics problems. USTRANSCOM J5 planners participated in JPP briefs and provided operational feedback. LTG Jered Helwig (Deputy Commander, USTRANSCOM) highlighted the importance of training as a test bed for real operations. While reviewers praised many student products, they recommended tighter alignment with joint staff expectations, maintaining a focus on authority understanding and logistics integration in contested environments. The pilot produced staff-quality annexes under classified conditions, shortened decision timelines, and instilled confidence that JLPC graduates can deliver immediately actionable operational products.

Student Feedback

Students appreciated the hands-on, student-led format and the Secret-level realism. Practical requests included short refresher modules on authorities and funding and an anonymized repository of previous graduate and real staff products. They also requested more practice on interagency coordination and clearer guidance on which authorities govern specific actions.

Shared Priorities

Much like the recent remarks of the Chief of Staff of the Army at the 2025 Association of the United States Army (AUSA) conference emphasizing continuous transformation, JLPC's evolution is far from over and constantly evaluated. Faculty, students, and senior leaders all agreed on near-term improvements and fully understood the importance of adapting the course to meet future operational environment needs.

Operational Impact

JLPC shortens staff ramp-up and reduces the need for senior adjudication. Graduates return with templates, authority awareness, and practiced risk communication so they can contribute immediately. The course awards 1.5 joint education credits and Army students receive the P1 (Theater Planner) for future talent management and assignment consideration.

Measured Outcomes

At course completion, 90% of students reported a significant improvement in their ability to plan joint logistics. Six to 12 months after graduation, alumni continue to report continued operational benefits, indicating immediate skill gains and lasting value.

JLPC Next Steps

- Translate outcomes into behaviors. For each course section, define two to three observable actions. These behaviors make assessment clear and remediation direct.
- Formalize an inject escalation ladder. Predefine inject types, timing, and scoring so cohorts face calibrated, progressively harder decision stressors and faculty can benchmark progress.
- Standardize templates. Provide concise, CCMD-vetted templates to reduce grading variance and give students a durable schema for rapid production.
- Preserve Secret where it matters. Keep classified elements that materially improve realism; use sanitized, unclassified variants when classification is not required.

What JLPC Delivers

JLPC transforms doctrine into capability. Graduates align Service contributions with joint plans, clarify authorities and support relationships, and communicate logistics risks in actionable terms. Commands with JLPC graduates experience faster materiel prioritization, improved annexes that withstand staff transitions, maintained operational tempo, and logistics teams that enhance commander options.

Call to Action — Enroll Your Logistics Planners

If you want logisticians who can contribute on day one, send them to JLPC. Enrollment is open to qualified officers, warrant officers, NCOs, civilians, and contractors who meet all prerequisites. To nominate personnel or register, contact your Service training manager or the JLPC faculty for eligibility and scheduling details.

COL Steve Erickson served as the commandant of the Logistics Corps & Army Sustainment University at Fort Lee, Virginia. He has completed significant training courses, including the High Performance Leader Program as a Center for Creative Leadership Fellow, the U.S. Army Command & General Staff Course focused on Operational Planning & Leadership, and the Total Army Instructor Course. His higher education includes a Master of Science degree in national strategic studies from the Air War College and a Master of Science degree in Adult Education from Kansas State University.

LTC Brian Johnson is the chief of the Joint Logistics Education Branch at the Army's Logistics School. He previously served as speechwriter to the commander of U.S. Transportation Command, joint mobility operations officer, brigade and battalion executive officer, and support operations officer. He is a graduate of the MG (R) James Wright Master of Business Administration Program at the College of William and Mary.

MAJ Avraham "Avi" Behar is the director for the Joint Logistics Planners Course at the Army's Logistics School. He previously served as a joint logistics instructor, executive officer, support operations officer, and research fellow. He is the U.S. Army Command and General Staff College Distinguished Master Sustainer for 2020 and a graduate of the U.S. Air Force's Advanced Logistics Readiness and Operations Course and the Indian Army's Senior Management Ordnance Course. He holds a Master of Science degree from Michigan State University and the Command and General Staff College.

Putting The Foxhole On The Factory Floor

Bridging TWI and pRFID for Army Sustainment Transformation

- *By CPT Laurkee Adedeji, Ph.D.*

This article explores the intersection of the Army's Training with Industry (TWI) program and item-level passive radio frequency identification (pRFID) as twin engines of sustainment modernization. Drawing from the author's fellowship with United Parcel Service (UPS), this article demonstrates how industry practices in precision, automation, and real-time visibility can inform Army reforms in accountability and predictive sustainment. Case studies from the West Point Cadet Uniform Factory (CUF) and the Defense Logistics Agency (DLA) show measurable gains in efficiency and lifecycle traceability.

This article also looks at synchronization through the Office of the Secretary of War (OSW), Enterprise Business System–Convergence (EBS-C), and updated federal labeling standards, emphasizing that precision logistics and data integrity are decisive in contested environments.

The Precision Imperative

Victory in modern warfare no longer depends solely on mass or firepower; it hinges on precision — knowing where each asset, part, and piece of protective gear is at any given time. The Army's modernization agenda recognizes that logistical precision translates directly into operational power. In an age of dispersed formations, contested supply lines, and digital sustainment, the force that can see itself the fastest sustains itself the longest.

TWI: Learning Precision from the Private Sector

The TWI program was built on the principle that Soldiers learn best when immersed in the private sector's most advanced logistics environments. During my TWI assignment with UPS, I witnessed how commercial innovation achieves nearly perfect visibility across global operations. Every package, uniform, and route were tracked in real time. Data accuracy was not merely an aspiration; it was ingrained in the culture. UPS demonstrated a fundamental principle: precision becomes scalable only when supported by systematic processes. Barcode scanning, route optimization, and item-level tracking were all part of a disciplined ecosystem that treated data as a combat multiplier.

The company's global uniform program offered a practical blueprint for the Army's organizational

clothing and individual equipment (OCIE) management challenge. Garments tagged with item-level identifiers moved seamlessly from vendor to distribution center to employee, eliminating manual errors and saving hundreds of labor hours. That experience reshaped my understanding of sustainment. The same automation that allows UPS to deliver millions of packages daily could empower the Army to deliver readiness with accuracy, speed, and confidence.

UPS leadership echoed this commitment to both precision and partnership. Patrick Thompsen, UPS Automotive Engineering, Director of Information Services and Learning Development stated, "UPS has a long history of supporting our service members, both in wearing the uniform in support of our country or working with our different branches while on a military fellowship at UPS. RFID has improved UPS's ability to track end-to-end our customers' packages and improve delivery accuracy. CPT Laurkee Adedeji was immersed throughout the development and refinement of this technology, and UPS is proud of the implementation and growth she has learned when returning to the Army."

From Industry to Innovation: The Case for pRFID

Item-level pRFID brings factory-grade automation to the tactical edge. The typical item-level pRFID process affects three key areas of military uniform production: new/modified steps, existing/modified steps (manufacturer process), and existing/modified steps (Virtual Item Manager–Apparel Research Network shipping). Item-level means that each item, such as a single uniform or component of a uniform, is tagged and tracked with its own unique RFID tag. The technology eliminates manual scanning bottlenecks and provides instant asset visibility.

In recent Army pilots, Soldiers reduced inventory time by 96% after minimal training. pRFID labels — costing mere cents each — record an item's identity and location automatically when within range of a reader. When applied to OCIE, pRFID ensures full accountability from factory floor to foxhole. Each tag becomes a digital handshake between operator, maintainer, and commander. By feeding real-time data into enterprise systems, pRFID enables predictive sustainment, reduces rework, and strengthens audit readiness. Three simple changes would unlock the full value:

1. Require item-level pRFID on selected national stock number (NSN) items, prioritizing high-value or high-throughput classes of supply.
2. Update federal labeling standards — MIL-STD-129R, Military Marking for Shipment and Storage, and Defense Federal Acquisition Regulation Supplements (DFARSs) — to pRFID specifications that use Gen3, the EPCglobal ultra-high-frequency Class 1 Generation 2 RFID standard, for interoperability.
3. Extend tagging requirements across federal agencies so suppliers tag once, and data flows seamlessly.

The outcome will be a common language of logistics that will fuse commercial precision with military purpose.

Case Studies in Action

West Point CUF Pilot: At the U.S. Military Academy's CUF, dry-cleaning-survivable pRFID tags were embedded into garments. Fixed readers inventoried 99 uniforms in two seconds, saving 274 labor hours annually while achieving complete lifecycle visibility. Soldiers and civilians alike reported faster workflows and greater accountability.

DLA: At the enterprise level, DLA's integration of pRFID into supply operations demonstrated scalable results. Tag costs dropped toward $0.05 each, and handheld reader kits under $6,000 per site yielded 70% inventory time reduction and 98% accuracy. Together, these pilots prove that automation at scale is achievable and affordable.

Ms. Sydney Smith, Director of Supply Policy, stated, "The success of item-level pRFID integration at West Point's CUF and within DLA supply operations clearly highlights the technology's potential to enhance accountability and efficiency across the Army sustainment enterprise. Supply Policy is committed to supporting the implementation of these technologies, specifically through the harmonization of labeling standards and strategic selection of NSNs for item-level tagging. Our focus remains on maximizing the benefits of pRFID to provide our Soldiers with the best possible equipment and support, while simultaneously improving the stewardship of Army resources."

The Way Ahead: OSW Integration and Federal Standards Alignment

True modernization demands synchronization across strategy, policy, and practice. The Deputy Chief of Staff, G-4, and EBS-C must serve as the bridge from pilot innovation to enterprise implementation. pRFID's value compounds when data feeds directly into enterprise analytics, enabling commanders to anticipate needs rather than react to shortages. By linking TWI-derived insights to federal standards, the Army can influence government-wide policy reform. Updating MIL-STD-129R and DFARS to codify Gen3 interoperability will create an unbroken chain of data across suppliers, depots, and tactical nodes, eliminating redundancy and strengthening accountability.

Strategic Application: Fort Leavenworth pRFID Pilot

Army correctional facilities such as the U.S. Disciplinary Barracks and the Midwest Joint Regional Correctional Facility represent an untapped frontier for item-level visibility. These sites manage a wide range of equipment and resources, including uniforms, medical supplies, and tools used in textile shops and dining facilities. Implementing a closed-network pRFID system would enable real-time tracking of items and equipment, mapped to facility layouts. This system would provide commanders with enhanced operational awareness by tracking resource movement aligned with established workflows, enabling improved accountability, operational efficiency, and safety. The same principles driving OCIE accountability can ensure compliance and safety in corrections operations, demonstrating that sustainment precision strengthens security and readiness.

Risk, Reality, and Contested Logistics

pRFID is not a silver bullet, but it is a proven foundation for sustainment modernization. As the Army prepares for distributed, multi-domain operations, contested logistics will be the rule, not the exception. In such environments, manual systems collapse first. Automated item-level visibility ensures that sustainers can act with confidence even when networks degrade.

In tomorrow's contested fight, precision sustainment will decide whether readiness is maintained or lost in the fog of logistics.

LTG Heidi Hoyle, Deputy Chief of Staff, G4, stated, "Item-level visibility technologies, like pRFID, are revolutionizing Army sustainment by enabling enhanced asset tracking, predictive maintenance, and optimized resource allocation across the entire supply chain. The strategic implementation of pRFID supports our modernization efforts, ensuring we maintain a competitive edge in contested logistics environments. By leveraging real-time data and automated processes, we can improve operational efficiency, strengthen readiness, and enhance decision making at all levels."

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Featured Photos

Left: "UPS's new package centre in Penang Science Park North enhances services for its customers across the city." (https://www.prnewswire.com/apac/news-releases/ups-opens-new-package-centre-enhances-delivery-services-in-penang-302577762.html)

Right: Representatives supporting the U.S. Army Medical Materiel Agency conduct line-by-line inventory of Class VIII medical supply items and medical equipment at the equipment configuration and hand-off area in Komotini, Greece, during DEFENDER 25, May 19. (Photo by Cameron Porter)

AMMUNITION ON THE MOVE

Answer

You will need to organize a LOGPAC consisting of at least three compartments or vehicles to meet ammunition compatibility requirements. Additionally, one of the vehicles must include two armed guards based on the type and category of ammunition being transported. Below are two example responses:

- **Bulk issue pallet requirement:** 14x pallet positions.
- Consolidated pallet requirements: 7x pallet positions.

Answer 1:

- **Vehicle 1 – Bulk explosives (Compatibility Group D):** M023, M456, M757, M060, M032.
- **Vehicle 2 – Detonators/initiators (Compatibility Group B):** M130.
- **Vehicle 3 – Small arms & simulators (Compatibility Group C, G, S):** M670, A080, A111, A598, L594.

Answer 2:

- **Vehicle 1 (w/Trailer):**
  - **(Truck) Bulk explosives (Compatibility Group D):** M023, M456, M757, M060, M032.
  - **(Trailer) Detonators/initiators (Compatibility Group B):** M130.
- **Vehicle 2:**
  - **(Truck) Small arms & simulators (Compatibility Group C, G, S):** M670, A080, A111, A598, L594.

Analysis

A three-vehicle configuration remains the only arrangement that satisfies explosive-safety compatibility requirements while supporting the operational demands of multiple company training events. Compatibility group assignments were verified using Appendix G of the Yellow Book, which provides standardized hazard classifications for all Department of War ammunition and explosives. These classifications were then cross-referenced against the compatibility tables in Appendix G to determine which items may be transported together and which must be segregated.

The updated tables confirm that all 1.1D items, including bulk demolition charges, detonating cord, and Bangalores may be transported together on a single vehicle. However, 1.4B detonators such as the M130 must remain completely isolated from all 1.1D explosives due to the single-point initiation hazard created when Groups B and D are mixed. In contrast, 1.4S small-arms blanks, 1.4C pyrotechnics, and 1.3G simulators are identified as mutually compatible and may be transported together without violating segregation rules, as they present significantly lower explosive risk and do not trigger the restrictions applied to Groups B and D. These cross-referenced compatibility rules drive the LOGPAC structure: all 1.1D items consolidated on one vehicle, all 1.4B items isolated on a second vehicle, and all 1.4S, 1.4C, and 1.3G items grouped safely on a third.

In addition to compatibility requirements, this configuration also incorporates security considerations. Because the convoy is transporting Category II ammunition and explosives, armed guards must be assigned to the movement in accordance with installation policy and 49 Code of Federal Regulations (CFR) security requirements. While a dedicated escort vehicle is not required, each ammunition-carrying vehicle must have an armed Soldier, or the convoy must include designated armed personnel to maintain positive control and meet security standards. This structure ensures safe movement, reduces regulatory risk, and aligns with 49 CFR transportation standards, Department of the Army (DA) Pamphlet 385-64, Ammunition and Explosives Safety Standards, and standard ASP practices. Below is a breakdown of classification regarding each DODIC:

DODIC	NSN	HCD	UN#	UN DESCRIPTION
M023	1375-01-389-3854	1.1D	0048	CHARGES, DEMO
M456	1375-00-180-9356	1.1D	0065	CORD, DET
M130	1375-01-192-9174	1.4B	0255	ELECTRIC, DET
M757	1375-00-926-3985	1.1D	0048	CHARGES, DEMO
M670	1375-00-028-5246	1.4S	0105	FUSE, SAFETY
M060	1375-00-926-4108	1.1D	0048	CHARGES, DEMO
M032	1375-00-028-5142	1.1D	0048	CHARGES, DEMO
A080	1305-00-005-8005	1.4S	0014	SMALL ARMS, BLANK
A111	1305-00-752-8087	1.4S	0014	SMALL ARMS, BLANK
A598	1305-01-078-4879	1.4C	0338	SMALL ARMS, BLANK
L594	1370-01-557-8527	1.3G	0430	ARTICLES, PYRO

Logistical Takeaway

This knowledge helps logisticians because it ensures ammunition movements are safe, compliant, and efficient. When logisticians understand hazard classes, compatibility groups, and security requirements, they can build load plans that prevent accidents, avoid regulatory violations, and keep training on schedule. It also strengthens coordination with ASP personnel and commanders, since logisticians can clearly explain why items must be separated or secured. In short, it turns ammunition transport from a simple task into a professional, risk-managed sustainment operation that protects Soldiers and keeps missions running smoothly.

In addition to proper compatibility and bulk transportation requirements, distribution elements must consider efficiency of issue when preparing loads. In this scenario, the supported unit S-3 may have prescribed combat configured loads to be delivered to each company. Otherwise, the distributing unit has discretion to configure cargo in the most efficient manner for distribution. Effective units build loads to minimize the number of times cargo must be handled of breakbulk performed. For example, while the A080, A598, and A111 in this scenario may all fit on one pallet, if space permits, the distribution platoon may be wise to split the load across an extra pallet to minimize stacking and unstacking at the logistics release point. Issuing ammunition out of the same package to multiple units also increases accountability challenges. Distribution units must properly prepare and maintain DA Form 5515, Training Ammunition Control Documents, to ensure accurate Class V accountability.

Units must be familiar with and plan missions in accordance with all installation, state, and federal or host nation regulations regarding transportation, storage, and distribution of ammunition.

Featured Photos

Pg 42: Soldier with the 412th Civil Affairs Battalion (Airborne) 240B machine gun at Camp Atterbury, Indiana, Aug. 13, 2025. (Photo by SFC Sarah Zaler)

Pg 65: 77.62 mm round production at Lake City Army Ammunition Plant. (Photo by Dori Whipple)

Deliver the Parts

by Private David H. Poer, Jr.

An Army Reserve supply company has taken on a dramatically expanded mission —and is proving its capabilities.

Editor's Note: This Blast from the Past article was initially published in Army Logistician (the former title of Army Sustainment) in the MAY-JUN 1974 issue. This article highlights that getting published knows no rank.

Until about a year ago, the 988th Supply Company, operating under the 81st U.S. Army Reserve Command, provided direct support on repair parts to three Reserve units. It was an important and mission-oriented assignment but was insignificant compared with what was to come.

In light of the overall drawdown of the Active Army and the increased pace of issuing equipment to Reserve units, a reevaluation of the support being furnished to the Army Reserve by Active Army installations was directed by the Department of the Army. Resulting Department of the Army guidelines state that Army Reserve combat service support units — such as the 988th — should be used as a nucleus for providing additional support.

The idea was not only to save money but to put to even greater use the skills the Reserve units had acquired. A major change in the level of activities of the 988th resulted.

From then on, the unit was to furnish direct wholesale repair parts support to general support and direct support maintenance companies and 11 area maintenance support activity (AMSA) shops serving some 100 Army Reserve units throughout Florida and Georgia.

Some Said It Couldn't Be Done

Some wondered how a company of part-time Soldiers could possibly "get it together" enough to receive and fill the hundreds of requisitions and pack and ship the parts without falling hopelessly behind or getting the orders fouled up beyond recognition.

Those pessimists underrated the 988th. The 250-man company was organized into four teams. One team meets each weekend. Orders for parts are processed 52 weeks a year. One Sunday each month all teams meet as a unit.

Each team is fully capable of processing and filling requisitions and then packing and crating the parts and transporting them to the shipping point.

The all-mobile 988th stores hundreds of line items in vans parked at its Reserve Center in East Dublin, Georgia. Stocked items range from truck tires to firing pins for the M16 rifle. Repair parts for wheeled vehicles, radios and related equipment, and weapons are kept on hand. If mobilized, the company would be able to supply troops in a fluid and highly mobile battlefield environment.

Before the unit's mission was expanded, area maintenance shops sent their requisitions directly to class I Active Army installations. Now they go directly to the 988th. Only if the 988th can't fill the requisition does it go on along to a class l installation.

When the 988th's mission was enlarged, it was able to fill about 25 percent of the requisitions it received. Now it can fill about 75 percent of them. Shops report that they receive the parts they order at least as rapidly as they did when the requisitions went directly to class I installations. The 988th boasts that no order is more than a week old.

Records are kept showing how frequently various parts are ordered. When the demand for a part reaches a certain level, the 988th adds that part to its on-hand inventory. Thus, the unit can satisfy an increasing percentage of requisitions from its own stock.

Area maintenance shops in the 81st Army Reserve Command area, which maintain aircraft and other special items of equipment, do not send requisitions through the 988th since support of those items is not part of the unit's TOE (table of organization and equipment) mission.

The 988th Supply Company's operation has proved that the Army Reserve can serve its own under deadline pressure. They have proved they can deliver the parts.

Private David H. Poer, Jr. was an information specialist in the 81st U.S. Army Reserve Command Headquarters, Atlanta, Georgia.

OVER THE OCEAN

What the Falklands Campaign Can Teach the Army About Emerging Theaters

■ *By LTC Nathaniel A. Rice*

SGT Martin and his team had just finished installing the Chinook's blades aboard the *SS Atlantic Conveyor* at sea about 90 miles north of East Falkland. This grueling task was made all the harder because they were aboard a converted merchant vessel operating on a ship rocking on the waves that was converted only weeks earlier from a commercial container vessel. Because of the limited space, only one aircraft could be launched at any given time, a significant difference from the ample hanger space back in England. Despite this, 19 helicopters and Harrier Jets had already been completed and were on their way to support operations. The soldiers and the sailors of the task force worked long hours under stress, but national pride was on the line. SGT Martin had his mission: the final 10 helicopters needed to depart the ship to support the landings.

As the team prepared to work on the next platform, the nearby *HMS Hermes*' alarm started blaring and chaff shot in all directions. A blast rocked the *Atlantic Conveyor,* throwing the maintenance crew to the deck. Over the next hours, SGT Martin's team was rescued from the burning wreck. Their fleet of helicopters were helpless as the ship slowly listed on its way to its inevitable end: the bottom of the Atlantic.

Operation Corporate, the name for the United Kingdom's (UK's) mission to retake the Falkland Islands from the Argentinians, was not the conflict the UK was expecting to fight. Military restructuring and drawdowns resulting from an

economic downturn and realignment of NATO missions caught UK logisticians between a rock and a hard place. How do you assemble, deploy, and support a task force over a line of communication a third of the circumference of the Earth away, all without local allied or partner support?

The Royal Navy did not have enough ships to conduct such a task. Their active and auxiliary fleets were designed for operations in European waters with a small-scale contingency force used mostly for partnered exercises. Moving a brigade's worth of soldiers was not possible, much less their assigned equipment and basic load. Air transport was not an option; Geopolitics made landing in an adjacent country to assemble and invade impossible. Even airborne insertion was not *avaliable*, with the only feasible airfield base too distant. Bottom line: the Royal Navy could not get the British Army and the Royal Marines to the fight, let alone support them when they got there.

The logisticians of the UK government had open eyes about this problem. Before the first round had been fired by the Argentinian army, commercial shipping to support the task force was already being booked. By the conflict's end, over 50 ships had been taken up from trade, either through contracting or involuntary requisition. These ships performed many duties in the conflict, such as hauling fuel, transporting soldiers, repairing piers, and sweeping for mines. It is not an overstatement to say that, without these ships, the mission would have been impossible. Despite their achievements, use of commercial shipping comes with significant hurdles to operations.

First, commercial shipping is not designed for expeditionary military operations. Most ships of this sort are used exclusively in well-established routes with known support systems and built-up infrastructure. For example, many commercial carriers can only unload at deep water ports and at piers capable of supporting them. Unloading in the open water between platforms presents great risk, while unloading in shallow waters directly to shore is impossible. There were not enough naval carriers available to ferry all the aviation assets needed to the area, so ships like the *Atlantic Conveyor* were significantly altered to stow then launch these craft.

Transfer of supplies and wheeled vehicles occurred via ship-to-ship crane operations, helicopter sling or cargo load, or via Mexeflote rafts. Because the commercial ships were not designed to operate using these methods, transfer of materials was usually slow and risky, making the ship immobile and targetable for long periods of time. Though the *Atlantic Conveyor* was the only UK commercial ship sunk, it was only by combination of chance and clever air defense scheming that others were not hit during the landings.

Second, not just any ship could be requisitioned and used. Sovereign nations pass laws that govern the conduct of the ships registered to their country. For example, if the UK government wanted to contract a Canadian-flagged ship, the Canadian government could refuse the action, either forcing the company to re-register the ship to another country or deny the contract. The same is true for the sailors themselves; countries can pass laws restricting their citizens from crewing ships from other nations. The only notable foreign sailors on UK ships were citizens of Hong Kong, which was then under British control. Luckily, the UK had a significant shipping industry at the time of the conflict and were able to requisition and contract a large fleet and use the waning might of their maritime industry to make alterations quickly.

Third, the variety of ships taken up and the lack of port facilities meant that load planning was a bespoke task. This was exacerbated by the haphazard loadout and supply dumping at each port. Lack of supply was not an issue for logisticians; the entire country mobilized industry and emptied warehouses to ensure any possible provision needed by the task force was sent to the ports of embarkation. However, this rush to provision resulted in disorganized supply dumps at each port. As ships were requisitioned, they were loaded in ways that often made little sense with hindsight. Stores were loaded manually, with some ship holds too small to allow the use of material-handling equipment. Even when ships could handle International Organization for Standardization (ISO) 20- or 40-foot containers, the lack of port facilities in forward areas made the use of those containers impossible. Ships typically could transfer and move only pallet-sized objects or boxes, about the same as the ubiquitous tri-wall container used today in many warehouses.

This resulted in loads being handled two or three times prior to final configuration, expending significant time and man hours. Some materials became lost or unreachable, making them unavailable for distribution. Significant material was eventually just sent back to the UK despite being needed by ground forces.

These experiences can provide lessons for operations in the U.S. Indo-Pacific Command (USINDOPACOM) area of responsibility (AOR). There are obvious strategic implications to contracting or requisitioning shipping. Does sufficient American-flagged shipping exist with American sailors to forestall any lack of international support? Will requisition of shipping impact domestic economic support, especially to Puerto Rico, Hawaii, and Alaska? Will our domestic ports have enough capacity and a workforce ready to support? Will shipbuilders be able to cope with alterations, new construction, and repairs?

There are also tactical and operational considerations and lessons that can be learned and translated into doctrine and techniques in the near term to reduce friction.

First, Army logisticians and aviators can conduct training and exercises with civilian shipping to gain experience and lessons learned for contemporary operations. Pacific Pathways, a contemporary training exercise in USINDOPACOM, regularly exercises the Army's capability to deploy via commercial means to the area of interest. However, the shipping portion of these exercises is often done via carriers that conduct port-only operations, similar to the operational environment we experienced in Operation Iraqi Freedom offloading in Kuwait.

Use of port facilities likely will not be possible in an island-hopping campaign. Ports are prime targets and are sure to be damaged or destroyed, especially if they are near adversary nations, and some islands simply do not have facilities that can handle standard commercial shipping. The Falklands are a prime example of this. Their jetty was, even in peacetime, unable to offload significant cargo. Even where Army and Navy ships are handling ship-to-shore operations, commercial shipping will be required to resupply these forward elements. During Operation Corporate, the majority of ships taken up from trade were replenishing Royal Navy logistics ships in open water or ferrying equipment to the combat area for distribution via crane, air, or Mexeflote raft. Practicing both ship-to-ship and ship-to-shore operations without port infrastructure will be vital for open water supply chain maintenance.

This exercise must be centered around open ocean transfer of tactical units, preferably involving an infantry assault force and aviation elements. As a part of a future Pacific Pathways, U.S. Transportation Command (USTRANSCOM) could requisition a commercial ship with the intent to conduct alterations to make it suitable for operational deployment. This will undoubtedly be a difficult and slow task, but one that will generate incredible lessons learned and institutional knowledge. It will also demonstrate capability, resilience, and improvisation.

Second, port operations and supply organization for load planning must be trained and practiced as a primary outcome by combat units. Unit logistics training often occurs as a consequence of supporting combat arms training, such as gunnery or force-on-force maneuvers at a training center. Though this training is sufficient to ensure direct support to combat arms operations in a maneuver setting, it does not train all the competencies that we require of Soldiers in a port setting. If a unit organizes stores inappropriately, such as mixing hazardous material (HAZMAT) that is not compatible or exceeding net explosive weights, this can result in severe port delays or the destruction of ship and stores and death of personnel. This was a factor for the British Army. As they were organizing and loading ships, several loads were refused by requisitioned ships due to HAZMAT incompatibility, causing both frustration of cargo and critical material to be left behind.

Additionally, training must enable Soldiers to create loads that

can be handled outside the ISO container context. Certain ship cargo holds do not allow for the use of containerization, nor would offloading without port facilities allow it. When deploying, the British Army used ships such as the *Queen Elizabeth II* cruise ship, necessitating the hand storage of materials in every type of room that a cruise ship offers. Training that creates lessons learned and tactics, techniques, and procedures to account for non-standard stowage in these cases will reduce the risk of handling supplies multiple times or losing control of them due to supply loss due to inaccessible storage.

Though this kind of training can be combined with Pacific Pathways, it can also be a separate event, accomplished at a much lower cost with options to do it at local installations. Focused training such as this will not only build unit and individual competencies but create institutional memory and best practices for future operations. Modern ports no longer employ longshoremen in the numbers they did during the 1970s and 1980s, nor do they specialize in manual loading of ships as they did before the ISO container era. There is no reason to believe that such labor will be available to our forces in the future, so the use of unit manpower to conduct this task is the likely outcome. Partnering with industry to inspect loads and plans to ensure compliance with safety requirements and best practices would add realism to this line of effort.

Third, USTRANSCOM, the Surface Deployment and Distribution Command, and Military Sealift Command must conduct engineering surveys of commercial shipping in anticipation of future requisition and alteration requirements. These organizations track all American-flagged shipping, in coordination with the Department of Transportation. As of January 2023, 153 militarily useful ships existed in the U.S. fleet, 62 of which were container ships. Many of these ships are enrolled in the Maritime Security Program, where the Federal Government provides a stipend to ship owners to remain flagged to the U.S. and under a state of acceptable readiness for requisition in times of national emergency.

No two of these ships are exactly alike, but many have significant similarities. The survey of one ship, such as would be done for the Pacific Pathways exercise, would provide key insights into other ships as well. These surveys need not significantly interrupt commercial operations. Most of the work could be done with ship blueprints or by doing what the British military did: embedding engineers while underway to conduct surveys.

These surveys would inform material preparation for such alterations as well. Long-lead-time items, such as power transformers, radio support equipment, or crane motors, could be either pre-purchased and warehoused or or secured through a contingency contract with a vendor. Contracts could be laid with shipbuilding companies to conduct contingency alterations and repairs, providing contractors with predictability.

In total, around 10,000 British soldiers and marines were put ashore for ground combat action in the Falklands. To support their efforts, an additional 18,000 military and civilian personnel were mobilized, sailing over 110 total ships, and flying over 80 aircraft. The distance of the theater of operations paired with the complex operational and tactical problem magnified an already complex distribution problem. For every logistics landing ship employed, at least one dry stores ship needed to be contracted. For every warship, at least one tanker needed to be requisitioned. For every brigade transported, at least one passenger liner needed to be taken up.

Any potential combat in the USINDOPACOM AOR will likely require mass force projection, perhaps on an order of magnitude larger than the UK experienced with the Falklands. While USTRANSCOM and the Army cannot affect the size of the shipping fleet available in the short term, adopting lessons from the Falklands can provide capability and readiness gains to operate with the fleet we have.

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Featured Photo
Wessex helicopter ferrying supplies to East Falkland in the absence of proper port facilities. (Photo by Kenneth Ian Griffiths, public domain)

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