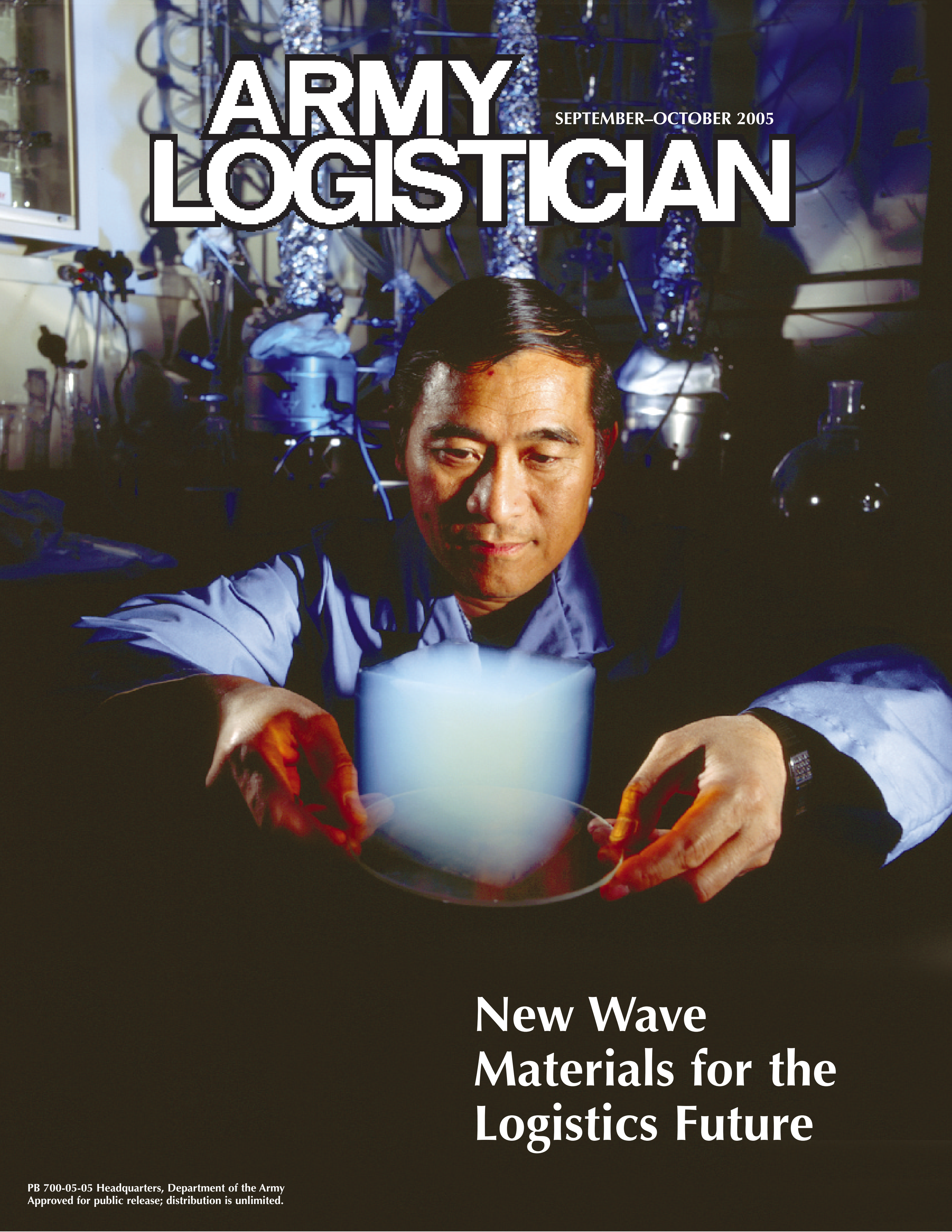
ARMY LOGISTICIAN

SEPTEMBER–OCTOBER 2005



New Wave Materials for the Logistics Future

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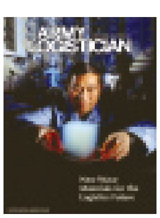

Cover: Research at the atomic, molecular, and photonic levels is producing new materials that hold the promise of revolutionary changes in Army equipment and capabilities. One of these materials is aerogel, a substance that is 99.38 percent air yet can hold 4,000 times its own weight. In the cover photo, a scientist at the National Aeronautics and Space Administration's Jet Propulsion Laboratory at the California Institute of Technology examines a sample of this "frozen smoke." The article beginning on page 24 discusses aerogel and other materials that may profoundly affect the future of Army logistics. (Courtesy NASA/JPL-Caltech.)

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ALOG NEWS

LOG CROP FUNCTIONS INTEGRATED IN GLOBAL COMBAT SUPPORT SYSTEM

The latest release of the Global Combat Support System (GCSS), version 4.2, integrates the functions of the Logistics Common Relevant Operational Picture (Log CROP) so that the user now has a "watchboard" application in the GCSS environment. [A watchboard is a digital dashboard that facilitates the display and review of information.] This application allows the joint task force commander to define thresholds for critical supply items and alerts him when there are changes to the threshold. The watchboard does not mirror Log CROP, but its capabilities are in accordance with the watchboard functional requirements document approved by the combatant commands and Joint Staff and, in fact, include more functionalities than Log CROP.

Log CROP was a prototype watchboard capability developed by the J–9/Logistics Transformation, U.S. Joint Forces Command (JFCOM), to provide the commander with the ability to monitor critical assets. The watchboard also was a requirement of the Joint Theater Logistics advanced concept technology demonstration (ACTD), for which JFCOM was the functional proponent. ACTDs deemed to have military utility normally are targeted to be integrated into an operational environment or system.

The watchboard application is the result of an agreement between JFCOM and the GCSS Combatant Commanders/Joint Task Force (GCSS CC/JTF) Program Management Office. GCSS (CC/JTF) is a Secret Internet Protocol Router Network (SIPRNet) Web-browser capability currently accessible by all combatant commands, their service components, and the Joint Staff J–4. Access to GCSS (CC/JTF) requires a SIPRNet public key infrastructure (PKI) and a GCSS account. A user may request access to the GCSS portal from the J–4 at each combatant command.

ARMY FIELD SUPPORT COMMAND UNITS ESTABLISHED IN EUROPE AND IRAQ

The Army Materiel Command (AMC) has redesignated five Europe-based combat equipment units as field support units and established a new field support brigade and subordinate battalion in Iraq.

In a 1 June ceremony, two field support units in Iraq were named. The former AMC Logistics Support Element-Iraq was replaced by the Army Field Support Brigade-Iraq, and the former Equipment Support Activity-Iraq Zone became the Army Field Support Battalion-Iraq. General Benjamin S. Griffin, AMC commander, referred to the new brigade and battalion as the Army's 911 capability—able to respond immediately and deliver logistics power wherever and whenever joint forces require.

In a separate ceremony on 24 May at Hammonds Barracks in Seckenheim, Germany, combat equipment battalions in Livorno, Italy; Bettembourg, Luxembourg; Eygelshoven, The Netherlands; and Hythe, England, were named as field support battalions under the Army Field Support Brigade-Europe (AFSB–E). At the same time, a combat equipment base at Rhine Ordnance Barracks, Germany, became a field support company. The new units, the first of their kind, were reshaped to enable them to provide more effective support to expeditionary fighting forces.

General Griffin told the gathered troops and guests that "You are leading the effort in AMC and setting the standard." He added that AFSB–E and its subordinate units are on the "tip of the transformation spear," harnessing acquisition, logistics, and technology in a way that will improve support to combat forces.

WARGAME TESTS JOINT LOGISTICS (DISTRIBUTION) CONCEPT

A wargame to support development of the Joint Logistics (Distribution) Joint Integrating Concept (JIC) was successfully conducted from 16 to 19 May. [For more information on the Joint Logistics (Distribution) JIC, see the article "Developing a Concept for Joint Distribution" in the July–August 2005 issue of *Army Logistician*.]

The wargame's objectives were to provide a venue for joint, service, and Department of Defense (DOD) input; review and modify (where appropriate) supporting tasks, conditions, and standards to support a capabilities-based assessment; test and evaluate the concept against the illustrative scenario and concept of operations; and analyze the consistency of the concept's "fit" within a major combat

(ALOG NEWS *continued on page 45)*

Improving Tactical Trucks for the Future

BY MAJOR RICHARD L. HARRIS, JR.

Future Tactical Truck System Maneuver Sustainment Vehicle.

The Army's Tactical Wheeled Vehicle (TWV) Modernization Strategy focuses on supporting the Army at war while simultaneously preparing for future challenges. These dual goals are pursued through the TWV Fleet Modernization and Future Tactical Truck System (FTTS) Advanced Concept Technology Demonstration Program, which is the Army's plan to expedite the insertion of product improvements into the current fleet as well as to develop future tactical wheeled vehicles. This program will result in vehicles—improved current Army TWVs and the FTTS—that are highly reliable, safe, survivable, affordable, and easily maintained.

The TWV Fleet Modernization program includes the recapitalization and refit of existing TWVs by continuously integrating new technologies as they become available to enhance the vehicles' survivability as well as improve Army distribution, force sustainment, and network centricity. The modernization program is designed to maintain TWVs that are viable and modern over their effective lifespans by maintaining accurate visibility of the health and mortality of the TWV fleet, leveraging the use of commercial truck technologies, modernizing the supply of spare parts, recapitalizing TWVs, producing new vehicles, and integrating TWV fleet requirements and decision processes with the other armed services.

The FTTS is being built to support Future Force units equipped with the Future Combat Systems (FCS). The plan is to produce FTTS demonstrators in fiscal year 2006 for a military utility assessment.

Key Attributes of Improved TWVs

The TWV Fleet Modernization program will result in TWVs with increased reliability, safety, survivability, affordability, and maintainability.

Highly reliable. Significant improvements in reliability will reduce supply needs and the in-theater maintenance footprint dramatically. In recent years, the commercial automotive industry has produced vehicles with significantly greater improvements in vehicle reliability than the Army's TWVs and without major increases in their product development costs. These companies have abandoned the practice, still used by the Army, of specifying and testing to statistically based reliability requirements. Instead, the automotive industry substitutes mandatory design practices and product assessments that are based on rigorous identification and mitigation of all known failure modes of each component and automotive system as it is developed (but before production contracts are negotiated). Elimination of all failure modes then is confirmed by preproduction testing of components and systems.

It also is standard commercial practice to collect data on why components fail (through dealer warranty programs) rather than rely on the current Army practice of collecting data only on the supply demand for components. By enhancing its failure-mode data collection and source-selection practices, the Army should be able to make improvements in TWV reliability that are comparable to those achieved by the automotive industry.

Safe. Application of emerging safety systems will significantly counter hazards that can be created unintentionally by new tactics, techniques, and procedures (TTPs) for convoys. These new TTPs include increased convoy speeds, decreased distances separating vehicles in convoys, and sustained, high operating tempo of logistics units. Emerging safety systems that can help reduce hazards include easier-to-engage passenger restraint systems, brighter vehicle headlights, more durable light-emitting diode (LED) lights, enhanced night vision, and active anti-roll capabilities (such as those extensively used in commercial sport utility vehicles with antilock brakes).

Survivable. Armor protection and weapon mounts are subsystems of the TWV fleet. Use of lightweight armor is one potential solution to the problem of ensuring current and future TWV armor protection. Lightweight armor, such as ceramics and high-strength fibers, could provide high levels of protection without placing an extreme weight burden on the vehicle. Use of modular, reconfigurable, composite armor and gun mounts will provide commanders flexibility to adapt to changing threats and mission requirements. By installing armor-system attachment brackets, framework, and armor panels in hard-to-access locations in their vehicles, vehicle operators could convert from an armored to an unarmored configuration in minutes without having to use special tools; they also could avoid having to carry the greater weight imposed by armor during those times when their vehicles do not need armor. This would maximize operational flexibility and eliminate the need to predetermine the level of armor protection of brigade combat teams.

Affordable. Affordability is computed across the life cycle of the future TWV fleet. It can be improved in several ways: by maintaining or reducing the current, inflation-adjusted average unit production costs of currently produced vehicles; keeping recapitalization costs under 75 percent of the cost of a new vehicle while doubling vehicle life and improving vehicle reliability, safety, and maintainability (resulting in lower annual operations and support costs); minimizing the number and variants of trucks and trailers with unique components and parts; and including life-cycle cost estimates in source selection criteria.

Easily maintainable. The Army's goal is to reduce the time needed to complete all field maintenance actions at the technical manual –10, –20, and –30 levels to less than 30 minutes. This will be accomplished by using fewer tools and relying on built-in diagnostics, minimum required maintenance training, and enhanced real-time vehicle maintenance management through the use of wireless vehicle-health monitoring.

FTTS

The National Automotive Center is working with industry to develop prototypes for the new FTTS. The FTTS program is focused on the development of a Capabilities Production Document for future truck acquisitions. The effort will look at two variants: the maneuver sustainment vehicle (MSV), which addresses the current families of medium and heavy tactical vehicles, and the utility vehicle (UV), which addresses the current family of light tactical vehicles. Both vehicles will provide direct support for the distribution of cargo, equipment, and personnel as well as command and control operations. Although there are only two FTTS variants, both will be able to transport varied mission modules (such as bulk fuel, water, ammunition, cargo, and personnel).

Each FTTS variant will provide greatly enhanced crew protection by incorporating integral, modular armor combined with advanced hit-avoidance and signature-management technologies. Integrated and embedded command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems will allow operators to maintain tactical situational awareness and report their position locations, status, and onboard cargoes for in-transit asset visibility.

The FTTS will explore technologies that could help reduce the logistics footprint and operations and support costs by greatly improving reliability, onboard prognostics and diagnostics, and fuel efficiency and by virtually eliminating materiel-handling requirements on the battlefield. The FTTS also will explore technologies that could optimize the Army's distribution system by integrating an onboard, intelligent load-handling system and using modular, intermodal platforms (flatracks) to create an intermodal interface with the C–130 transport and other modes of transportation. Ultimately, the FTTS will deliver those platforms directly to the FCS without exposing crews to hostile fire during the critical period of resupply. While current legacy vehicles have an average operational range of 300 miles on a single tank of fuel, the operational range required for support to Future Force units in the battlespace will be 450 to 900 miles, depending on the area of operations.

The TWV Modernization program and the FTTS Advanced Concept Technology Demonstration culminate at the end of fiscal year 2006 with a tactical wheeled vehicle rodeo (in the third quarter) and an FTTS military utility assessment in the Stryker brigade combat team (SBCT) at Fort Lewis, Washington (in the fourth quarter). The TWV rodeo will demonstrate product-improved and new designs for tactical vehicles and trailers. The SBCT assessment will be a prototype demonstration that will focus on the military utility of two MSV demonstrators and two UV demonstrators. The results will allow senior leaders to assess the operational effectiveness of the fleet in achieving program objectives. The result will be a determination on the ability of the future TWV fleet to support modular and Future Force maneuver sustainment and support operations. **ALOG**

Major Richard L. Harris, Jr., is the Future Tactical Truck System materiel combat developer and user representative in the Directorate of Combat Developments for Transportation at the Army Combined Arms Support Command at Fort Lee, Virginia. He has an M.B.A. degree from William Carey College in Mississippi and is a graduate of the Field Artillery Officer Basic and Advanced Courses, the Combined Arms and Services Staff School, and the Army Acquisition Officer Basic Course.

Field Maintenance Shortfalls in Brigade Support Battalions

BY CAPTAIN JAMES B. SWIFT

During peacetime, FSBs and BSBs do not have enough maintenance personnel to meet maintenance requirements. The author suggests augmenting the battalions with civilian mechanics to alleviate this shortfall.

In garrison, units are required to maintain an equipment operational readiness (OR) rate of 90 percent. This is nearly impossible because not enough mechanics are available in garrison to perform the required maintenance and needed repairs of their vehicles. This personnel shortage exists because authorizations are based on wartime requirements. In wartime, Soldiers work longer days than in peacetime, 7 days a week, and they do not have the personal time off for weekends, Federal holidays, and training holidays or the time off for physical training and mandatory training that Soldiers in peacetime garrisons have.

A study of military occupational specialty (MOS) 63B (light-wheel vehicle mechanic) workloads in the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky, confirmed the shortage of mechanics in peacetime. This was true not only of legacy forward support battalions (FSBs) but also of transformed brigade support battalions (BSBs). Lack of sufficient personnel to meet peacetime maintenance requirements is a significant issue that the Army needs to address as it transforms.

Maintenance Transformation

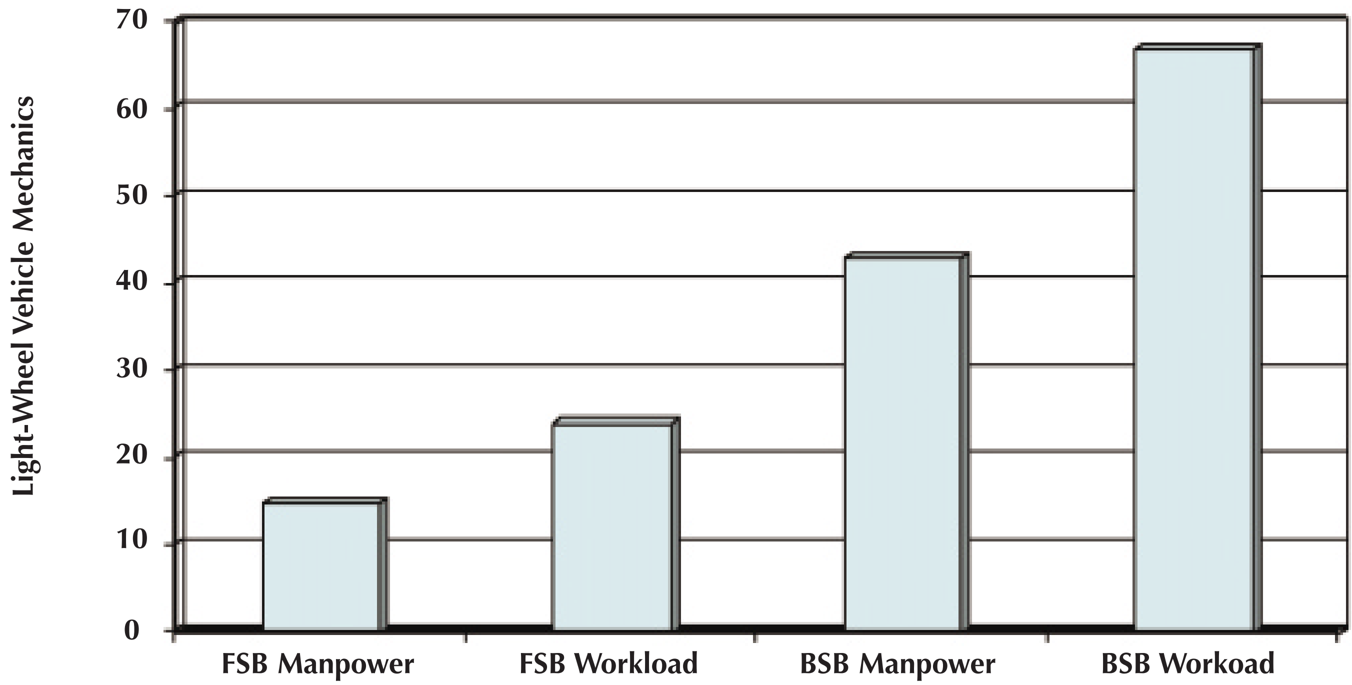
In January 2004, the Chief of Staff of the Army, General Peter J. Schoomaker, directed the Army to transform its 10 divisions into more than 40 modular, stand-alone units called units of action (UAs) [now referred to as brigade combat teams (BCTs)]. The plan called for several different types of UAs, including infantry, aviation, fires (artillery), and sustainment. This concept required that each UA have the ability to operate independently and self-sustain. Self-sustainment would be provided by an organic, multifunctional combat service support unit—the BSB.

> Force management and change have always been inseparable. However, the pace of changes in organizational orientation, technological advances, the rapid introduction of new systems, and the requirement for flexibility in priorities, has created an unprecedented fluidity in force management procedures, processes, and information.
>
> — Army Regulation 71–32, Force Development and Documentation-Consolidated Policies

The BSB would provide the following core services: water production and storage; requisition, distribution, management, and storage of all classes of supply; mortuary affairs; transportation; combat health support; and most direct support (DS) and below maintenance.

Maintenance transformation changed the legacy four-level system (unit maintenance, DS, general support, and depot maintenance) to a two-level system (field maintenance and sustainment maintenance). The legacy unit maintenance and DS maintenance functions were combined and now are conducted at the unit level. Thus, the term "unit maintenance," which is used to describe the first level of the legacy system, is also used interchangeably with the new term, "field maintenance," when comparing FSB and BSB structures. To accommodate the new two-level maintenance system, the Army Materiel Command is updating the maintenance allocation charts found in the technical manuals of all wheeled systems. In the meantime, one can assume that all tasks previously considered DS are now performed at the field maintenance, or unit, level.

FSB–BSB Sample Annual Manpower/Workload Comparison



Maintenance Personnel Shortfall

The 101st Airborne Division study analyzed MOS 63B workloads for 10 critical vehicles. It found that annual 63B workload requirements were resourced during peacetime at less than 66 percent for legacy FSBs and 73 percent for transformed BSBs. This means that the FSBs and BSBs do not have enough mechanics to maintain organizational equipment at the required 90 percent OR rate. (Note that the study included only 10 vehicle types and did not include all vehicles that 63B mechanics are required to maintain, so the actual percentages of personnel available to complete required maintenance on all vehicles will be lower.)

Army Regulation (AR) 570–4, Manpower Management, indicates that each maintenance Soldier in garrison is available 116 hours a month. However, authorization documents, which are driven by minimum mission-essential wartime requirements, indicate that each Soldier would have to be available 269 hours per month to meet unit maintenance requirements. Thus, a maintenance Soldier in garrison is available less than half of the time needed to meet the required OR rate.

Force Development Process

The Manpower Requirements Criteria (MARC) is a collection of designators used by requirements document developers to determine the number of personnel, by MOS, needed to complete certain duties in a specific unit. Maintenance personnel requirements based on the MARC usually translate directly into the requirements documents without decrement. MARCs are based on the following crucial parameters—

- What is the unit's mission?
- In what battlespace is the unit located?
- Does the unit move?

The MARC used for a BSB is 31A: 3 represents a combat service support unit, 1 means that it is in the maneuver brigade's battlespace, and A means that it moves frequently.

A U.S. Army Europe availability study conducted in 1992 produced an annual MOS availability factor

> The formula used to determine the manpower requirement for a given MOS:
>
> $$(A \times B) \div C = R$$
>
> Where:
> A = Productive man-hours required per work unit (AMMDB data)
> B = Number of work units (equipment quantity from TOE)
> C = AMAF
> R = Manpower requirement

Legacy FSB AMMDB Values

LIN	Nomenclature	Organization/ Unit Rqmt	Direct Support Rqmt	Field Rqmt	Sustainment Rqmt	Number of Items Authorized	Annual Total Rqmt (Hours)	Annual Cap (Peace)	Annual Cap (War)	Annual Shortfall Excess (Hours)
T40999	M1074 PLS	228.76	54.46	N/A	N/A	3	686.28			
T93761	PLS trailer	66.92	54.46	N/A	N/A	3	200.76			
T87243	2,500-gallon HEMTT fueler	393.40	100.80	N/A	N/A	4	1,573.6[1]			
T73347	10K RTFL	1,218.00	322.00	N/A	N/A	7	8,526.00			
T49255	4K RTFL	1,216.60	317.80	N/A	N/A	3	3,649.80			
T60081	LMTV 4x4	321.02	77.98	N/A	N/A	25	8,025.5			
T61494	¾-ton HMMWV	235.06	70.98	N/A	N/A	32	8,097.90			
T61908	MTV cargo truck	354.06	99.96	N/A	N/A	0	0			
T95992	HMMWV trailer	127.96	21.98	N/A	N/A	14	1,791.40			
T96564	LMTV trailer	160.02	27.02	N/A	N/A	0	0			
							32,551.2[2]	**19,488**[3]	**45,200**[4]	**Peace (13,063.2) War 12,668.8**

Notes:

1 FSBs not authorized any HEMTT fuelers but had four on hand.
2 Excludes all other ground systems except LINs listed above; includes only organizational maintenance requirements.
3 Assumes 14 63Bs x 116 hours per month x 12 months per year.
4 Assumes 14 63Bs x 3,230 hours per year each.

Legend:

HEMTT = Heavy, expanded mobility tactical truck
HMMWV = High-mobility, multipurpose, wheeled vehicle
LIN = Line item number
LMTV = Light medium tactical vehicle
MTV = Medium tactical vehicle
PLS = Palletized load system
Rqmt = Requirement
RTFL = Rough-terrain forklift

(AMAF) of 3,230 hours for an MOS 63B Soldier belonging to a unit with a MARC of 31A. This figure computes to an availability of 62.12 hours per week per Soldier. The same AMAF is designated for a BSB in AR 71–32, Force Development and Documentation-Consolidated Policies, which defines minimum mission-essential wartime requirements.

AR 570–4 attempts to reconcile some of the differences among minimum mission-essential wartime requirements and the realities of day-to-day availability of maintenance personnel in garrison. These differences are of special concern to maintainers. For instance, the mission availability factor of 116 hours a month noted in this AR equates to about 29 hours per week, or 1,392 hours per year, compared to the AMAF of 62.12 hours per week, or 3,230 per year. The chart on page 5 illustrates FSB and BSB manpower versus workload requirements in garrison.

Another important aspect of the force development process is the Army MARC Maintenance Database (AMMDB) value for each item of equipment, by line item number (LIN), for which the unit maintenance and DS requirements are identified. Although unit maintenance and DS requirements are listed, only unit maintenance requirements were included in the final computation of the 101st Airborne Division study because legacy FSBs are still operating under the four-level maintenance management model. Furthermore, the AMMDB no longer includes separate workload data for MOSs 63B, 63S, and 63W because the three MOSs have been consolidated and 63S and 63W no longer exist. Therefore, it is impossible to determine maintenance workloads that existed for these MOSs before the maintenance transformation began.

AMMDB Values Analysis Summary

The tables above show one thing clearly: FSBs and BSBs do not have enough 63Bs to maintain ground wheeled systems properly in garrison. Reducing the total annual maintenance man-hour requirement of 32,551.2 by 10 percent to account for the 90 percent OR rate required by AR 220–1, Unit Status Reporting, leaves FSBs with an annual requirement of 29,296.08 hours but a capability of only 19,488 hours, which

BSB–FSB AMMDB Values

LIN	Nomenclature	Organization/ Unit Rqmt	Direct Support Rqmt	Field Rqmt	Sustainment Rqmt	Number of Items Authorized	Annual Total Rqmt (Hours)	Annual Cap (Peace)	Annual Cap (War)	Annual Shortfall Excess (Hours)
T39518	Cargo truck	394.1	102.2	None	None	0	496.30			
T96496	Cargo truck	228.76	54.46	None	None	33	9,346.3			
T93761	PLS trailer	66.92	54.46	None	None	33	4,005.5			
T58161	2,500-gallon HEMTT fueler	394.1	101.8	None	None	11	5,454.9			
T73347	10K RTFL	1,218	322	N/A	N/A	7	10,780.0			
T60081	LMTV 4x4	321.02	77.98	N/A	N/A	40	25,033.1			
T61908	MTV cargo truck	354.06	99.96	N/A	N/A	17	7,718.3			
T61494	¾-ton HMMWV	235.06	70.98	N/A	N/A	59	18,056.4			
T95992	HMMWV trailer	127.96	21.98	N/A	N/A	50	7,497.0			
T96564	LMTV trailer	160.02	27.02	N/A	N/A	22	4,114.9			
							92,502.7[1]	**61,248**[2]	**142,120**[3]	**Peace (31,254.7) War 49,617.3**

Notes:

1 Excludes all other ground systems except LINs listed above; includes organizational and DS maintenance requirements.

2 Assumes 4 63Xs (vehicle maintenance supervisors) and 39 63Bs x 116 hours per month x 12 months per year.

3 Assumes 4 63Xs and 39 63Bs x 3,230 hours per year each.

yields an annual shortfall of 9,808.08 hours. The FSB AMMDB Values Table includes only a sample of the wheeled systems in the FSB, and the manpower still is woefully short. Note that only organizational workload requirements are included in this example.

The results of the computations on the BSB–FSB AMMDB Values Table are similar to those on the Legacy FSB Values Table. After reducing the total annual requirement by 10 percent to account for the 90 percent OR rate, the BSB had an annual shortfall of 22,004 hours. The main difference in the two tables is that the BSB–FSB AMMDB Values table includes both unit maintenance and DS workloads because of the transition from a four-level maintenance model to two-level maintenance.

Shortfall Solution

All BSB leaders throughout the Army need to review their modification tables of organization and equipment (TOEs) and compare the AMMDB values with their authorized 63B strengths. Then those leaders must request augmentation tables of distribution and allowances to bridge the maintenance manpower shortfalls in garrison. An augmentation TDA puts civilian mechanics in the motor pool to help meet the maintenance requirements. For example, assuming 50 productive weeks per year and 40 hours of productive labor per week, each BSB in the 101st Airborne Division needs 11 full-time civilian equivalents.

With current allocations, BSBs will not be able to meet their maintenance requirements in garrison. The Army must correct this deficiency in order to maintain a current and ready force. Using civilian mechanics to augment the military is one viable solution to this problem. **ALOG**

Captain James B. Swift is an action officer in the Collective Training Directorate of the Combined Arms Center at Fort Leavenworth, Kansas. He has a B.S. degree in biology from Truman State University in Missouri, an M.S. degree in healthcare administration from Central Michigan University, and an M.S. degree in logistics from the Florida Institute of Technology. He is a graduate of the Combined Logistics Officers Advanced Course and the Army Logistics Management College's Support Operations Course, Multinational Logistics Course, Joint Course on Logistics, and Logistics Executive Development Course.

The author wishes to thank Lieutenant Colonel Duane Gamble, Major Kirk Whitson, and Major Spencer Smith for their assistance in conducting the study on which this article is based.

Resetting the FMTV

BY GILBERT J. DURAN

The Army Tank-automotive and Armaments Command Reset Program refurbishes FMTV trucks returning from Afghanistan and Iraq.

Family of medium tactical vehicles (FMTV) trucks serve as the prime transporters of Soldiers and equipment. These wheeled vehicles are well built, reliable, and capable of meeting the needs of the combat Soldier in any environment. FMTV variants provide a wide array of capabilities, including recovering vehicles and weapon systems; hauling earthmoving equipment, soils, and aggregates; and transporting troops and supplies. The FMTV chassis also serves as the platform for weapon systems such as the High-Mobility Artillery Rocket System (HIMARS).

The FMTV has been subjected to extreme battlefield tests by U.S. forces in Afghanistan and Iraq. The trucks are used daily to conduct resupply, recovery, and other combat support missions. During these operations, the vehicles are subjected to intense heat, windstorms, rocket-propelled grenades, controlled improvised explosive devices, and small arms fire. FMTV trucks have far exceeded expectations and have maintained the highest readiness rate of any vehicles in the Army's fleets.

Redeploying Vehicles

Before units redeploy to their home stations, they conduct standard preventive maintenance checks and services on their vehicles to determine what repairs are needed to return the vehicles to a state of operational readiness. Although many Army installations have direct and general support maintenance service capabilities, redeploying units have found that damage to the vehicles caused by combat and extended use often requires depot-level repairs, such as replacing bent frame rails, completely rebuilding cabs, and overhauling engines and power train components.

Reset Program

The need for depot-level repair of returning vehicles led to the development of the Army Tank-automotive and Armaments Command (TACOM) Reset Program. A $16.9 million contract with Stewart & Stevenson Tactical Vehicle Systems, Limited Partnership (TVS), requires the company, the original equipment manufacturer, to overhaul and refurbish selected vehicles to

This M1081 standard cargo low-velocity-airdroppable truck needs considerable repair when it arrives at the reset facility.

The first step in the repair process is to remove the cab and engine.

their original condition within 100 days of their arrival at the FMTV reset facility. The short turnaround time allows Army units to regain their equipment quickly and restore their units to a deployable status.

Battle-worn and damaged trucks began arriving at the TVS facility in Sealy, Texas, during late winter of 2003 and early spring of 2004. (Items that could be replaced at the unit level, such as seats, doors, and mirrors, had been replaced by the unit before the vehicle was sent to reset.) Joint inspections were conducted by the contractor and the Defense Contract Management Agency (DCMA) quality assurance representative, parts were ordered, and the teardown process began. As more trucks arrived, the lists of needed items were revised. Representatives from the TACOM Reset Program Office, the office of the TVS Project Manager, and DCMA conducted weekly program-update meetings to ensure the Reset Program's effectiveness.

Repair Process

The initial assessment of the first 40 trucks found major damage to frame rails and cabs and missing or damaged transmissions, engines, and axles. TVS assembled a select group of mechanics and designated a functional work area for inspecting, tearing down, and rebuilding the trucks. Although the work process was slow at first, it gained momentum, and the trucks were returned by the required deadline.

The contract required that certain items, including starters, air compressors, hydraulic fittings, radiators, shock absorbers, seals, wiper blades, mud flaps, and odometers, be replaced on all trucks. Engines, transmissions, transfer cases, and differentials were rebuilt as needed, and tires were replaced when necessary. Finally, all trucks were freshly painted.

At the FMTV reset facility, the damaged trucks were disassembled and repaired or rebuilt at 10 workstations to make maximum use of time, support equipment, and manpower. The final assembly progressively gained speed as the flow of vehicles increased. The technical competence of the mechanics and a long company history of manufacturing tactical vehicles greatly enhanced the process. As soon as the repairs were complete, the DCMA representative, a TVS representative, and the Program Manager's staff prepared documentation to return the trucks to their units.

The Reset Program results have been tremendous. TVS has been able to rebuild and return all of the reset trucks on time or ahead of schedule. The units received like-new vehicles for 29 to 61 percent ($72,042 to $198,166) less than the price of a new vehicle, depending on the truck variant. **ALOG**

Gilbert J. Duran is the Contract Administrator for the Family of Medium Tactical Vehicles Reset Program at Defense Contract Management Agency-Stewart & Stevenson, Sealy, Texas. He has a bachelor's degree in criminal justice from the University of Texas at San Antonio and a master's degree in administration from Incarnate Word University in Texas.

Rebuild of the M1081 is in progress.

The refurbished M1081 is ready to return to its unit.

Saber FLE in Iraq

BY LIEUTENANT COLONEL PETER A. CATANESE AND LIEUTENANT COLONEL SAMUEL J. FORD III

The 1st Infantry Division Support Command had to support a cavalry squadron located far from its usual support battalion. The solution was to task-organize a forward logistics element.

When the 1st Infantry Division (Mechanized) deployed in Iraq, it faced a logistics challenge: How would it perform supply and maintenance support for a division cavalry squadron located 90 kilometers from the division aviation support battalion (ASB) responsible for that support? What would be the best task organization for efficient use of all of the combat service support (CSS) resources within the division support command (DISCOM) in order to provide support in a cavalry squadron support area? This support would include supply point distribution of classes I (subsistence), II (clothing and individual equipment), III (petroleum, oils, and lubricants), IV (construction and barrier materials), VI (personal demand items), VII (major end items), VIII (medical materiel), and IX (repair

M969 fuel tankers of the 601st Aviation Support Battalion were part of the Dragon Express that provided class IIIB resupply.

parts), direct support (DS) ground and aviation intermediate maintenance, ground and aircraft recovery, showers, laundry, clothing repair, and bulk water. The solution to this challenge was to use a forward logistics element (FLE). What follows is a description of the task organization and operations the 1st Infantry DISCOM used to provide logistics support 90 kilometers from the ASB—the story of the Saber FLE.

Cavalry Squadron Support Challenges

A cavalry squadron is the most diverse and flexible battalion-sized unit in a heavy division. The squadron's 27 M1A1 Abrams tanks, 41 M3A2 Bradley cavalry fighting vehicles, and 16 OH–58D Kiowa Warrior helicopters require a substantial amount of external logistics support to sustain continuous operations. A robust logistics capability must be collocated with the squadron to provide responsive logistics support, including DS tracked and wheeled vehicle repair, aviation intermediate maintenance (AVIM), armaments, communications and electronics repair, fire control, generators, welding, vehicle recovery, heavy equipment transport, medical support, bulk water, and supply of classes I, II, III, IV, VII, VIII, and IX.

A division cavalry squadron can operate as a separate maneuver element well forward in the division's battlespace, which increases significantly the distances it must travel to obtain logistics support—far beyond the distance a maneuver brigade must travel to get support from its habitual FSB. In a heavy division, the ASB has a direct support responsibility for the division cavalry squadron. When the squadron falls under the control of the division commander or is attached to another maneuver brigade, the squadron often exceeds the doctrinal support distance of the ASB.

> There is very little, if any, written doctrinal guidelines, and there is no dedicated logistics support element, such as a brigade's forward support battalion (FSB), to support a squadron the size of a mini-brigade.
>
> —Major J.D. Keith
> *Armor* Magazine, September–October 2003

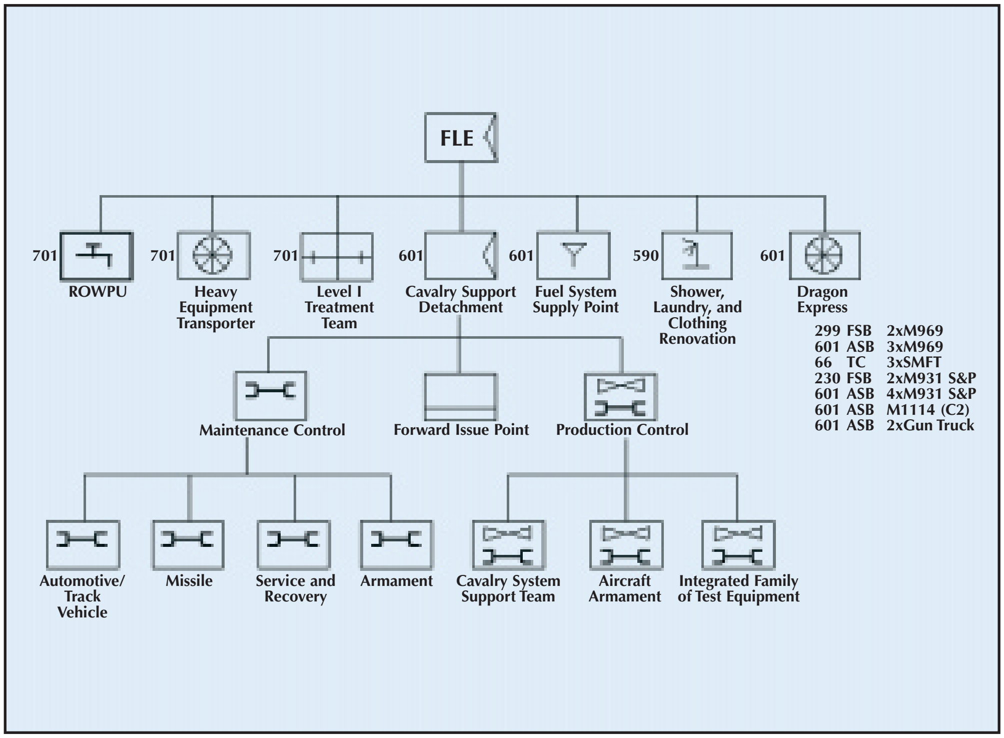
When the cavalry squadron is located far forward, the ASB normally will organize a FLE to provide continuous CSS. The FLE typically comprises elements of the ASB and tailored assets from the DISCOM or corps support command (COSCOM). The squadron S–4 coordinates with the FLE to communicate requirements and schedule resupply. The ASB support operations officer is the single point of contact for all logistics operations. The FLE's forward location reduces travel requirements for the squadron.

Saber FLE

The 1st Infantry Division's Saber FLE provided supplies, DS maintenance, and AVIM logistics support to the division's 1st Squadron, 4th Cavalry Regiment (1–4 Cavalry), for the entire 12-month deployment. Saber FLE logistics support included the delivery of over 3.3 million gallons of bulk water, 822,000 bottles of water, 1.2 million meals, 2.6 million gallons of fuel, and 171 truckloads of mail on M923 5-ton trucks, as well as the completion of 1,400 work orders for DS ground maintenance, AVIM, and backup aviation unit maintenance (AVUM).

Saber FLE was actually a "team of teams." The task organization was a combination of 1st Infantry DISCOM and 167th Corps Support Group Soldiers working together to provide all classes of supply as well as heavy equipment transportation, a downed aircraft recovery team, level I medical care, and shower, laundry, and clothing renovation (SLCR) services.

Saber FLE operations enabled the 601st ASB to conduct split-based operations. Half of the battalion support operations staff was designated as "Team Dragon," was led by the Support Operations



1st Infantry DISCOM Saber FLE task organization.

Section's aviation maintenance officer, and operated from the 601st ASB Tactical Operations Center to provide command and control of all external logistics support to the 1st Infantry Division's 4th Brigade Combat Team (BCT) from the division support area. [The ASB's mission is to support both the 4th BCT and 1–4 Cavalry.] The other half of the ASB's Support Operations Section, which was called "Team Saber," was led by the battalion support operations officer and operated from the battalion's tactical alternate command post located in the cavalry squadron support area to provide command and control of Saber FLE.

Saber FLE was task-organized with Soldiers from the 601st ASB Cavalry Support Detachment (CSD); the 601st ASB's Headquarters and Supply Company (HSC) Class III/V [ammunition] Platoon and Supply Platoon, AVIM Company OH–58D Repair Section, and Ground Support Maintenance Company Cavalry System Support Team; the 701st Main Support Battalion's Alpha Company Reverse Osmosis Water Purification Unit (ROWPU) Team, Bravo Company Heavy Equipment Transport Section, Delta Company D Missile Team, and Echo Company Level I Medical Treatment Team; and the 590th Quartermaster Company's SLCR Platoon. The 601st ASB and the 299th FSB provided M969 5,000-gallon fuel tankers, and the 66th Transportation Company (TC) furnished water trucks with semimounted fabric tanks (SMFTs) to haul bulk water.

Saber FLE task organization also included a transportation capability to move all classes of supply. A transportation unit called "Dragon Express," with trucks operated by the 601st ASB, the 299th FSB, and the 66th TC, moved supplies 40 kilometers from a brigade support area to a FLE forward issue point in the squadron support area at a forward operating base. Supplies also were flown in by CH–47 Chinook helicopter logbird operations. The Saber FLE forward issue point facilitated supply point distribution with its Standard Army Retail Supply System (SARSS–1) remote computer and 10,000-pound Atlas forklifts.

The 1st Infantry DISCOM Saber FLE task organization and CSS operations provided the logistics capabilities needed to support the division cavalry squadron 90 kilometers from its ASB in Iraq. This task organization contributed to efficient use of all CSS resources within the DISCOM.

ALOG

Lieutenant Colonel Peter A. Catanese is assigned to the V Corps G–4 Section in Heidelberg, Germany. He was the Support Operations Officer of the 601st Aviation Support Battalion, 1st Infantry Division (Mechanized), during Operation Iraqi Freedom. He has a bachelor's degree in business management from Indiana University of Pennsylvania and is completing a master's degree in public administration from Pennsylvania State University. He is a graduate of the Field Artillery Officer Basic Course, the Quartermaster Officer Advanced Course, the Combined Arms and Services Staff School, and the Army Command and General Staff College.

Lieutenant Colonel Samuel J. Ford III is the Commander of the 601st Aviation Support Battalion, 1st Infantry Division (Mechanized). He has a B.S. degree in physical education, health, and sports management from Slippery Rock University of Pennsylvania, an M.S. degree in logistics management from the Florida Institute of Technology, and an M.S. degree in military operational art and science from the Air University. He is a graduate of the Armor Officer Basic Course, the Aviation Officer Advanced Course, the Combined Arms and Services Staff School, the Army Logistics Management College's Logistics Executive Development Course, the Air Command and Staff College, the Joint Forces Staff College, and the NATO Defense College.

Restructuring for Simultaneous Movement Control Operations

BY LIEUTENANT COLONEL CHARLES R. BROWN

Across the Army, virtually every command is expected to be able to handle several missions simultaneously. As an example of its multi-tasking capability, the Army is fighting the Global War on Terrorism and, at the same time, it is transforming strategically.

In March 2005, the Vicenza, Italy-based Southern European Task Force (SETAF) transitioned from a peacetime Army organization to one that commanded joint combat operations in Afghanistan. To support Operation Enduring Freedom, SETAF required the services of the only movement control battalion (MCB) in Italy—the 14th Transportation Battalion (Movement Control), or 14th MCB, a subordinate element of U.S. Army Europe's (USAREUR's) 21st Theater Support Command (TSC).

Major General Bennie E. Williams, commander of the 21st TSC, commenting on the need to deploy the 14th MCB in support of SETAF, said "Split operations are . . . necessary and becoming the norm, and I have full confidence that the 14th can support the SETAF downrange while continuing its vital movement missions in Italy." Thus, to prepare for the additional mission, the 14th MCB restructured, reshaped, and retrained its battalion headquarters in order to provide support simultaneously to the U.S. European Command (EUCOM) and the U.S. Central Command.

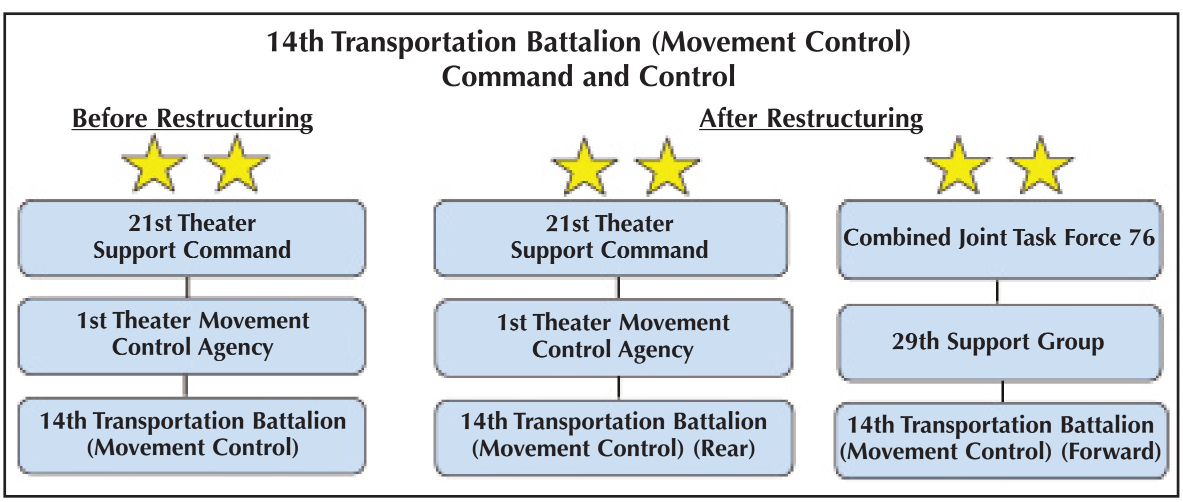
Restructuring

The deployment of SETAF and the 14th MCB to Afghanistan for a year expanded the battalion's mission set dramatically. ["Mission set" refers to a unit's mission parameters, which are based on the unit's mission-essential task list.] Split operations required an immediate change in the organizational structure of the MCB's headquarters.

This was not the first time the 14th MCB had restructured its headquarters. In the summer of 2003, the battalion transitioned its headquarters to meet difficult mission requirements in support of Joint Task Force (JTF) Liberia—an unprecedented mission to provide support to West African military forces conducting peace support operations in Liberia in order to avoid a humanitarian crisis. From late July through September of that year, the 14th MCB's headquarters transformed from an Army MCB to a JTF joint movement control center in order to support SETAF. Drawing from the battalion's experiences during the Liberia crisis, the battalion staff was able to plan split operations in Afghanistan and southern Europe.

A close peacetime relationship with SETAF paid big dividends for the 14th MCB when the time came to deploy with the task force. "We were fortunate because of our integration with SETAF during peacetime day-to-day operations, training exercises, and other real-world contingencies," said Major Thomas Nelson, the 14th's S–2/3. "It paid off for us when it really counted, making . . . [restructuring] for future operations smoother. Critical relationships with our [Operation Enduring Freedom] command were already established."

The 14th MCB is traditionally subordinate to the 21st TSC. Its brigade-level higher headquarters is the 1st Theater Movement Control Agency, based in Kaiserslautern, Germany. However, reorganizing the MCB's headquarters for split operations created a dual command and control structure (see chart below) in which the 14th's forward headquarters element was subordinate to Combined Joint Task Force (CJTF) 76 while its rear element continued the traditional command and control structure. The chart at the top of page 14 shows the battalion's mission set before and



14th Transportation Battalion (Movement Control) Mission	
Before Restructuring	After Restructuring
• Provide movement control and traffic management support to U.S. forces and Department of Defense (DOD) activities throughout U.S. European Command's (EUCOM's) Southern Region, including Italy, Africa, and the Balkans. • Provide trained and deployable movement control battalion (MCB) headquarters (HQ) and movement control teams (MCTs) to supported combatant commanders.	• Provide movement control and traffic management support to U.S. forces and DOD activities throughout EUCOM's Southern Region, including Italy, Africa, and the Balkans. • Provide trained and deployable MCB HQ and MCTs to supported combatant commanders. • Deploy Southern European Task Force (SETAF) to Operation Enduring Freedom (OEF). • Deploy 14th MCB HQ to OEF. • Provide Combined Joint Task Force 76 interim joint transportation officer to SETAF J–4. • Establish rear detachment. • Receive, reintegrate, and retrain MCTs from Operation Iraqi Freedom.

after restructuring in preparation for deployment to Operation Enduring Freedom. Note how the number of MCB missions increased from two to seven.

Reshaping

Restructuring the 14th MCB headquarters naturally led to its reshaping. This reshaping consisted of five personnel actions—

• Expanding the duties of the GS–12 traffic manager so he would serve as both battalion traffic manager and battalion S–2/3 in place of the major who would deploy.

• Hiring 11 temporary Department of the Army (DA) civilians and local nationals for 1- to 4-year appointments to assume the workloads of soldiers who would deploy.

• Incorporating soldiers from a local Army Reserve unit, the 663d Movement Control Team (MCT), based in Vicenza, into the battalion's S–2/3 operations.

• Standing up a rear detachment and designating its commander.

• Providing the SETAF J–4 an interim JTF joint transportation officer (JTO) for a 90-day period in support of CJTF 76 deployment preparations.

The final two positions were filled by the same 14th MCB officer (a major).

Providing the SETAF J–4 with an interim JTF JTO limited the operational capability of the MCB headquarters for 90 days, but it had a positive effect on the overall CJTF 76 deployment. The JTO's most notable accomplishments were—

• Serving as the 21st TSC lead for CJTF 76 deployment.

• Posturing SETAF for successful deployment.

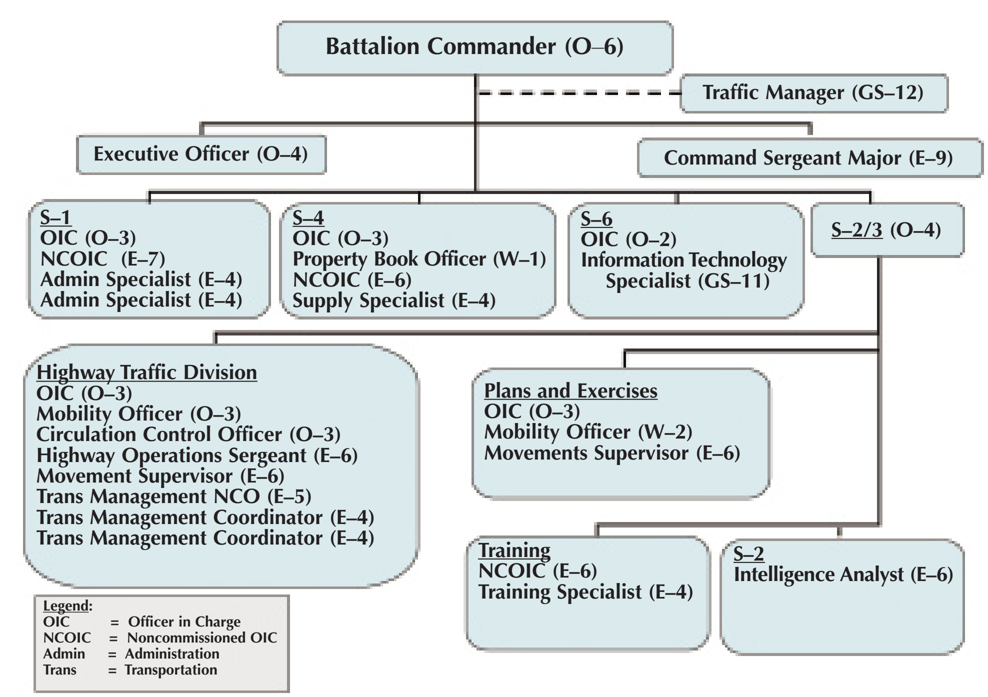
• Ensuring that the JTO was fully manned, operational, and functioning.

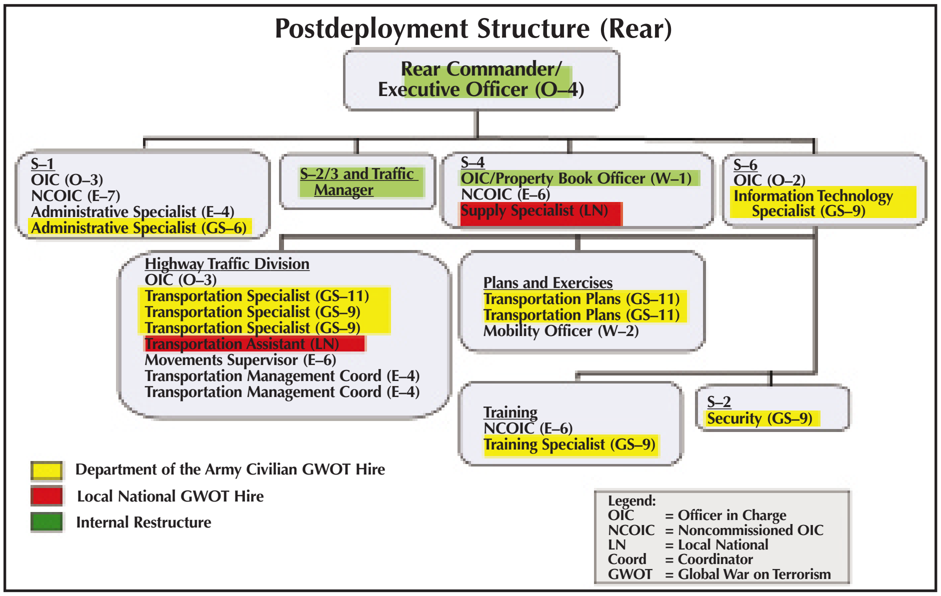
• Publishing USAREUR's Southern Region plan for deployment to Afghanistan.

The predeployment MCB headquarters organization, depicted on the chart below, shows the traditional MCB structure by duty position and grade. The postdeployment rear organization, indicated on the chart at the top of page 15, details the changes in structure brought about by reshaping. Nine DA civilian positions (highlighted in yellow) and two local national employee positions (highlighted in red) were created to fill vacancies created when the soldiers occupying them deployed. The incumbents of the three positions highlighted in green were to "dual-hat," or perform two key jobs instead of one.

The postdeployment forward organization chart at the bottom of page 15 reflects the design of the battalion headquarters when deployed in support of Operation Enduring Freedom.

Predeployment Structure of 14th Transportation Battalion (Movement Control)





Retraining

In order for the headquarters restructuring and reshaping to be successful, four personnel had to be retrained. The 14th MCB established a comprehensive professional development program in which the senior traffic manager, temporary DA civilian and local national employees, Reserve component soldiers, and a rear detachment commander would be trained to perform their new duties. This retraining program consisted of extensive on-the-job and institutional training.

Senior traffic manager. Soon after the battalion headquarters received a deployment notification, the commander decided to expand the senior traffic manager's job description to include both traffic manager and battalion S–2/3 functions. The major serving as the S–2/3 was deploying, and his departure would leave a huge staff void and a training challenge. However, rigorous on-the-job training by the traffic manager and expansion of his job description to incorporate the new S–2/3 duties proved both timely and effective.

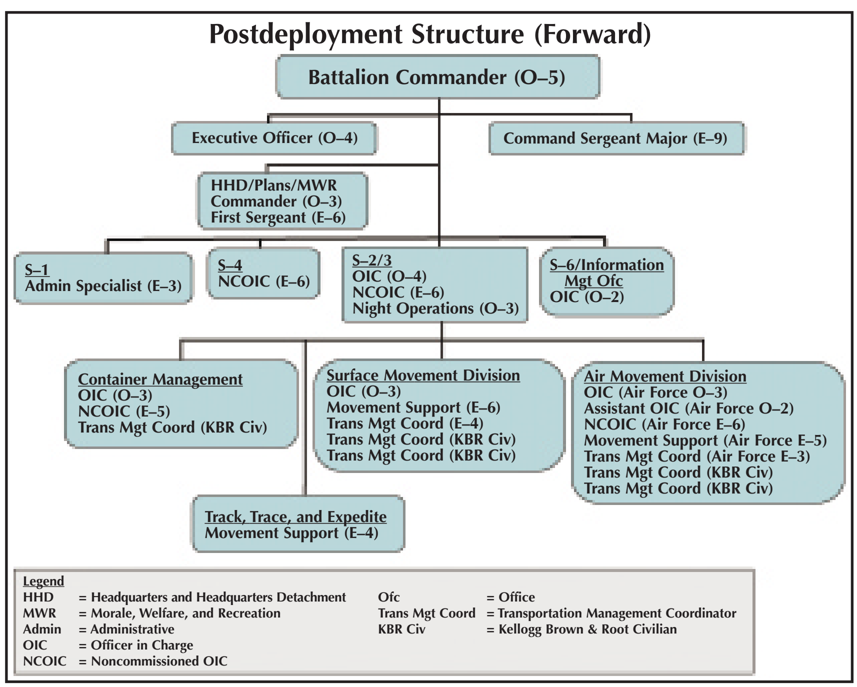
Civilian employees. Army-sponsored institutional training and on-the-job training with their battalion counterparts ensured a seamless transition and integration of the temporary DA civilian and local national personnel. However, hiring was restricted by both the availability of quality applicants, especially in an overseas setting, and the complexity of the civilian employee hiring systems.

Reserve component soldiers. Up to five Reserve component soldiers from the 663d MCT were integrated into the 14th MCB S–2/3 operations section for up to 6 months during critical periods. Incorporating these soldiers into current operations proved vital to the battalion's overall success. On-the-job training with Active component soldiers ensured continuity and mission accomplishment.

Rear detachment commander. According to USAREUR training requirements, deploying units must have a rear detachment and a rear detachment commander. The battalion selected a major to serve as rear detachment commander and sent him to the 5-day, USAREUR-sponsored Rear Detachment Commanders Course at Vilseck, Germany.

Predeployment initiatives that the 14th MCB put into effect served the battalion well when it deployed to the Afghanistan theater of operations in late March. The lessons learned can be useful to other movement control elements that are tapped to perform multiple missions over great distances. It goes without saying that these changes require the full support of the unit's chain of command, as well as the necessary funding to hire temporary civilian replacements, in order to keep operations flowing smoothly and without interruption. The flexibility granted to the 14th MCB by both SETAF and the 21st TSC allowed the battalion to rise successfully to the immense challenge of managing operations in two widely separated regions of the world. **ALOG**

Lieutenant Colonel Charles R. Brown, a Transportation Corps officer, is the commander of the 14th Transportation Battalion (Movement Control) in Vicenza, Italy. The battalion currently is deployed to Afghanistan to support Combined Joint Task Force 76. He has a bachelor's degree in management from the University of North Carolina-Wilmington and a master's degree in administration from Central Michigan University. He is a graduate of the Army Command and General Staff College.



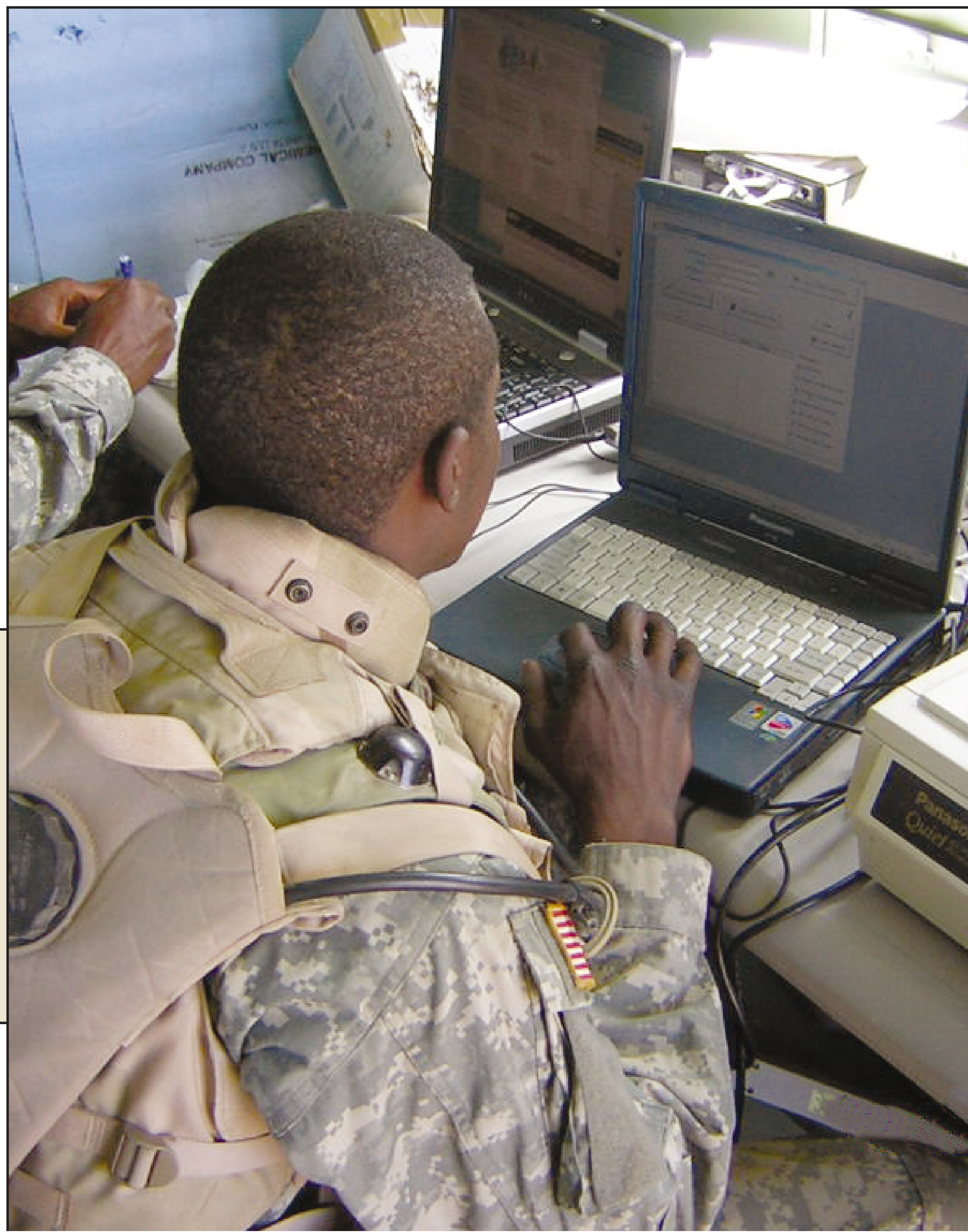
TCAM: Making the Class VIII System Work for Your Brigade Combat Team

BY CAPTAIN MICHAEL S. SMITH

Managing class VIII (medical materiel) on the battlefield has always been a challenge, especially for divisional units. Even with today's modern technology, getting medical supplies to the user is often a difficult task. To streamline this process and empower levels I and II medical elements, the Army Medical Department (AMEDD) developed the Theater Army Medical Management Information System (TAMMIS) Customer-Assisted Module (TCAM) and mandated that it be *the* system for ordering class VIII at brigade level and below. With adequate planning and command emphasis, TCAM can be a significant enabler in getting critical medical supplies to the right place at the right time on the battlefield.

What Is TCAM?

TCAM is a Windows-based, point-and-click application specifically designed to allow providers of levels I and II medical care to research class VIII requirements, submit orders via the Internet, and maintain an inventory database. (Level I medical care includes immediate lifesaving measures provided by trauma specialists with military occupational specialty 91W, healthcare specialist, assisted by self-aid, buddy aid, and combat lifesaver skills, or by a physician or a physician's assistant at the battalion aid station. Level II medical care



A Soldier in the field operates a TCAM terminal. The terminal is plugged into the wireless Combat Service Support Automation System Interface (CAISI), which interacts with a Very Small Aperture Terminal (VSAT) to provide Internet access.

A CAISI is set up in a field environment (above). One main CAISI system in a unit is connected to the VSAT (below), and other elements that have CAISI systems can interface with the main CAISI to establish Internet connections.

includes all care provided by level I and adds laboratory, x-ray, dental, and patient-holding capabilities. This level of care typically is provided by medical companies and troops of brigades, divisions, separate brigades, armored cavalry regiments, and area support medical battalions.)

TCAM enables users in units providing levels I and II medical care to access information on the operations of their higher medical supply activities and retrieve real-time data. Many features that were unavailable to them in the past are now accessible. For example, TCAM can be used to—

- Obtain an up-to-date catalog that includes suppliers' on-hand balances, complete item descriptions, photos, and any available substitutes.
- Build stock record tables, which allow users to build, update, and track their on-hand balances and dues-in.
- View and print the status of orders.
- Maintain an automated class VIII document register.
- Set up subaccounts for subordinate customers.
- View quality control messages that pop up automatically when certain items are ordered.
- View the maximum release quantity of selected items and see if the items are stocked.

People often assume that a special computer and equipment are required to use TCAM. Not so; all a user needs is a desktop or laptop computer with a Windows-based operating system, free updated software, and any Internet browser. (TCAM Version 3.0 can be downloaded from www.medlogspt.army.mil/index.html. Click on "Site Map," then on "AMEDD Log Systems" and "TCAM 3.0.")

TCAM is the fastest, safest, and most accurate way for medical units to process class VIII data. It is currently being fielded to all units across the Army, and it is already the standard in Kosovo, Afghanistan, and Iraq. In some areas, medical supply activities use TCAM exclusively to request and receive class VIII supplies.

All levels I and II medical facilities are familiar with disk or hard-copy information transfer, both of which are often called the "sneaker net." Adding Soldiers and vehicles to convoys to carry these data on a disk or in hard-copy form exposes those Soldiers to some of the most dangerous areas on the modern battlefield. Data can be transferred digitally with TCAM without putting a single Soldier in danger.

Implementation Hurdles

So why isn't TCAM the standard in every brigade's day-to-day business? After reviewing myriad after-action reports from recently deployed medical units; observing many units in training at the National Training Center at Fort Irwin, California; and interviewing a number of subject matter experts, I found that most of the levels I and II medical units in the current areas of operations have at least tried to use TCAM. Some have had more success than others, but most met with difficulty at some point. Problems occurred at the operator level and continued all the way up to the division level. Through research and observation, we have uncovered many of these problems. Some obstacles that seem to be common to all units include—

- A lack of dedicated access to the Internet.
- Insufficient number of IP (Internet protocol) addresses available to permit TCAM terminals to access the Internet on the unit's local area network.

• Inability to transfer data because of network security protocols, or "firewalls."

• Insufficient knowledge and training among operators to troubleshoot and overcome operator-level problems.

Keys to TCAM Success

How can units overcome these obstacles and implement TCAM as the standard? The answer to this question is twofold. First, units must plan properly and coordinate all of the external requirements needed for TCAM to function properly. Second, there must be strong command emphasis on getting units to comply and make the system work. These two elements go hand in hand and must be present simultaneously to be effective.

Several key areas must be considered when planning for TCAM implementation. First, the user must have access to the nonsecure Internet. This can be done by VSAT (Very Small Aperture Terminal), TACLANE (Tactical Local Area Network Encryptor), or a commercial browser. Medical planners must make their communications requirements known to the signal community early on so that TCAM framework requirements can be factored into the overall brigade signal requirements. These requirements include —

• Providing TCAM terminals with dedicated IP addresses.

• Factoring TCAM terminals into the overall signal architecture.

• Locating TCAM terminals within the distance constraints of the category V (CAT V) cable from the signal node (typically 100 meters). [CAT V cable supports frequencies up to 100 megahertz and speeds up to 1,000 megabits per second.]

• Coordinating with the signal community to ensure that firewall ports used for FTP (file transfer protocol) operations are open. [FTP is a communications protocol that governs the transfer of files from one computer to another over a network.]

If medical planners can resolve these issues with the signal community, they then can focus on the other contributing factor to getting TCAM running: command emphasis.

When new and innovative systems such as TCAM are implemented, challenges and friction sometimes impede progress and delay acceptance. As a result, units resort to doing "business as usual," which, in this case, means defaulting to the sneaker net. When this happens, future attempts to troubleshoot the new system are eventually stopped unless strong command influence dictates otherwise. We see this trend time and time again with the fielding of new systems in the military. Unless the command team decides to follow up and check on the implementation of a new system regularly, the Soldiers usually get the job done in ways that are most familiar to them—the old ways.

For example, when attempting to transfer maintenance data for the first time by FTP, brigade combat teams (BCTs) at the National Training Center often struggle with the process because they are not familiar with it. Problems occur, and they default to the sneaker net. Although this method works, it doesn't provide timely and accurate data transfer. Without command attention, the units abandon any attempts to use FTP simply because they don't know how. It usually takes a senior member in their chain of command, usually the brigade executive officer, to enforce the "new brigade standard" and mandate that all units transfer data by FTP. Eventually, as the units become familiar with FTP and gain confidence in it, they use the FTP process efficiently to provide the BCT leaders with accurate and timely information.

This training scenario undoubtedly is repeated when other BCTs attempt to implement TCAM. BCT leaders are hesitant to mandate use of TCAM because it is new and unfamiliar to the leaders and Soldiers. There is little command emphasis to compel units to make TCAM the standard for class VIII operations.

Until recently, an automated class VIII system was not available to medical units below level III (hospital care). However, TCAM is now the AMEDD standard, and it is being used successfully by many units across the Army, especially those that are deployed. Under the Army's new BCT structure, TCAM will be the tool used by brigade medical supply officers to manage class VIII stocks, so knowing how to use it will become even more critical.

TCAM, like any new equipment fielded in the Army, has some shortfalls. However, with proper planning and appropriate command attention to its implementation, it can be a powerful enabler across the Army. **ALOG**

Captain Michael S. "Sean" Smith is an observer-controller at the National Training Center at Fort Irwin, California. He served previously as commander of the forward medical support company of the 2d Brigade Combat Team, 3d Infantry Division (Mechanized), during the initial phases of Operation Iraqi Freedom. He has a bachelor's degree in biology from Lincoln University in Missouri, and he is a graduate of the Army Medical Department Officer Basic Course and the Combined Logistics Captains Career Course.

Improving Logistics Automation Support

BY CHIEF WARRANT OFFICER (W–4) JACQUELINE L. WALLACE

The author proposes realigning several warrant officer military occupational specialties to create a warrant officer specialty area that will increase the knowledge and experience of those charged with supporting and maintaining logistics automation systems.

The speed and mobility of today's combat forces make logistics automation systems vital tools in sustaining an Army that can move farther and faster than any force in history. Logistics automation systems, collectively called Standard Army Management Information Systems (STAMIS), were developed by the combat service support community to improve logistics support to the warfighter. These systems are essential to ensuring that Soldiers have the resources they need to win the fight. However, supporting STAMIS continues to be a challenge for the logistics and signal communities. One key reason for this is that no single military occupational specialty (MOS) combines cross-functional expertise in information systems, supply, and maintenance.

The six logistics functional areas (supply, maintenance, transportation, civil engineering, health services, and other services such as personnel administration, finance, and food service) have many specially developed STAMIS. STAMIS are found at every level of the Army organizational structure, from company motor pools, supply rooms, and orderly rooms to corps materiel management centers, depots, and national inventory control points. Under the Future Force structure, STAMIS will be found in brigade combat teams (BCTs) and units of employment (UEs).

The Global Combat Support System-Army (GCSS-Army) will replace 30-year-old legacy STAMIS technology with an integrated, modular system that uses common hardware, software, communications interfaces, and protocols. However, this will not lessen the need for skilled support technicians. Highly trained technicians with the right skills will still be needed to keep GCSS-Army equipment operational.

CSSAMO

The organization responsible for supporting all levels of STAMIS is the combat service support automation management office (CSSAMO). The CSSAMO includes functional experts in automation, supply, maintenance, and logistics. In Active Army and Army Reserve units, the CSSAMO officer in charge usually holds functional area (FA) 53, systems automation manager. The senior technical leader is a warrant officer with MOS 251A, information systems technician. (When a 251A is not available, a 250N, network management technician; 918B, electronic systems maintenance technician; or 920B, supply systems technician, may fill the slot.) The two most common enlisted specialties assigned to a CSSAMO are 25B, information systems operator-analyst, and 92A, automated logistical specialist. The Army National Guard has one person assigned as the CSSAMO in the G–4 in each state, three territories, and the District of Columbia. This position can be a warrant officer (MOS 920A, property accounting technician; 920B; or 251A), a commissioned officer (FA 90A, logistics specialist; 91B, medical specialist; or 92A, automated logistical specialist), or a civilian technician.

The CSSAMO provides a single point of support for STAMIS hardware, software, communication devices, local area networks, and wide area networks and manages assigned wireless and satellite equipment. CSSAMOs are also responsible for—

- Ensuring that software updates are implemented.
- Maintaining hardware and software data on all STAMIS within their area of responsibility.
- Ensuring information assurance compliance.
- Integrating databases for new units.

• Coordinating signal support requirements with the signal officer.

• Assisting supported units with STAMIS continuity of operations planning.

• Recording and reviewing system problem reports.

• Preparing an Engineering Change Proposals-Software form for common problems.

• Providing user-level support training.

CSSAMO Analysis

In 1995, the Army Training and Doctrine Command Analysis Center at White Sands Missile Range, New Mexico, released a report called "Combat Service Support Automation Management Office (CSSAMO) Training Analysis." The executive summary of this report identified two key deficiencies in CSSAMO operations: inadequate staffing levels and a lack of necessary skills and qualifications. Its recommendations included increasing staffing levels, modifying staff composition, and providing training to improve skills.

The analysis also reported eight concerns expressed by CSSAMOs in the field, six of which relate to cross-functional skills. Those six concerns are—

• The mix of personnel skills is inadequate to meet job requirements. CSSAMOs require a mix of functional personnel with backgrounds in STAMIS and technical personnel with backgrounds in computer systems, operating systems, and computer hardware.

• The grade structure of the staff is too low. The functions CSSAMOs perform require personnel experienced and skilled in computers or functional systems. Many of the highly skilled staff have acquired their skills on their own rather than through Army training.

• The CSSAMO concept does not provide for the fielding of new systems. New and emerging systems are constantly being fielded, and users look to the CSSAMOs for support that may not be available.

• The CSSAMO concept does not address increasing system complexity.

• CSSAMOs support split operations, a requirement that is not in the CSSAMO concept and for which they are not staffed.

• The consolidation of MOSs 76C, equipment, records, and parts specialist; 76P, materiel control and accounting specialist; 76V, materiel storage and handling specialist; and 76X, subsistence supply specialist, into MOS 92A increased system problems. The 92As are the operators for many automated logistics systems, but their training does not cover the systems in any depth. The data clearly showed that many 92As did not know how to operate their specific systems, which created problems when they tried to operate complex systems.

Problems sometimes occur when MOS 92A Soldiers experienced in the operation of only one supply and maintenance system are assigned to a CSSAMO, where they are expected to be highly skilled in the operation of many systems. Similar problems occur when Soldiers with MOS 25B are assigned to a CSSAMO and are expected to be knowledgeable about all types of computer hardware, software, operating systems, and networks.

CSSAMO training courses are available at the Army Logistics Management College at Fort Lee, Virginia, and at the Army National Guard Professional Education Center at Camp Robinson, Arkansas. Both schools cover STAMIS-specific hardware and operating systems, STAMIS applications and interfaces, STAMIS software and communications, and STAMIS troubleshooting and diagnostics.

Problems During Operations

During Operation Joint Guard in Bosnia-Herzegovina in 1996, Task Force Eagle experienced recurring problems with STAMIS communications because of inadequate operator and CSSAMO logistics automation training. Seven years later, units engaged in Operation Iraqi Freedom (OIF) experienced the same problems. In the summer of 2003, the Deputy Under Secretary of Defense (Logistics and Materiel Readiness) and the Joint Staff J–4 sponsored an objective assessment of logistics in Iraq. Science Applications International Corporation completed the assessment in March 2004. Its summarized findings state—

> Logistics succeeded in OIF at the tactical level in spite of our logistics capability, not because of it. This Objective Assessment of Logistics in Iraq has highlighted a number of opportunities. These opportunities have been identified before. We have seen them in Desert Shield and Desert Storm. We have seen them in Bosnia. We have seen them in Kosovo. We have seen them in OEF [Operation Enduring Freedom]. And now, we have seen them in OIF.
>
> Improvements in logistics capability have been achieved over the course of the past decade, but they have not kept pace with the progress of the combat force. Military logistics is structured to support the way we used to fight, not the way that we do fight. It is time to take the significant steps to transform, not merely improve, logistics.

Correcting the Problems

Transforming STAMIS support will require staffing BCT and UE CSSAMOs with senior technicians who have the skills necessary to understand integrated systems fully. STAMIS require a high level of integrated knowledge in computer systems, networks, and supply

Years of WO Service	1, 2, 3, 4, 5, 6, 7	8, 9, 10, 11, 12	13, 14, 15, 16, 17	18, 19, 20, 21, 22, 23–30
Rank	WO–1 (1–2); CWO–2 (3–7)	CWO–3	CWO–4	CWO–5
Typical Positions	**250N Network Management Technician**			→ 255Z Senior Signal Systems Technician
	Network management technician (tech) Communication center tech Battle staff signal analyst Communications and electronics (C–E) officer (add)	Satellite Command engineer tech Tactical operations team chief Joint communications (comm) support tech	Major command force integration tech Staff network management tech C–E staff tech	
	251A Information Systems Technician			**255Z Senior Signal Systems Technician**
	Information systems (IS) administrator IS network manager IS project officer IS tech Network security tech Assistant S–6 (add)	Chief, CSSAMO (move to 254A) IS support tech IS security tech Information assurance tech Systems network administrator Web master administrator Assistant S–6 (add)	Chief, Computer Systems Branch IS security tech Information assurance tech Chief, Network Operations Branch Information management security tech Webmaster administrator Chief, COMSEC Branch (add)	Regimental chief warrant officer Personnel proponent manager Tactical operations network tech Tactical operations network advisor Theater operations network advisor Theater information systems advisor
	254A Signal Systems Support Technician			→ 255Z
	Chief, CSSAMO (add) IS support tech (delete) Assistant S–6 (move to 251A) C–E support officer (move to 250N) Officer in charge, communication security (COMSEC) Materiel direct support tech Chief, COMSEC office of record	Chief CSSAMO (add) Assistant S–6 (move to 251A) Chief, Tactical Operations Center Joint comm support tech (delete, already 250N) Chief, IS security tech (delete, already 251A)	Chief, CSSAMO (add) Chief, COMSEC Branch (move to 251A) Chief, COMSEC office of record Chief, Network Maintenance Branch	
Self-Development Goals	Associate Studies (years 1–7)			
	Baccalaureate Studies (years 5–14)			
	Graduate Studies (years 11–23–30)			
	MOS-Related Certification and Licensing (years 1–23–30)			
	Training with Industry (years 3–17)			

and maintenance logistics. This critical aspect of STAMIS support has been lacking in CSSAMOs from their inception.

Each Soldier in a CSSAMO brings functional area expertise to the team. Over the course of an assignment, a Soldier often learns enough about other areas through experience, formal training, and on-the-job training to become highly effective at diagnosing and fixing more complex system problems. However, a Soldier departing a CSSAMO may never be assigned to another one, and his replacement may have no experience in CSSAMO operations. Thus, CSSAMO operations have few personnel with logistics automation support skills that have been accumulated beyond a single tour of duty.

Logistics automation systems are too critical to suffer this skills gap continually. The solution lies with the Army's warrant officers—technical experts who maintain the Army's systems throughout their careers and serve as technical leaders and senior advisors. Signal Corps warrant officers typically fill CSSAMO warrant officer positions. With minor realignment of positions in the Signal Corps warrant officer leader development model, one warrant officer MOS could provide dedicated support to the CSSAMO.

Recommended MOS Changes

Warrant officer MOS 254A, signal systems support technician, was established in 2003 to support nonsignal units. STAMIS are located primarily in nonsignal units, and the established 254A primary tasks align well with supporting STAMIS. Additional training in Army supply and maintenance systems and making MOS 254A the dedicated CSSAMO career track could provide a warrant officer with a 254A MOS the advanced level of technical expertise and knowledge that is critically needed to provide highly effective STAMIS support.

To facilitate the addition of the CSSAMO position to the MOS 254A career track, some of the existing positions could be realigned to the other Signal Corps warrant officer MOSs. (Note the suggested career track position changes on the chart above.) Information systems (IS) security positions (under various titles) are included in both 251A and 254A career tracks. IS security is one of the core specialties of the

Proposed 254A Warrant Officer Basic Course (WOBC)	
	Hours
Information Systems Training	
Advanced Hardware Troubleshooting	40
Networking	40
Network Troubleshooting	40
Windows Operating System (OS)	40
Windows OS Troubleshooting and Diagnostics	40
Unix Solaris OS	40
Unix Solaris OS Troubleshooting and Diagnostics	40
Mobile Subscriber Equipment	40
Enhanced Position Location Reporting System	40
Standardized Communications Security (COMSEC) Custodian	96
Local COMSEC Management Software Course	80
Subtotal for Information Systems Training	536
Logistics Courses	
Army Logistics Introductory Course	80
Retail Supply and Maintenance Systems Course	32
Support Operations Course (Phase I)	40
Support Operations Course (Phase II)	80
CSSAMO Maintenance Systems Course	120
CSSAMO Supply Systems Course	80
Subtotal for Logistics Courses	432
Total for 254A WOBC	968

Proposed 254A Warrant Officer Advanced Course (WOAC)	
	Hours
Information Systems Training	
Advanced Networking	40
Advanced Network Troubleshooting	40
Advanced Windows OS	40
Advanced Windows OS Troubleshooting and Diagnostics	40
Advanced Unix Solaris OS	40
Advanced Unix Solaris OS Troubleshooting and Diagnostics	40
Mobile Subscriber Equipment	40
Subtotal for Information Systems Training	280
Logistics Courses	
Accelerated to Department of the Army Logistics Intern Training Program	960
Subtotal for Logistics Courses	960
Total for 254A WOAC	1,240

251A warrant officer. It makes sense to fill all IS security-related positions across the board with MOS 251A warrants rather than train two separate specialties to do the same job. MOSs 251A and 254A both have an IS security technician position at the W–3 level. Eliminating the chief, IS security technician, position from 254A and recoding that position as 251A IS security technician or information assurance technician would eliminate this redundancy. The chief, communications security branch, position should be removed from 254A and added to 251A.

Another logical change is to remove the joint communications support technician from the MOS 254A career track. This position is already included in, and is more closely related to, the 250N career track. The communications and electronics (C–E) support officer position is included in the career track for 254A warrant officers at the W–1 and W–2 levels only. However, the position is included in the career track for MOS 250N at the W–4 level. Moving the C–E support officer position to the career track of MOS 250N warrant officers at the W–1 to W–2 level would provide them with the experience needed to fill the C–E staff technician position later in their careers.

Several other MOS 251A and 254A positions need to be realigned. The assistant S–6 position should be removed from 254A and added to 251A. Warrant officers with a 251A MOS spend most of their careers working for the S–6, supporting non-STAMIS automation assets. They are not prepared for CSSAMO assignments. Realigning the assistant S–6 position from 254A to 251A would improve career progression within the 251A MOS. The chief, CSSAMO, position should be removed from 251A and added to 254A. Finally, the chief, communications security branch, position should be removed from 254A and added to 251A because information systems security is one of the core specialties of the 251A warrant officer.

MOS 918B also lists the CSSAMO and communications security positions as possible assignments, but neither is central to the 918B's core skills. The primary focus of this MOS is electronic systems hardware maintenance and repair. Divesting the 918B of these nonmaintenance positions would strengthen the MOS. Under the proposed BCT and UE Army organizational model, each unit is assigned at least one 250N, 251A, and 254A position.

The 254A MOS training should include computer hardware, operating systems, networking, and logistics courses. The recommended 254A Warrant Officer Basic Course and Warrant Officer Advanced Course (WOAC) subjects are outlined in the charts at left. The advanced course would include the Department of the Army Logistics Intern Training Program, which is a 24-week course designed to develop multiskilled, multifunctional technicians who have the knowledge and skills needed to support logistics operations.

The next generation of Army information systems should resolve many of the low-level interface and communications problems plaguing the legacy systems. However, these advances will increase rather than decrease the need for highly skilled technicians who have a breadth and depth of knowledge about all facets of the systems. Automated systems that are robust and simple for the end user are rarely simple in architecture or internal operation. Intricate systems require highly skilled support technicians.

Enlisted personnel bring knowledge and experience in their field to a CSSAMO. Simple problems with root causes traceable to a single field can be solved by someone with expertise only in that field. However, troubleshooting a problem to find its root cause, especially a problem with multiple contributing factors, requires an understanding of the system as a whole. Unfortunately, by the time an enlisted Soldier in a CSSAMO acquires such an understanding, his assignment is over, and the probability of follow-on CSSAMO assignments is minimal. A 254A warrant officer with additional supply and maintenance training and a dedicated career track to support logistics automation should have the high-level skills and long-term logistics automation experience needed to keep Army information systems fully mission capable and ready to support the combat mission. **ALOG**

Chief Warrant Officer (W–4) Jacqueline L. Wallace is an information systems technician in the Intelligence Technology Division at the Joint Analysis Center, Royal Air Force Base, Molesworth, United Kingdom. She has served as the Combat Service Support Automation Management Officer for Fort Lewis, Washington, and for Area III, Korea. She has a B.S. degree in computer science from Madonna University in Michigan and a master of engineering management degree from St. Martin's College in Washington and is a graduate of the Warrant Officer Advanced Course and the Warrant Officer Staff Course.

The author thanks Chief Warrant Officer (W–3) Robert Powers, Chief Warrant Officer (W–3) Gerald Morrow, Chief Warrant Officer (W–3) Janice Fontanez, Chief Warrant Officer (W–3) Roger Fillmer, and Chief Warrant Officer (W–4) Roslyn Barbee for their help in preparing this article.

Designer Materials: Changing the Future of Logistics

BY DAVID E. SCHARETT AND ROBERT E. GARRISON

What do carbon nanohorns, photonic band gap materials, electroactive polymers, and electrospun second skin have to do with logistics? They very well may provide the Army with lightweight, reliable systems that revolutionize how logisticians support the warfighter.

Aerogel is 99.38 percent air (on page 25), but it can hold 4,000 times its own weight (for instance, the brick above) and act as a heat barrier (at left, protecting crayons from a torch).

Editor's Note: This is the second article in a three-part series on future technology and its potential impact on logistics. The first article, in the July–August issue, introduced the Revolution in Atoms, Molecules, and Photons (RAMP) and explored the implications of RAMP for energy production and delivery. This article introduces the extraordinary "designer" materials that RAMP research promises and explores the implications of designer materials for improving equipment readiness and reducing demands on the supply chain and distribution processes. The final article, in the November–December issue, will address research and development initiatives that are leading to revolutionary capabilities in "knowledge on demand" that will "Connect the Logistician" globally.

As a nation at war, the United States must sustain its technological superiority if it is to maintain its dominance on the battlefield. Our forces, faced with an extremely adaptive enemy that ignores territorial boundaries, need novel, robust capabilities that are not easily countered. Research being conducted at the atomic, molecular, and photonic levels offers the means to design materials with revolutionary properties. These materials in turn will make possible equipment and capabilities that will assist in the triumph over our enemies.

For example, the way molecules with various shapes and surface features organize into patterns on the nanoscale level determines important material properties, including electrical conductivity, optical qualities, and mechanical strength. By controlling how that nanoscale patterning unfolds, researchers are learning to design new materials with remarkable properties. It is these revolutionary "materials by design" that will provide our forces with materials that are lightweight, reliable, and superconducting and that possess other properties that will enable new and greater capabilities. Researchers who once dreamed of making molecular-scale versions of transistors, wires, and other microelectronic components on chips are now seeing this done routinely throughout the world.

Materials by Design

The emerging fields of nanoscience and nanoengineering are leading to unprecedented understanding and control over the fundamental building blocks of all physical things. This development is likely to change the way almost everything—from vaccines to computers to vehicles to objects not yet imagined—is designed and built. One group of these "designer" materials is called metamaterials.

Metamaterials are artificially constructed materials with qualities and responses that do not occur in nature. The functions of these new materials derive from extrinsic inhomogeneities (nonuniform structures) that can take many forms, including voids, particles, wires, and layers, and that can create structures whose properties transcend those of natural materials or any of their constituents. High-performance, low-frequency (less than 1 megahertz) magnetic metamaterials are being researched and developed for use in power electronics, electronic propulsion, and power generation. Novel high-frequency (greater than 1 megahertz) metamaterials with superior microwave and optical properties are being researched and developed for communication, radar, and wireless-power-transfer applications.

Metamaterials possess amazing characteristics. Some of these materials turn our traditional perspective of the world upside down. "Left-handed" metamaterials are a case in point. For example, at an early stage in life, we learn that extension cords, which are made of metal wires, are used to conduct electricity from the wall outlet to an appliance such as a lamp, television, or toaster. We also learned to associate electrical conductivity with metals, normally the copper in extension cords. However, RAMP research has produced designer materials that fly in the face of our long-held understanding that materials such as plastics cannot and do not conduct electricity.

With the advent of materials-by-design research and the discovery of a category of materials known as left-handed metamaterials (which possess negative mirror-image, or "left-handed," properties compared to naturally existing materials), our understanding of

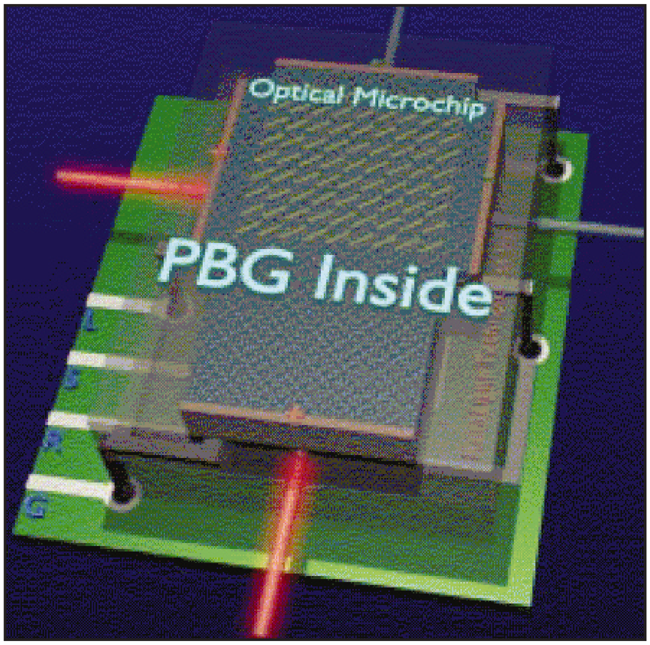
Electroactive polymers can operate like biological muscles.

material properties is quickly changing. In other words, it may now be possible to produce plastic metamaterials that are superconductors of electricity. Since plastics generally are significantly lighter than electrical conducting metals, it is now conceivable that the traditional metal electrical wiring in vehicles and equipment could be replaced with plastic wiring. Imagine the weight reduction in a vehicle that uses lightweight plastics instead of the traditional metal wires to conduct electricity.

The benefits of left-handed metamaterial plastics include not only the obvious reduction in overall system weight but also orders-of-magnitude reductions in electrical resistance resulting from their superconducting properties. Large drops in electrical resistance translate directly into reduced thermal (heat) buildup and major increases in the mean time between failures of electrical components. This, of course, is very desirable to both combat forces actively engaged on the battlefield and the personnel who maintain the combat readiness of their equipment.

As we design new combat and combat support systems, it seems prudent that we consider these new plastic metamaterials for several reasons—

- Increased availability of combat-ready vehicles and equipment.
- Reductions in the life-cycle operations and sustainment costs for vehicles and equipment that could save billions of dollars.
- Decreased demand for logistics support, with considerable secondary effects: Fewer parts will need to be procured, stored, shipped, distributed, accounted for, and tracked; throughput demands on supply chain and distribution processes will be reduced, including decreased fuel consumption associated with reduced vehicle weight; and requirements for maintainers on or near the battlespace will decrease.



An optical microchip incorporates microphotonic devices made of PBG materials.

Photonic Band Gap Materials

One type of metamaterial of particular interest to logisticians is photonic band gap (PBG) materials, which could significantly improve reliability in electronic components. PBG materials offer simplification and improved efficiencies in microchips. Recent advances in microstructuring technology have allowed controlled engineering of three-dimensional PBG structures at the near-infrared, as well as the visible, regions of the electromagnetic radiation spectrum. Light in certain engineered dielectric microstructures can flow in a way similar to electrical current in semiconductor chips. ["Dielectric" refers to a material that is an electrical insulator or that can sustain an electrical field with a minimum dissipation of power.] These microstructures provide a foundation for the development of novel microphotonic devices and the integration of such devices into an optical microchip. (See photo above.)

The current state of PBG research suggests that this field is at a stage comparable to the early years of semiconductor technology, shortly before the invention of the solid-state electronic transistor. If this analogy holds, we may find PBG materials at the heart of a 21st century revolution in optical information technology, similar to the revolution in electronics that occurred over the latter half of the 20th century.

PBG materials are being used to revolutionize electronic chips and radio frequency identification (RFID) tags. (The final RAMP article in the November–December issue of *Army Logistician* will discuss this subject in greater detail.)

Electroactive Polymers

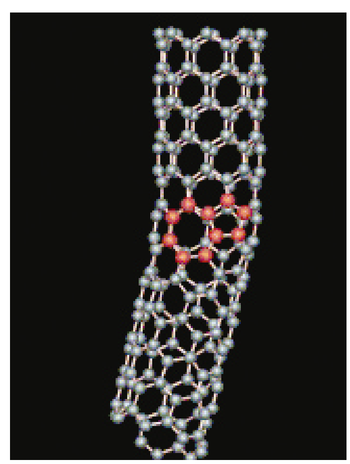
The recent emergence of electroactive polymers (EAP) material with large displacement response changed the understanding of these materials and their potential capability. ["Displacement response" refers to a substance's response to being moved from a normal position.] The main characteristic of EAP is their operational similarity to biological muscles, particularly their resilience and ability to induce large actuation [bringing into action] strains. (See photo at far left.) Unique robotic components and miniature devices are being explored in which EAP serve as actuators to achieve new capabilities.

The most attractive feature of EAP is their ability to emulate biological muscles with a high degree of toughness, large actuation forces, and inherent vibration damping. This similarity, which gained EAP the name "artificial muscles," offers the potential of developing biologically inspired robots. Such biomimetic robots come in various sizes and shapes and can be made highly maneuverable, noiseless, and agile. Effective EAP also offer the potential of turning science fiction ideas into reality much faster than would be feasible with any other conventional actuation mechanisms.

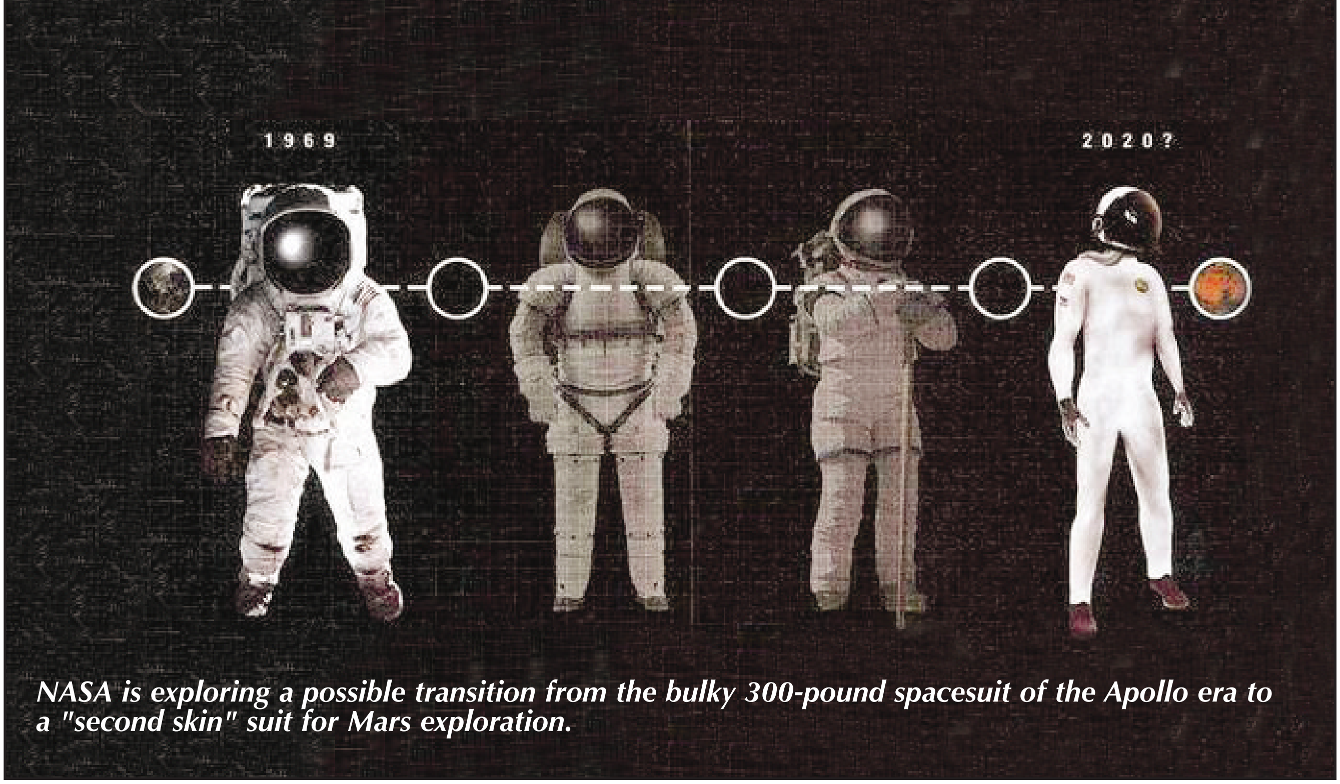
Cagey Crystals and Aerogel

Cagey crystals are materials that are characterized by randomly shaking atoms. They could be crucial to developing materials that are able to conduct electricity but not heat. That ability is one key to improving the reliability of electrical components.

Aerogel is a transparent material that is 99.38 percent air and can hold 4,000 times its own weight without deformation. (See photos on pages 24 and 25.) It is a heat barrier that could be used as a heat shield in combat vehicles or as a thermal blanket for munitions. Aerogel is commercially available today and could help to solve the weight issues associated with the Army's Future Combat Systems.



This nanotube was formed by joining an "even" rolled graphic sheet (above the joint), which is predicted to be semiconducting, to a "spiral" rolled sheet (below the joint), which is predicted to show metallic behavior. Theory predicts that this would act as a nanodiode.



NASA is exploring a possible transition from the bulky 300-pound spacesuit of the Apollo era to a "second skin" suit for Mars exploration.

Nanoscale Materials

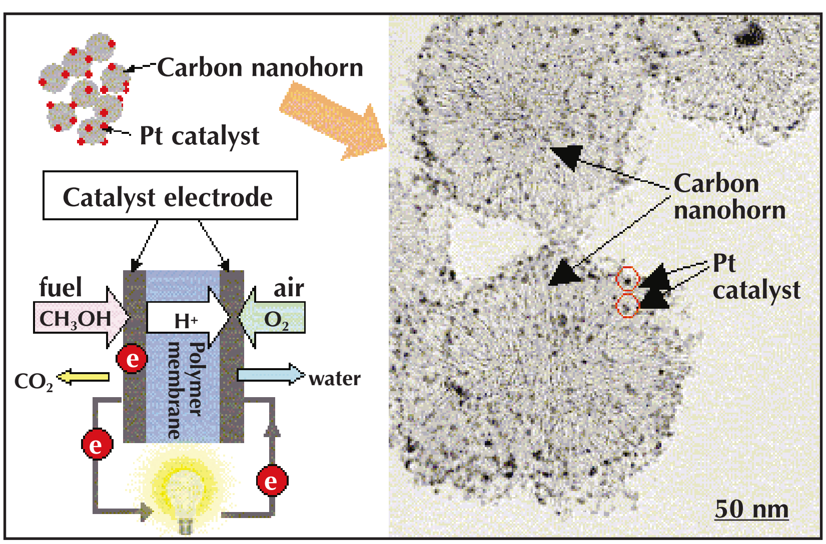
Nanoscale materials, such as nanotubes, nanopipettes, nanocones, and nanohorns, are finding applications in electronics. These applications offer such desirable benefits as dramatic reductions in electrical resistance and the associated thermal buildup that is a major cause of failure in electronic components. Nanodiodes hold the promise of having a 20,000 times reduction in electrical resistance compared to today's electrical circuits. (See photo on page 27.) Similar applications of superconducting carbon nanotubes in batteries significantly extend the usable energy in those batteries. This application of carbon nanotubes is being used today as nearly 60 percent of all current cell phone batteries incorporate carbon nanotubes. Extending the usable energy in batteries will increase battery life, which will reduce the frequency of recharging or replacing batteries on the battlefield and the demand for battery resupply by logisticians.

Carbon Nanohorns

Scientists have developed a tiny fuel cell for mobile terminals using the minute and unique structure of the carbon nanohorn. (See diagram below.) This fuel cell has attained significant improvements over conventional activated-carbon terminals. The carbon nanohorn fuel cell has about 10 times the energy capacity of a lithium battery. This fuel cell could power continued use of a personal computer for several days, as opposed to only several hours. Materials such as carbon nanohorns offer the same logistics benefits as other nanoscale materials: greatly reduced requirements for conducting energy resupply missions.

Electrospun Second Skin

Future space explorers may apply a spray-on "second skin"—an organic, biodegradable layer offering protection in extremely dusty planetary environments.



Carbon nanohorns are used to make a tiny fuel cell with 10 times the energy capacity of a lithium battery. ("Pt" is the chemical symbol for platinum, "C" for carbon, "H" for hydrogen, and "O" for oxygen; "e" stands for energy, and "nm" for nanometer.)

Second-skin spacesuit research is supported by the National Aeronautics and Space Administration (NASA) Institute for Advanced Concepts. (See photo at left.)

The microfine fibers produced by electrospinning randomly collect into thin, nonwoven fiber mats that behave like microporous membranes. The objective of the second-skin initiative is to use electrospinning to produce seamless garments that perform multiple functions, such as providing flammable, chemical, and environmental protection. This will be done by blending the fibers into electrospinlaced layers in combination with polymer coatings. The second skin will incorporate electrically actuated artificial muscle fibers to enhance human strength and stamina.

This spray-on coating also could be used to protect cargo shipments or as a second skin to enhance logisticians' physical strength for handling cargo. It could augment Soldiers' strength to the point that the need for materials-handling equipment to handle certain configured loads or classes of supply might be eliminated. Electrospun coating also could be used to hermetically seal cargo and thus protect it from the environment, dust, heat, cold, and humidity. Since this material biodegrades, it could eliminate the traditional problem of residual dunnage. NASA's Institute for Advanced Concepts and the Army's Natick Soldier Systems Center are actively researching and developing the manufacturing technologies that will provide electrospun polymers.

Nano-technology has given us the tools . . . to play with the ultimate toy box of nature—atoms and molecules. Everything is made from it . . . The possibilities to create new things appear limitless.

—Horst L. Störmer,
Lucent Technologies and
Columbia University,
1998 Nobel Prize in Physics

Other Designer Materials

Materials with an unprecedented combination of strength, toughness, and lightness will make all kinds of land, sea, air, and space vehicles and associated combat equipment lighter and more fuel efficient. Aircraft designed with lighter and stronger nanostructured materials will be able to fly longer missions and carry more payload. Plastics that wear less, because their molecular chains are trapped by ceramic nano-particles, will lead to the development of materials that last a lifetime.

Some long-term researchers are working to create self-repairing metallic alloys that automatically fill in and reinforce tiny cracks that otherwise can grow and merge into larger ones. These alloys could help prevent catastrophic equipment and component failures.

Other materials of interest to the Army logistician include—

- Molecular layer-by-layer crystal growth, which can be used to make new generations of more efficient solar cells.
- Selective membranes, which can desalinate seawater inexpensively or provide other means of producing potable water.
- Chameleon-like camouflage, which can change shape and color to blend in anywhere, anytime.
- Blood substitutes.

The pervasive RAMP research and development that has been, and is currently being, conducted will bring about the advent of materials by design. Materials such as photonic band gap, electroactive polymers, cagey crystals, aerogels, and others offer the promise of increased component and material reliability; novel sources of energy; human-like robots capable of performing complex work; electrospun coatings that not only protect cargo but also protect and enhance the strength of Soldiers; and new means to communicate. As Army logisticians, we should be prepared to exploit the potential benefits that designer materials offer. **ALOG**

David E. Scharett is a senior research scientist with the Pacific Northwest National Laboratory on assignment from the Department of Energy to the Army Logistics Transformation Agency at Fort Belvoir, Virginia. A command pilot with experience in both fixed- and rotary-wing aircraft, he has over 37 years of Government service. He has a bachelor's degree in engineering from Virginia Polytechnic Institute and State University and a master's degree from Golden Gate University and is a graduate of the Air War College.

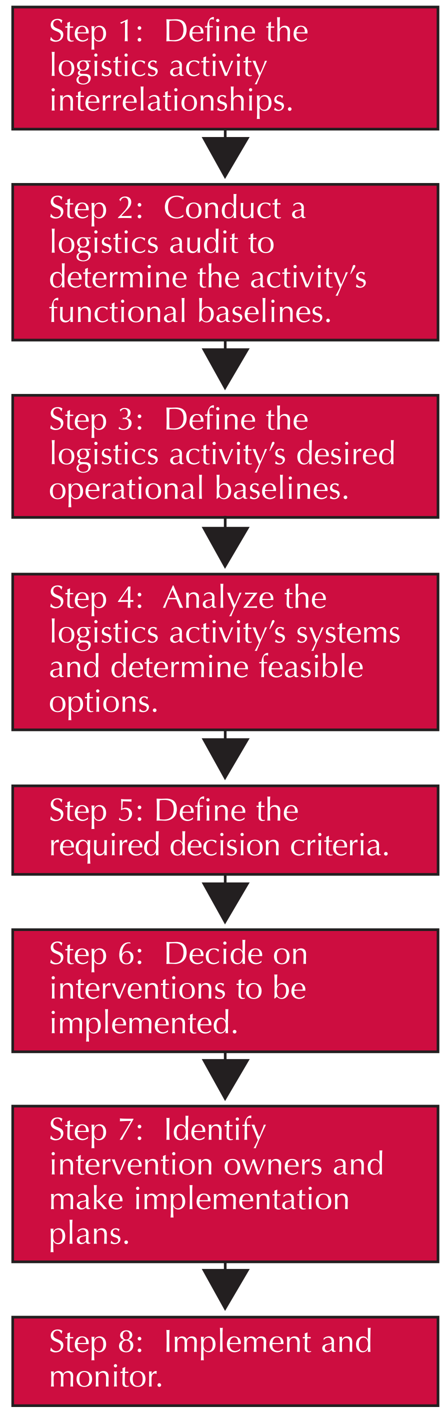
Robert E. Garrison is a logistics management specialist with the Army Logistics Transformation Agency, Future Logistics Division, Science and Technology Team, at Fort Belvoir, Virginia. A recently retired chief warrant officer (W–5) with over 32 years of active service in the Army, he has an associate's degree in general studies from the University of Maryland, a bachelor's degree in vocational education from Southern Illinois University, and a master's degree in general administration from Central Michigan University.

An Eight-Step Process for Improving Logistics Activities

BY MAJOR DAVID R. GIBSON

Logistics activities are searching constantly for ways to improve process capabilities, shorten throughput times, improve quality, and cut costs. Many manufacturing and quality engineering books describe the specifics of defining process capabilities or optimally designing logistics systems. In many cases, the need for improvements may be obvious. In fact, to many private or public sector organizations, these improvements may be necessities. Unfortunately, most private sector businesses and Government activities do not have the luxury of starting from square one. Therefore, most activities require interventions that are synchronized with ongoing operations. So, where is one to start, and what methodology should be used? This article describes an eight-step methodology that can be used to guide decisionmakers through an activity design or redesign to improve operations, increase capacity, or shorten system time requirements. (See chart at right.)

Eight Steps for Designing an Activity

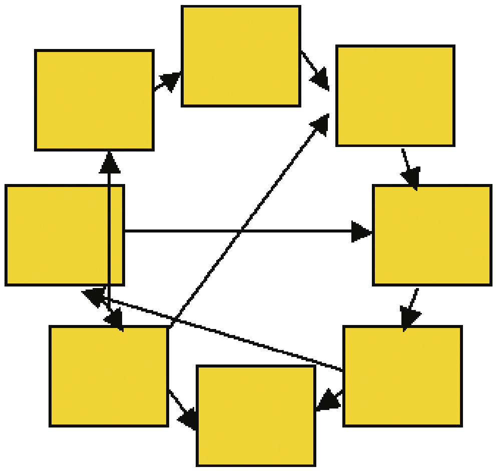


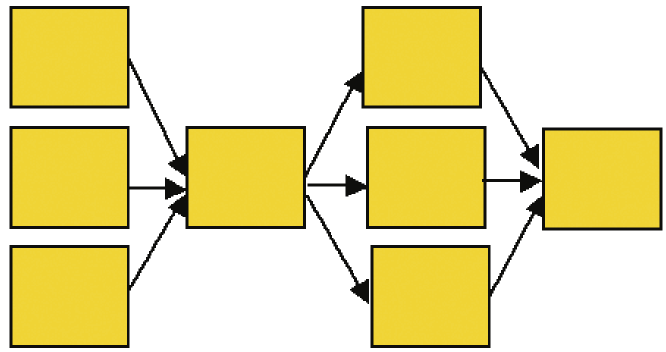
Step 1: Define Logistics Activity Interrelationships

What materials, products, or information come into the activity? What materials, products, or information flow out of the activity? What interactions does the activity have with other activities?

Before initiating or reworking an activity's design, it is crucial to understand the role the activity plays with other activities. This will help decisionmakers avoid the trap of suboptimizing an interrelated system or chain of activities; that is, making a change that benefits one activity but actually degrades overall system performance. This can be mapped with a method called interrelationship diagramming. Developing an interrelationship diagram can be as simple as showing all of the associated activities on a chart and drawing in lines to represent the flow of functional or information interactions. (See diagram on page 31.)

Defining an activity's "as is" and proposed "to be" interrelationships serves as a precursor to activity design or redesign. If the activity is already in operation, this will simply require mapping the known relationships. If the activity is not in operation, a knowledgeable, cross-functional team should draft and troubleshoot a few options to ensure material, function, and information dynamics are addressed.





Interrelationship diagrams are used to define the roles among activities.

Once interrelationships are laid out, the analysts can review the relationships to better understand the activity's role and its inputs and outputs—whether physical or informational. This review may help identify opportunities to eliminate unnecessary redundancies, or it may illustrate opportunities to combine functions within activities. At a minimum, analysts will better understand the environment in which the activity functions.

Step 2: Conduct a Logistics Audit

A logistics audit is a crucial prerequisite to task, process, or system modification. The logistics audit will determine or validate the "as is" baselines by which intervention successes are measured.

The audit should answer the following questions: What resources are available, such as storage, production, and throughput capacities; buildings by size; number of personnel by type; materials-handling equipment by type; conveying systems; and budgeted capital expenditures? What constraints does the activity face, such as building layouts, storage capacities, time allotted for given production requirements, use of certain automation systems, regulatory compliance requirements, surge requirements, and capital expenditure budget? What processes does the activity use, and what are the current standards governing those processes?

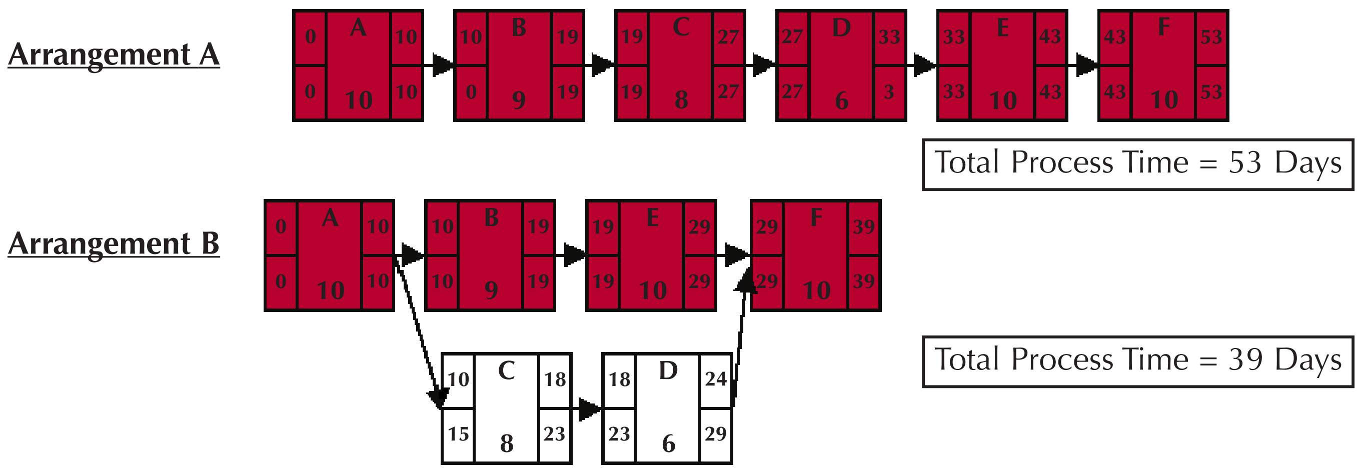
Ideally, an activity should use flow charts to demonstrate the processes used to perform tasks, the performance standards required for those processes, and the metrics employed to monitor success. If flow charts are not used, the processes must be documented to ensure that tasks are being performed consistently.

The logistics audit provides a foundation for understanding an activity, analyzing feasible solutions, and measuring the value of implemented solutions.

Quality engineers use the DMAIC (define, measure, analyze, improve, and control) model to document processes before beginning process improvement. If processes are documented, another series of logical questions apply: Are the processes being followed? Are they within acceptable control and performance parameters? Are they outdated? Can they be improved?

It is important to note that processes being performed consistently and within statistical control still may be well outside required performance standards. Processes that appear to be outside the tolerance of established performance parameters must be analyzed for the factors that contribute to inconsistencies. This may be a result of process deviations or inconsistencies in process measurement. Each process analyzed must have a process owner who must be able to demonstrate the performance data that validate process control. Controlling processes within preestablished performance parameters should be part of the activity's ongoing quality control.

Once processes are documented, analysts can diagram process and system relationships in order to investigate task relationships within processes and process relationships within systems. This approach is called network diagramming. Although network diagramming is most commonly used in the construction industry for project management, the concept also can be helpful in designing a logistics activity. Network diagramming is useful for determining a comprehensive cycle time of more than one task, process, or activity.



In this example, the two arrangements represent the same process. By rearranging the relationships of how the tasks are performed, the cycle time is reduced by 14 units of measure (such as days) with arrangement B. By changing the relationships, the critical path (shown in red) also changes. Now tasks C and D have 5 days of float time before they affect the overall process time.

Network diagramming helps to identify the time required to complete a given process, activity, or project. This technique provides an ability to identify those tasks on the critical path—a task or process for which any deviation in time will affect the overall process, activity, or project time. Those tasks not on the critical path may have a degree of float time, or system slack, associated with them and may slip forward or backward based on the amount of float time. As long as a task does not slip past the amount of float time, it will not affect the overall process or project time. Changes in the relationships among tasks can affect the critical path and the overall cycle time. For example, if two tasks are performed simultaneously rather than sequentially, the time required to complete the process will be shorter. (See chart above.)

If the relationships of a given process, activity, or project are fixed, all efforts to decrease the time must focus on critical path tasks, processes, or activities. This approach is known as system "crashing," or system compression. Efforts to shorten time by compressing tasks not on the critical path will not produce results until all system float time is eliminated. Therefore, the most effective approach requires a focus on critical path activities. This can be done by modernizing equipment, changing task or process performance, or adding resources. Ideally, the system is only compressed to a point of optimal investment. Often the cost to compress outweighs the amount saved by the compression; however, other drivers, such as time constraints, may necessitate the addition of compression.

The boxes used in network diagramming typically show the task to be performed, the task duration, early and late starts, and early and late finishes. Determining float time requires two passes through the network, one forward and one backward. Once complete, subtracting the late start and finish times from the early start and finish times will show the amount of float time. (See chart on page 33.)

Step 3: Define Desired Operational Baselines

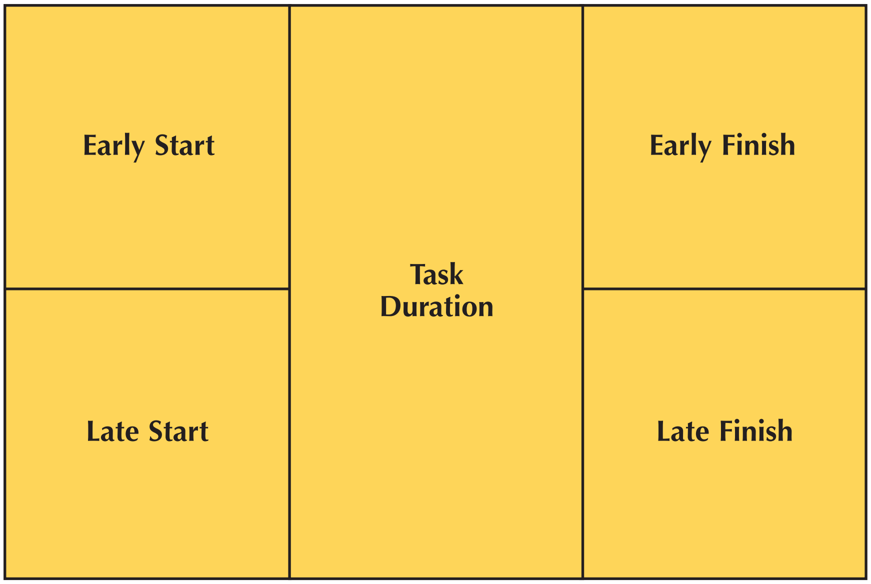
This step builds on step 2 when a performance change is determined to be necessary. The change may be an increase in production requirements, a reduction in time to perform a chain of activities, or a reduction of defect variation within existing operations.

To complete this step, analysts must work with the activity's managers to determine the desired activity performance benchmarks. Performance standards generally reflect cumulative amounts of process or system cycle times. Any task, relationship, or resource modification to a given process usually results in the requirement to modify the performance standard for that process or system.

Several books have been written on benchmarking organizational performance. Therefore, the complexity of this step should not be underestimated. Analyzing the difference between the "as is" performance of an existing activity (step 2) and defining its operational requirements (step 3) is also known as "gap analysis." The gap must be identified in order to investigate feasible solutions.

Step 4: Analyze Systems and Determine Options

The resources and constraints identified in step 2 will directly affect this step of the analysis. Although many methods are available for determining feasible



With network diagramming, each task node box shows the starting point, ending point, and duration.

options, simulation technology is often used because of its unquestionable value in identifying or validating potential solution sets. Simulating the interrelationships of an activity's current systems can identify functional bottlenecks. These bottlenecks are the areas that will require the most focus if the intent is to increase production capability. Simulations may use queuing theory and portray the impact of materials or products that converge at system points for necessary process tasks to be performed. [Queuing theory addresses how systems with limited resources distribute those resources to elements waiting in line and how those elements waiting in line respond.]

Other simulations may focus on linear programming, or "optimization." These types of simulations try to maximize or minimize something (a given function) subject to a set of constraints (the decision or control variables). The optimal solution is referred to as the objective function because it is always a function of the decision variables. Analysts may find many acceptable, although not optimal, solution sets within the region of feasibility.

Identified solution sets can be placed in simulation software to measure the forecasted value of given interventions, either alone or when combined with others. This gives decisionmakers the ability to experiment with thousands of combinations of interventions without making changes to equipment, numbers of personnel, their schedules, the equipment they use, or other infra- and suprastructure enhancements. Forecasting the value of an intervention can be critical in an environment of limited resources and gives decisionmakers the ability to program capital investments in a manner that makes the most sense for their given constraints.

Step 5: Define Required Decision Criteria

Military decisionmakers use both screening and decision criteria. Screening criteria allow decisionmakers to identify solutions that are impracticable or too costly. Screening criteria should be applied in step 4 to avoid wasting time designing solution sets that hinge on unreasonable interventions. For example, an intervention that requires resources that the organization cannot obtain may not be feasible. Legal, physical, cultural, or sociological constraints may also make an intervention unfeasible.

Applying decision criteria allows decisionmakers to categorize various interventions. For example, if the capital investment plan targets a high return on investment before an intervention's implementation, analysts should associate interventions with a net initial investment. Additionally, a summary of each net initial investment computation should be documented to ensure that stakeholders understand the computation. For public sector organizations, these values often are determined by cost avoidance. To determine the cash flows associated with cost avoidance, analysts should be able to demonstrate the amount of time or money saved, the increase in production, or the decrease in errors resulting from the intervention. This allows a value to be associated with each improvement.

Interventions may need to be divided into categories if all are not given equal consideration. The criteria in the example on page 34 were provided in order to conduct a cost/benefit analysis using the payback computation. Depending on the organization, use of other financial measures, such as the internal rate of return, profitability index, or net present value, may improve the analysis. All recommendations in the example were provided to enhance a Government warehousing operation. The analysis was conducted in conjunction with computer simulation technology.

Step 6: Decide Which Interventions to Implement

The complexity of this step is determined by the criteria defined and the documentation of interventions after completing analyses of feasible solutions.

Sample Cost/Benefit Analysis Using the

I. Life, health, and safety improvements. Recommendations in this category must include items that address current or potential hazards within the scope of warehouse operations. These may be based on specific Occupational Safety and Health Administration (OSHA) violations or items that contribute to a healthy work environment; for example, painting hazard marks on the floor to separate foot traffic from materials-handling equipment traffic or adding safety rails to prevent damage to shelving. These items must have order-of-magnitude costs identified. The benefits must be self-evident or required by published safety guidance or regulations. Calculating probable damage or expenses associated with accidents is not necessary.

II. Low-cost improvements. Recommendations in this category must include items such as process or minor functional changes that improve operations with little or no cost to the organization. Two examples are building a small storage rack to accommodate the organization and storage of packing materials and adding small clipboard devices to hold paper materiel release orders while pickers select stock. These items must have orders-of-magnitude costs identified. The benefits must be self-evident because of functional or ergonomic enhancements if cost savings or increased capabilities cannot be readily quantified.

III. Capital investments to improve operations. This category must address procurement of additional components, systems, technology, hardware, or other items that will improve operations or significantly increase capabilities to improve operations. These recommendations must be justified using the simulation model in order to demonstrate the functional feasibility of the recommendation.

The cost/benefit analysis must be based on the payback computation, which is used to demonstrate the viability of a given investment. The shorter the payback, the higher the investment should be ranked. This analysis will be computed as follows:

$$\text{payback} = \frac{\text{net initial investment}}{\text{annual cash flows}}$$

Since the Federal Government generally does not include profit on services or materials, it is difficult to compute cash flows in these terms. Therefore, these investments will be reviewed in terms of cost avoidance. For example, if the purchase of an additional stock selection device is recommended, the simulation model must demonstrate that the addition of this device will result in saving a given amount of time. Again, this must be within the required throughput production threshold objective of processing 3,000 materiel release orders a day with the recommended intervention. The final recommendation must show a total number of dollars saved per year. The computations used to arrive at the result must be itemized.

The figure used to represent the cost will be the net initial investment and must be computed as follows:

> Net initial investment = the purchase price + the installation cost + delivery fees + any initial training required to operate this device + any increase required for labor, maintenance, or materials required on hand for a 1-year period beginning the day the investment is placed into operation.

For example, if a recommended item requires a certain battery, a charging station, and special weekly

Payback Computation

maintenance, these costs must be itemized, computed for the first year of operation and included in the net initial investment.

Cost avoidance will serve as the annual cash flow and will be computed based on the funds currently spent or required to meet the same level of output. For example, if moving a conveyor belt from A bay to B bay eliminates the use of three forklifts, this must be demonstrated and validated in the model. The cost of these forklifts and their associated costs also should be included in the annual cash flow. The associated costs should include forecasted maintenance expenses and possibly adjustments if the recommendation includes the elimination of a maintenance contract or full-time support personnel who currently maintain a unique component or system. After analysis of the recommendations, the following must be provided—

- A summary of recommendations, rank-ordered by category in a table.
- A brief description of each recommendation, the technical data required for procurement, and the data used to arrive at the recommendation.
- A recommendation for the method or sequence of implementation if different from that shown in the prioritization matrix.

Simulation technology can be helpful in this area by validating time saved with process intervention or the addition of capital investments. The more quantifiable the criteria and the analysis of the intervention, the better.

Once decisionmakers receive the analysis results, they must apply relevant qualitative information to make final decisions for intervention programming.

Step 7: Identify Owners and Make Plans

For interventions to be successful, they must have upper management's support and someone must "own" the implementation plan. When implementation strategies are personnel intensive, organizational change management considerations should be addressed before the intervention begins. The value of creating personal buy-in and a sense of urgency, establishing ownership, and generating early success should not be underestimated.

Step 8: Implement and Monitor

Once implementation of the solution is underway, interventions should be monitored to validate their success. Measuring implementation progress against the implementation plan will provide the organization with valuable knowledge for future process improvements.

Change is a constant in all organizations. Conceptual models can provide a valuable roadmap to those charged with designing or reengineering an activity. The eight-step methodology described here is one such roadmap that, when followed, will produce pleasing results. An infinite number of management systems and tools can be used with this conceptual model, depending on the specific nature of the problem being addressed. Sometimes merely beginning is the most difficult stage of problem solving. As an old Chinese proverb states, "A journey of a thousand miles begins with a single step." **ALOG**

Major David R. Gibson is the Executive Officer of the 226th Medical Logistics Battalion in Miesau, Germany. He has a bachelor's degree in business from the University of Central Oklahoma, a master's degree in public administration from Murray State University in Kentucky, and master's degrees in construction management and in business administration and finance from the University of Denver. He is a graduate of the Army Medical Department Officer Basic and Advanced Courses, the Combined Arms and Services Staff School, and the Army Command and General Staff College.

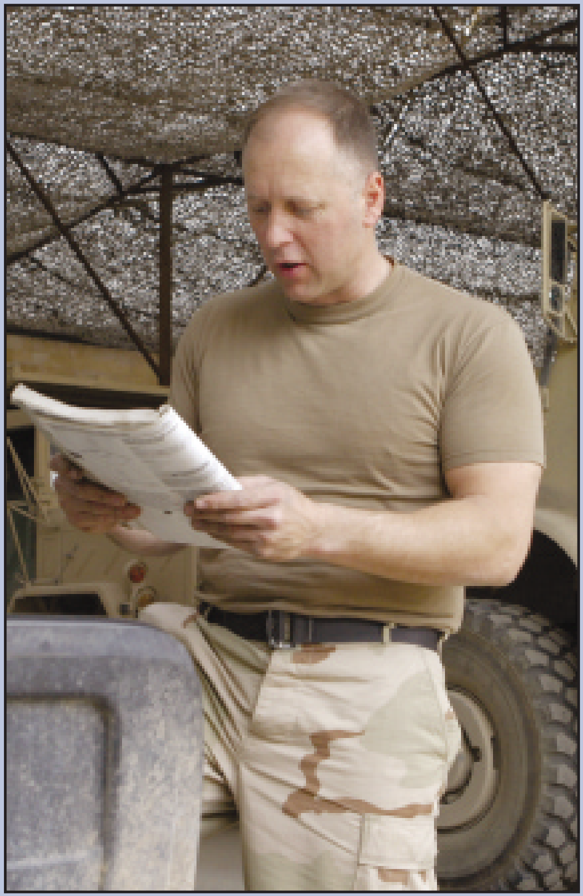
Maintenance Reinvention

BY KEITH B. WENSTRAND

The author offers 10 suggestions for "jump starting" Army maintenance policy.

Army planners agree that a transformed materiel maintenance system must substantially improve equipment reliability, reduce the size of logistics support elements, and enhance maintenance responsiveness. However, despite various programs and initiatives committed specifically to developing new maintenance concepts, processes, and technologies, the best way to proceed with achieving these goals has not been defined clearly. Attempts to make equipment sustainment equal in importance to other warfighting considerations have not yet produced meaningful results. In fact, Army maintenance procedures have changed very little over the past decade or so, and our Soldiers are still encumbered with overly bureaucratic maintenance policies, archaic logistics information systems, and equipment that may have been designed and engineered more for "manufacturability" than maintainability. Simply stated, the Army cannot expect to transform itself successfully without a genuine, conspicuous, and quantifiable commitment to reinvent maintenance.

This article presents 10 imperatives, or focus areas, for addressing maintenance policy shortfalls in a way that will launch authentic maintenance transformation. I developed this list after extensive analysis of Current Force and Future Force maintenance procedures. Several of the initiatives on the list have been approved already and are underway in the Army. Regrettably, not all of them are showing signs of real progress. I hope these suggestions will serve to jump-start the maintenance transformation process and provide a fundamental strategy for rethinking and reengineering Army maintenance.



A Soldier consults a technical manual before conducting maintenance on his vehicle at Camp Blue Diamond in Iraq.

1. Accelerate introduction of embedded diagnostics and prognostics. Embedded diagnostic and embedded prognostic (ED/EP) systems truly are the technological "heart" of a transformed maintenance system. Much more than an on-board troubleshooting tool, the ED/EP system also must be the primary conduit for many other sustainment functions, such as joint logistics information control, digital preventive maintenance checks and services, automated status reporting, platform-based parts requisitioning, remote diagnostics, telemaintenance, vehicle configuration management, component life-history recording, and embedded just-in-time maintenance training. Several experiments have successfully demonstrated the value of this multifunctional approach to ED/EP, including the Army G–4's visionary Common Logistics Operating Environment (CLOE) initiative, which is now the standard ED/EP operational architecture for connecting logisticians. [CLOE guides the Army's vision for developing a technology-enabled force equipped with self-diagnosing platforms that interact with a networked sustainment infrastructure.]

Maintenance transformation does not depend solely on innovative technology. Instead, real transformation results from profound cultural change that is enabled by technology. Therefore, the greatest return on investment from accelerated fielding of multifunctional ED/EP systems (for both Current Force and Future Force platforms) will be the creation of an enormous window of opportunity for modernizing logistics policies and procedures.

2. Update maintenance processes using CBM+ as the central theme. Because assured mobility is so crucial to the operational effectiveness of our Future Force, we must give leaders the option of replacing components before the actual point of failure. The Army must develop a transformed logistics system that blends conventional maintenance techniques with Department of Defense Condition-Based Maintenance Plus (CBM+) guidelines. Moving from a fault-based maintenance philosophy to one that is anticipatory, proactive, and reliability centered will decrease the battlefield maintenance workload, boost reliability during combat pulses, and reduce costs by avoiding catastrophic failures.

3. Adopt a NASA mentality for future ground platforms. Future ground platforms must be designed and engineered for improved maintainability, rapid repair, nominal tool requirements, redundancy, system bypass capability, and maximum use of plug-and-play modular components. This methodology, often called "pit stop engineering," also can be compared to the design philosophies of the National Aeronautics and Space Administration (NASA) manned space program. NASA designs spacecraft using strict reliability standards and incorporating multiple, redundant systems for continued operation, even during failures. If the Army wants to conduct sustained battlefield operations with minimal logistics support, it must invest in combat platforms that include at least some measure of engineering borrowed from the space program.

4. Increase maintenance performed by equipment operators and crews. The noncontiguous battlefield anticipated for future conflicts restricts the ability of logisticians to project maintenance support. With combat repair teams operating independently over extended distances, vehicle crews experiencing maintenance problems cannot always expect a timely response from field maintenance personnel. In some cases, a crew's survival may depend on its ability to diagnose faults and make repairs quickly.

With this in mind, the Army's combat maintainer model was introduced as a central feature of the Army Training and Doctrine Command-approved Stryker advanced maintenance concept. Patterned after the combat lifesaver model of field medical support, the combat maintainer program expands maintenance effectiveness and combat self-sufficiency by training vehicle crewmembers to perform selected mission-critical equipment repair tasks, basic troubleshooting, self- or like-vehicle recovery, and limited battlefield damage assessment and repair procedures.

5. Establish sense-and-respond processes for repair parts supply. The Office of Force Transformation's sense-and-respond logistics project holds great potential as a principal enabler for rapid distribution of mission-critical repair parts. The two primary repair parts management challenges in today's multidimensional combat environment are inaccurate anticipation of demands and sluggish battlefield distribution. Multifunctional ED/EP systems and sense-and-respond logistics can help mitigate these challenges through dynamic networking of dispersed logistics resources. Fundamentally, sense-and-respond logistics considers all repair parts, regardless of where they are stored or to which unit they belong, as a common pool that can be requested by any network user and delivered by any available asset. Under this concept, support roles are flexible and continuously adaptive, and logistics customers may be tasked periodically to function as logistics providers. Ultimately, sense-and-respond logistics processes will enhance the availability of repair parts across the battlespace without requiring a corresponding increase in logistics support structure.

6. Eliminate the notion of "levels of maintenance." In the purest terms, maintenance can be viewed strictly as another sustainment function that the Army must perform, regardless of "who, what, when, why, where, or how." All maintenance tasks could be consolidated into a single category, and it would no longer be necessary to describe the Army maintenance system using obsolete terms from the linear battlefield, such as "levels." While the Army's transition from four to two levels of maintenance has produced some benefits, the traditional practice of pigeonholing tasks into rigid columns on a maintenance allocation chart eventually can be replaced with a unified and highly adaptable maintenance philosophy that eliminates levels altogether.

7. Allocate maintenance tasks using decision logic. Once echeloning of the Army's maintenance system is abolished, responsibility for performing maintenance tasks can be determined by using a decision chart, with training and resources as the main considerations for task accomplishment. All Soldiers can be trained to apply task decision logic and quickly evaluate maintenance factors on the decision chart before proceeding with equipment repairs. Thus, if all of the decision chart requirements are met, the task is

Maintenance Task Decision Chart

	TRAINING	TIME	PERSONNEL	TOOLS & TMDE	REPAIR PARTS	EXPENDABLES	IETMS	
YES	☐	☐	☐	☐	☐	☐	☐	PERFORM TASK
NO	☐	☐	☐	☐	☐	☐	☐	DEFER TASK OR EVACUATE
	Evaluate each of the above maintenance factors before making maintenance task decisions.							

An example of a maintenance task decision chart.

performed; if any of the requirements are not fulfilled, the task must be deferred or reassigned to another maintenance element.

8. Develop a single, all-encompassing interactive electronic technical manual for each future platform. Eventually, on-board, interactive electronic technical manuals can be consolidated into a single reference tool (one manual for each platform or equipment item), and separate manuals for different levels of maintenance will be unnecessary. Future interactive electronic technical manuals also must include a master task list, similar to that found in commercial automotive service manuals, with detailed information that corresponds to the seven task-evaluation factors on the maintenance task decision chart. (See the example above.)

9. Purge the term "mechanic" from the Army's vocabulary. Perhaps the introductory paragraph from the Web page of the automotive technology program at South Puget Sound Community College in Olympia, Washington, best describes the changing nature of automotive service and repair: "A mechanic goes after your car with a hammer. An automotive technician talks to your car with a computer." Since digitally controlled systems are so commonplace in modern automotive designs, the knowledge, skills, and abilities of today's automotive service technician are distinctly different from those of yesterday's "grease monkey." Similarly, modern Army equipment has increased in sophistication to the point that the term "mechanic" does not accurately reflect the depth of technical expertise required to maintain our newest ground platforms. Because our professional maintenance Soldiers' roles on the future battlefield will be even more critical than they are now, calling them "technicians" is an important first step in changing the way we recruit, train, deploy, and retain them.

10. Revamp and certify maintenance training programs. When maintenance levels are eliminated, task allocation is linked to resources, and mechanics are replaced with technicians, automotive maintenance training can be transformed into three exportable modules: an entry course for equipment operators and crews, a basic course for new Ordnance Corps mechanical maintenance enlistees, and an advanced course for senior technicians. Eventually, all Soldiers will take the entry course, regardless of their primary military occupational specialties, to support distributive maintenance concepts by increasing operator and crew maintenance responsibilities.

Army maintenance training programs should be comparable to the best automotive technology programs in community colleges and trade schools across the country. The maintenance curriculum must be evaluated and certified by the National Automotive Technicians Education Foundation, the National Institute for Automotive Service Excellence, and local, state, or national college accreditation agencies.

Maintenance policies and procedures must change, and they must change now. Our logistics processes are fundamentally the same as they were decades ago. They are not keeping pace with the many changes occurring throughout our expeditionary Army. If any of the 10 recommendations presented in this article are adopted as a course of action, appropriately resourced, and aggressively cultivated with a true sense of urgency, significant improvements to equipment mission readiness, emerging force designs, and battlefield maintenance support are sure to result.

Keith B. Wenstrand is employed by Camber Corporation at Fort Knox, Kentucky, where he works as a senior analyst in the Army Armor Center Directorate of Training, Doctrine, and Combat Developments. He has an associate's degree in automotive technology from South Puget Sound Community College in Washington and a bachelor's degree in occupational training and development from the University of Louisville. He retired from the Army as a chief warrant officer (W–4).

Berlin Airlift: Logistics, Humanitarian Aid, and Strategic Success

by Major Gregory C. Tine, MDARNG

The Berlin Airlift is remembered as a symbol of American resolve in the early years of the Cold War, but it also demonstrated the power of logistics in attaining a strategic objective.

A C-7 transport leaves Rhein Main Air Base in West Germany on 30 September 1949 to make the last flight of the Berlin Airlift.

> There is no practicability in maintaining our position in Berlin and it must not be evaluated on that basis . . . . We are convinced that our remaining in Berlin is essential to our prestige in Germany and in Europe. Whether for good or bad, it has become a symbol of American intent.

With those words, General Lucius D. Clay, the U.S. Commander in Chief, European Command (CINCEUR), and Military Governor of Germany, set the resolve of the military to meet the tide of communism in 1948 Europe in a unique way. The resulting Berlin Airlift, or Operation Vittles, revolutionized U.S. strategic doctrine and demonstrated how logistics can win wars. Without firing a shot, Allied interests were secured in Europe. ["Operation Vittles" was the U.S. name for the airlift. The British called their operation "Plain Fare."]

Former Allies Divide Over Berlin

Post-World War II Germany was an occupied nation divided into four zones, each controlled by one of the victorious Allies. Berlin, the capital of Germany, similarly was divided into Soviet, British, French, and American sectors. The Soviet Union had wasted no time in expanding communism and its sphere of influence in Eastern European countries. It was anxiously eyeing Germany to also fall within that group. To that end, it would do anything to prevent the creation of a unified, democratic, capitalist Germany.

First Lieutenant Gail Halvorsen, USAF, became famous for "Operation Little Vittles." He rigged miniature parachutes with American candy bars and gum and then dropped the parachutes over Berlin for German children to retrieve.

A divided Berlin, however, sat like a cancer in the heart of the Soviet sector.

Making Germany an ally through economic aid was imperative to the United States. Germany's importance rested in its location and large population. Geographically, Germany is near the center of Europe. It twice rose to world power within the first half of the 20th century, and the potential existed for its people to do so again. In their book, *Airbridge to Berlin: The Berlin Crisis of 1948, its Origins and Aftermath*, D.M. Giangreco and Robert E. Griffin point out that Germany was so important to the United States that Secretary of State George C. Marshall tied the whole recovery of war-ravaged Europe to the restoration of the German economy. The Soviets agreed with this view of the importance of Germany. Vyacheslav M. Molotov, the Soviet Foreign Minister, noted, "What happens to Berlin, happens to Germany; what happens to Germany, happens to Europe."

In December 1947, diplomatic meetings between the four occupying powers were suspended indefinitely because they could not reach a consensus on unifying Germany. Great Britain, France, and the United States went forward with plans for forming a West German state. By the end of March 1948, the Soviets were inspecting all trains entering their sector of Berlin for proper permits. A short, 10-day airlift of supplies to the West Berlin military garrison made the Soviets ease their restrictions, but harassment of access continued until June. No thought was given to the needs of Berlin's civilian population during this abbreviated airlift.

Soviet Blockade Leads to Airlift

One of the first steps by Great Britain, France, and the United States toward establishing an independent West Germany was a reform of the German currency. This currency reform would include the Allied sectors in Berlin. The Soviets regarded the establishment of a German currency in Berlin as a provocation and responded by immediately suspending rail and highway passenger traffic into and out of Berlin.

Four days after the new deutsche mark (the new West German currency) was implemented in Berlin on 20 June 1948, the Soviets blockaded all ground transportation routes to the city. Giangrenco and Griffin point out that their goal was ". . . starving out the population and cutting off their business." The Soviets believed that, by isolating Berlin, the city would fall under their control. They also believed that the United States and Great Britain eventually would pull out of Germany altogether, and Germany then would be ripe to fall under Soviet influence.

The Allied logistics juggernaut wasted no time in leaping into action to support the people of Berlin. Plans for using an airlift had been discussed already. The task was daunting: the U.S. Air Force, just 9 months old at the time, had only two troop carrier squadrons in Europe, and Berlin had a population of approximately two million to support. Nevertheless, the first aircraft landed within 2 days with supplies for the Berliners and the garrison.

Like many military operations conducted without the benefit of lessons learned, there was a steep learning curve at the beginning. The Allies had to operate within three 20-mile-wide air corridors. Berlin started with two airfields but had two more built and operating within 5 months. Command and control also was difficult. Doctrine on emergency airlift operations was lacking, cargo was not prioritized, and loading and unloading operations were not organized.

It did not take long before the airlift became a multinational and joint logistics marvel. The U.S. Army procured supplies and moved them by ground (aided by German railroads), the U.S. and British navies transported bulk fuel and supplies to continental Europe, and the U.S and British air forces flew the supplies thus assembled into Berlin.

The minimum supply tonnage in June 1948 was computed initially at 4,500 tons daily. Because of continued operational success, this level was increased

German children living near Tempelhof Air Base in Berlin, where the U.S. transports unloaded their airlift supplies, play* Luftbrucke *(air bridge) using model American planes.

Citizens of Berlin watch a C–54 transport land at Tempelhof Air Base in Berlin in 1948.

to 5,620 tons daily by the fall of 1948. By January 1949, the city of Berlin was able to stockpile supplies and increase the daily food ration from 1,600 calories to 1,880 calories per person. In April 1949, Operation Vittles staged a 1-day demonstration. In a 24-hour period, 1,398 flights delivered over 13,000 tons of coal without accident or injury. Many private donations, such as toys, clothes, and candy, also were flown in throughout the operation.

When supply flights actually increased despite the German winter and continued to grow as the better weather of spring arrived, the Soviets realized the airlift could not be stopped. On 12 May 1949, the blockade was lifted and ground transportation flowed east to Berlin. The airlift continued, however, until West Germany was formally declared a nation (the Federal Republic of Germany) in September 1949. By the time the operation ended, 278,228 flights had delivered 2,326,406 tons of supplies. The United States conducted 189,963 of those flights carrying 1,783,573 tons of supplies, of which 1,421,119 tons were coal.

Response Sets Precedent for Logistics Influence

The Berlin Airlift changed the way modern war is waged. It showed that, by logistically supporting a beleaguered population, political and military interests can be secured. Projection of humanitarian aid and logistics accomplished this. The Berliners had to endure reductions in services from public transportation and public utilities (gas, electric, heat), unemployment resulting from businesses closing because of reduced power, food rationing, and a lack of fresh groceries such as milk, meat, and vegetables. Had the Western powers let the Berliners suffer under the Soviet siege, Berlin would have surrendered to the Soviet blockade and Soviet influence would have been strengthened in Germany. Many credit the Marshall Plan with stemming the tide of communism in Europe, but without the Berliners' resolve to stand up to Soviet tyranny and the logistics support of Operation Vittles, communism could be alive and well in Germany today.

Current U.S. Army operational doctrine recognizes the need to assist civilians as demonstrated in the Berlin Airlift. Field Manual 3–0, Operations, states—

> In support operations, Army forces provide essential support, services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. The purpose of support operations is to meet the immediate needs of designated groups for a limited time, until civil authorities can do so without Army assistance. In extreme or exceptional cases, Army forces may provide relief or assistance directly to those in need.

The Berlin Airlift was the first time the United States linked a support operation to a strategic and political objective. It set the precedent for, and demonstrated the success that can result from, aiding a civilian population. To put the airlift in perspective, the U.S. Air Forces in Europe Web site makes this observation—

> A comparison with the recent multinational airlift into Sarajevo [Bosnia] suggests how intense an effort the Berlin Airlift was. From July 1992 to January 1996, 179,910 tons of cargo was airlifted into Sarajevo. The Berlin Airlift delivered more than that in March 1949 alone, and did it again in each of the four months that followed.

Even today, in Iraq, Afghanistan, Bosnia, and Kosovo, the United States is applying the lessons learned from the Berlin Airlift. Not only does the United States operate a logistics pipeline using air transportation assets, but it also is trying to win the hearts and minds of the local populations by helping them meet their daily needs. The prominence of civil affairs units on today's battlefields reflects this goal. U.S. citizens also continually funnel private donations through service members.

Like the servicemen involved in Operation Vittles, U.S. servicemen helping civilians in current operations represent America's spirit and generosity as much as U.S. diplomacy does. Americans have realized that, to effect real change in a country, its people have to embrace that change. As a first step toward change, Americans are extending their generosity—just as they did in Berlin 67 years ago. **ALOG**

Major Gregory C. Tine, MDARNG, is an Active Guard/Reserve officer serving as the Support Operations Officer in the 29th Infantry Division (Light) Division Support Command. He has a B.S. degree from Northern Michigan University and is a graduate of the Armor Officer Basic Course, the Signal Officer Transition Course, the Quartermaster Officer Advanced Course, and the Combined Arms and Services Staff School. This article is adapted from a paper he prepared for the Command and General Staff Officers Course.

Logistics Changes Planned Under BRAC

The Secretary of Defense's recommendations for closing and realigning bases, submitted to a congressionally created commission on 13 May, will have a significant impact on the structure and conduct of Army and Defense logistics if adopted. The recommendations place great stress on consolidating facilities and organizations and on increasing capabilities for joint operations.

The Secretary's base realignment and closure (BRAC) recommendations are designed to advance five key goals—

- Transform the current and future force and its support systems to meet new threats.
- Eliminate excess physical capacity.
- Rationalize the Department of Defense's (DOD's) base infrastructure to support the new defense strategy.
- Maximize both warfighting capabilities and efficiencies.
- Examine opportunities for conducting joint activities.

The Army regards the 2005 BRAC process as a critical component of Army transformation. According to the DOD report to the BRAC commission—

> The Secretary of the Army's strategy for BRAC 2005 is to utilize BRAC to establish a streamlined portfolio of installations with optimized military value and a significantly reduced cost of ownership that:
>
> - Facilitates transformation, Joint operations, and Joint business functions;
> - Accommodates rebasing of overseas units within the Integrated Global Presence and Basing Strategy (IGPBS); and
> - Divests of an accumulation of installations that are no longer relevant and are less effective in supporting the Joint and Expeditionary Army.

The Army will use the BRAC process to meet its goals of *reshaping the fighting force*, by creating modular, flexible, deployable units; *relocating the force*, by moving overseas forces to the continental United States (CONUS); *rebalancing the force*, by changing the mix of Active and Reserve component units; and *creating a more joint force*.

Closing and Realigning Army Installations

DOD seeks to close Fort Monmouth, New Jersey; Fort Monroe, Virginia; Fort McPherson, Georgia; Fort Gillem, Georgia; Red River Army Depot, Texas; Hawthorne Army Depot, Nevada; Newport Chemical

Combined Arms Support Command Reorganizes for the Future

How Soldiers receive or provide combat service support (CSS) is determined largely by the work done beforehand by the Army Combined Arms Support Command (CASCOM) at Fort Lee, Virginia. CASCOM is responsible for the training and education of logistics Soldiers and for the development of the concepts, doctrine, organizational structures, and materiel solutions to support the needs of the Army.

CASCOM's process for supporting logistics Soldiers will change significantly under a headquarters realignment announced recently by Major General Ann E. Dunwoody, CASCOM's Commanding General. "Our new structure will allow us to approach problems and develop solutions differently than we ever have in the past," said Dunwoody. "By consolidating the logistics branch functions for training, materiel, force design, and doctrine under two integrating elements—Training and Futures—we are better postured to provide the multifunctional solutions the Army needs."

CASCOM traditionally has taken a branch-focused approach to logistics across the largest CSS branches: Ordnance, Quartermaster, and Transportation. As a result, proponent-based directorates had subordinate elements with their own materiel, concepts and doctrine, and force design divisions. While this functionally oriented structure provided an effective means to manage at the systems level, it lacked the flexibility to synchronize effectively across the logistics spectrum.

The CASCOM realignment is the most significant change to the headquarters since 1994 because it integrates the workforce across multifunctional lines. "The new organization, provisionally stood up in April 2005 . . . will not only advance our military transformation, but also improve combat effectiveness overall and posture us for success in the years to come," said Dunwoody. The realignment will provide "tremendous potential for synergy and interdependence among the CSS branches," she added.

The CASCOM headquarters transformation will greatly facilitate the recently announced Department of Defense (DOD) recommendations under the Base Realignment and Closure (BRAC) 2005 process. Although not yet finalized, the BRAC recommendations provide for the establishment of several joint and army training centers of excellence, including a Maneuver Center, a Net Fires Center, and a CSS Center. Establishment of the CSS Center involves relocating the Army Transportation Center and School from Fort

Depot, Indiana; Deseret Chemical Depot, Utah; Umatilla Chemical Depot, Oregon; Mississippi Army Ammunition Plant, Mississippi; Kansas Army Ammunition Plant, Kansas; Lone Star Army Ammunition Plant, Texas; Riverbank Army Ammunition Plant, California; and Walter Reed Army Medical Center, D.C.

DOD's plans will result in the relocation of a number of major Army command headquarters. The Army Materiel Command will move from Fort Belvoir, Virginia, to Redstone Arsenal, Alabama, as will one of its major subordinate commands, the Army Security Assistance Command. The Army Surface Deployment and Distribution Command (SDDC) will move from Fort Eustis, Virginia, to Scott Air Force Base, Illinois, where it will collocate with the U.S. Transportation Command and the Air Force's Air Mobility Command. SDDC's Transportation Engineering Agency also will move to Scott Air Force Base. The Army Forces Command will move from Fort McPherson, Georgia, to Pope Air Force Base, North Carolina, as will its subordinate, the Army Reserve Command. (Pope Air Force Base will shift to Army control as part of adjoining Fort Bragg.) The Army Training and Doctrine Command will move from the closing Fort Monroe to nearby Fort Eustis.

Reorganizing Army and DOD Logistics Schools

A number of Army schools will relocate to create combinations of related schools, along the lines of the Maneuver Support Center at Fort Leonard Wood, Missouri (which includes the Engineer, Chemical, and Military Police Schools.) One of these consolidations will create a Combat Service Support Center at Fort Lee, Virginia, that will include the following—

• Army Combined Arms Support Command (currently at Fort Lee).

• Army Logistics Management College (currently at Fort Lee).

• Army Ordnance School, which will move from its current locations at Aberdeen Proving Ground, Maryland, and Redstone Arsenal to Fort Lee.

• Army Quartermaster School (currently at Fort Lee).

• Army Transportation School, which will move from Fort Eustis to Fort Lee.

The Aviation Logistics School will move from Fort Eustis to join the Army Aviation School at Fort Rucker, Alabama.

DOD wants to consolidate all service training in three areas at Army installations to establish the following joint schools—

• Joint Center for Consolidated Transportation Management Training at Fort Lee.

• Joint Center of Excellence for Culinary Training at Fort Lee.

• Joint Center of Excellence for Religious Training and Education at Fort Jackson, South Carolina.

Eustis, Virginia; the Army Ordnance Center and School from Aberdeen Proving Ground, Maryland; and the Army Ordnance Munitions and Electronic Maintenance School from Redstone Arsenal, Alabama, to Fort Lee. This new "Logistics Center of Excellence" will become the hub of logistics training for the Army.

Establishing Fort Lee as a Logistics Center of Excellence will maximize the capabilities already at the installation, such as the CASCOM headquarters, the Army Logistics Management College, and the Army Quartermaster Center and School, and provide unparalleled synergy among the major CSS elements in the Army. "We are confident that the BRAC 2005 recommendations will advance transformation, combat effectiveness, and the efficient use of the taxpayers' money," said Dunwoody after the BRAC recommendations were released.

CASCOM is working closely with the proponent schools and the Army Training and Doctrine Command to define what the end-state Logistics Center of Excellence will look like. The realignments will require close coordination and integration to ensure that the training needs of the Army continue to be met as the schools are relocated from one site to another.

CASCOM is also exploring a number of initiatives that will provide students the best possible training environments. For example, efforts are underway to use nearby Fort Pickett as a state-of-the-art logistics warrior training site. There, Soldiers can become proficient in warrior tasks and battle drills, conduct convoy live-fire operations, use modern simulators and training systems, and train in urban environments while operating out of forward operating bases that replicate current field situations.

Fort Lee will become the focal point for institutional training. Where it makes sense, training will be consolidated. Proposals under evaluation include combining the logistics noncommissioned officer academies rather than maintaining separate proponent-level academies and, in concert with the Army Logistics Management College, establishing a Logistics University that would provide a multifunctional professional education baseline for officers, warrant officers, noncommissioned officers, and DOD civilians. Changes will be made with an eye toward building what will be needed now and in the future.

The latest CASCOM realignment and the BRAC recommendations are yet another step in the ongoing effort to find better ways to support our Army and its sister services. At the center of that development process will be the Soldiers and ensuring that they are provided the best possible support whenever and wherever it is needed.

–Story by Colonel Mike G. Mullins, CASCOM

Closing Red River Army Depot

The closure of Red River Army Depot will result in the following redistribution of functions—

- Munitions storage and demilitarization to McAlester Army Ammunition Plant, Oklahoma.
- Munitions maintenance to McAlester Army Ammunition Plant and Blue Grass Army Depot, Kentucky.
- Depot maintenance of armament and structural components, combat vehicles, depot fleet and field support, engines and transmissions, fabrication and manufacturing, and fire control systems and components to Anniston Army Depot, Alabama.
- Depot maintenance of powertrain components and starters and generators to Marine Corps Logistics Base Albany, Georgia.
- Depot maintenance of construction equipment to Anniston Army Depot and Marine Corps Logistics Base Albany.
- Depot maintenance of tactical vehicles to Tobyhanna Army Depot and Letterkenny Army Depot, both in Pennsylvania.
- Depot maintenance of tactical missiles to Letterkenny Army Depot.

Reorganizing the Defense Distribution Center

DOD's BRAC recommendations will result in significant changes in the organization of the Defense Logistics Agency's (DLA's) Defense Distribution Center (DDC). DDC will be reorganized to create four CONUS support regions, each with one strategic distribution platform and one or more forward distribution points. The strategic distribution platforms will be located at four Defense distribution depots (DDs): Susquehanna, Pennsylvania; Warner Robins, Georgia; Oklahoma City, Oklahoma; and San Joaquin, California.

The following 12 DDs will become forward distribution points: Tobyhanna, Pennsylvania (reporting to the Susquehanna Strategic Distribution Platform); Norfolk, Virginia (Susquehanna); Richmond, Virginia (Susquehanna); Cherry Point, North Carolina (Warner Robins); Albany, Georgia (Warner Robins); Jacksonville, Florida (Warner Robins); Anniston, Alabama (Warner Robins); Corpus Christi, Texas (Oklahoma City); Hill, Utah (San Joaquin); Puget Sound, Washington (San Joaquin); San Diego, California (San Joaquin); and Barstow, California (San Joaquin). DD Columbus, Ohio, will be disestablished, as will DD Red River, Texas, along with Red River Army Depot.

All DDs except Richmond are collocated with service logistics installations (such as DD Tobyhanna with Tobyhanna Army Depot). To accomplish the DDC reorganization, only minimum supply, storage, and distribution functions and inventories will be retained at each DD to support the service installation and serve as a wholesale forward distribution point. All other wholesale storage and distribution functions and inventories will be relocated to the appropriate strategic distribution platform.

Managing Consumable and Reparable Items

DOD is recommending a major consolidation of the management of consumable and reparable items under DLA. Certain inventory control point functions for consumable items (budget and funding, contracting, cataloging, requisition processing, customer services, item management, stock control, weapon system secondary item support, requirements determination, and integrated materiel management technical support) will move to DLA. The functions of allowance/initial supply support list development, configuration management, user engineering support, provisioning, and user technical support will remain with the services. Management of procurement of depot-level reparables also will shift to DLA.

For both consumable items and procurement management of depot-level reparables, this proposal will further consolidate the operation of inventory control points by supply chain type. Defense Supply Center Columbus, Ohio, manages the maritime and land supply chain; Defense Supply Center Richmond, Virginia, manages the aviation supply chain; and Defense Supply Center Philadelphia, Pennsylvania, manages the troop support supply chain.

Privatizing Commodity Management

DOD aims to privatize the management of selected commodities. This initiative will eliminate all DOD wholesale supply, storage, and distribution functions for tires; packaged petroleum, oils, and lubricants; and compressed gases. DOD will retain only the supply contracting function for these commodities, which will be relocated from several service sites to DLA inventory control points at Defense Supply Centers Columbus and Richmond. DOD will rely on the private sector for supply, storage, and distribution of these commodities.

The BRAC commission will study DOD's recommendations, decide on changes, and submit its recommendations to the President by 8 September. The President must submit his approval or disapproval of the commission's recommendations to Congress by 23 September. If the President disapproves, the commission has until 20 October to submit a revised report to the President. The President must submit his approval of the revised report to Congress by 7 November; if he still does not approve the commission's recommendations, the BRAC process ends. When Congress receives approved recommendations from the President—either on 23 September or 7 November—it will have 45 legislative days (days when Congress is in session) to disapprove those recommendations as a total package; Congress does not have the option of making changes. If Congress does not disapprove, the President's recommendations will become binding. **ALOG**

–Story by Robert D. Paulus

ALOG NEWS

(continued from page 1)

operation focused on the seize-the-initiative phase and setting the conditions for follow-on decisive operations. Approximately 70 to 80 representatives from the DOD, joint, service, and functional and regional combatant command communities participated. Also attending were representatives from working groups supporting development of other JICs.

The game was structured to accommodate white, blue, and red cells, as well as capabilities working groups of 8 to 10 participants each to address deployment and redeployment, reconstitution, sustainment, and repositioning requirements during the four phases of the campaign. The bottom line for the wargame was that the concept, including the supporting illustrative scenario and concept of operations, was determined to be fundamentally sound. However, some revisions and modifications were recommended to ensure that the final product is compelling and will enable capabilities-based assessments.

Following the wargame and further updating of the concept, the next steps planned were gaining further insights and guidance from the JIC's general officer sponsors, followed by general officer and field officer staffing.

Protecting Army vehicles and their personnel from attack by improvised explosive devices, rocket propelled grenades, and heavy-caliber machineguns has become a priority mission in Iraq. Providing help has been the M1117 Guardian armored security vehicle, which the Program Executive Office Combat Support and Combat Service Support is fielding through the Army Field Support Battalion-Iraq directly to troops in combat. The Guardian is designed to meet the security needs of military police Soldiers on patrol. It carries a three-person crew and is equipped with a modular, expandable armor system of ceramic composite material on the outside and a spall liner on the inside. (The spall liner protects the crew against flakes of material that can chip off the inside of armor plating when an armored fighting vehicle is attacked.) The Guardian also has an offensive capability since it is armed with a .50-caliber machinegun and a Mark 19 grenade launcher. The vehicle can travel at speeds up to 63 miles per hour. In the photo above, a Soldier from the 59th Military Police Company from Fort Carson, Colorado, inspects his newly issued Guardian.

HUMVEE DEVELOPED TO PROVIDE MOBILE COMMAND AND CONTROL

The Joint Systems Integration Command (JSIC) has developed a truck that can serve as a mobile command post for the joint task force commander. The command and control on-the-move (C2OTM) vehicle is actually a high-mobility, multipurpose, wheeled vehicle ("humvee") equipped with a satellite dish and spread spectrum technology that provides the commander with access to a variety of communications, including secure telephone, two-way video teleconferencing, the Global Command and Control System, and three Internet protocols. The commander can use these systems simultaneously and while the vehicle is traveling at speeds up to 50 miles an hour. He also can leave the humvee and still use its communications systems up to a quarter mile away with a secure wireless system.

The C2OTM vehicle was developed by JSIC (a subordinate command of the U.S. Joint Forces Command) to meet requirements identified by V Corps during its experiences in Operation Iraqi Freedom. According to Lieutenant Colonel Tony Krogh of V Corps, "We see C2OTM as a primary platform for our commander that gives him the ability to maneuver around the battlefield and maintain situational awareness without being tethered to the standard command post or having to stop and erect some type of a satellite dish. He can arrive on scene with full situational awareness."

JSIC built and tested a C2OTM conceptual prototype last year. An operational prototype was scheduled for a V Corps mission rehearsal exercise in July.

ACCOUNTABILITY SOFTWARE TRACKS TROOPS IN COMBAT ZONE

The new Deployed Theater Accountability Software (DTAS) System, developed by the Army Human Resources Command (HRC), provides U.S. commanders with up-to-the-minute headcount information on the 170,000 Soldiers, Marines, Government civilians, and contractors serving in Afghanistan, Kuwait, and Iraq. DTAS allows users to retrieve information generated days, hours, or minutes earlier by tactical units on the battlefield. Fielding of the system began in October 2004. Partnering with the Army, the Marine Corps' 2d Expeditionary Force in Iraq is also using DTAS; Navy and Air Force units in the area of operations may follow suit soon.

According to Lieutenant Colonel Terri Campbell, head of the Design and Development Branch of the Adjutant General Directorate's Field Services Division of HRC, DTAS was designed with "the absolute bottom line that accountability is the foundation for any support or service that the deployed commander needs to succeed operationally. If you don't know who you've got, where they are, and what skills they have, then you're on shifting sand."

DTAS interacts with other data systems so that information used for pay, personnel, and other command activities is kept current. Accountability data are entered into the system daily at the battalion S–1 level and synchronized with the theater personnel database in Kuwait as well as with the Enterprise Datastore at the Pentagon. Information is passed through the Secret Internet Protocol Router Network (SIPRNET), which is used by the military to communicate classified data. When a tracked service member returns from a deployment, the Enterprise Datastore has a complete record of every place he has been and every duty position he has held. The system has also proven invaluable in tracking personnel requiring Red Cross message notifications.

HIGH-ALTITUDE PRECISION AERIAL RESUPPLY BEING TESTED

A new aerial delivery system that incorporates global positioning system (GPS) technology could lead to the use of high-altitude airdrops to supply Army forces. The system, the Joint Precision Airdrop System (JPADS), is the subject of an advanced concept technology demonstration (ACTD) conducted by the Army, Air Force, U.S. Joint Forces Command (JFCOM), and industry.

JPADS combines a guided parachute system with GPS. With its GPS-based aerial guidance unit (AGU) and high-altitude airdrop capability, JPADS can deliver supplies within 50 to 100 meters of the target while protecting crews against enemy fire that can endanger low-altitude runs.

JPADS is a product of Army and Air Force collaboration. The Army designed the AGU and the parachute decelerators, while the Air Force created the JPADS mission planner (JPADS–MP). The JPADS–MP is a laptop computer that fits into the cockpits of both the C–130 and C–17 transports. It can transmit weather and geographic data to the system's AGU just before the JPADS is released. The AGU then can correct for any errors and guide the payload to its intended landing target.

Two JPADS models have been developed so far: the 2,000-pound load and 10,000-pound load. Under JFCOM's limited acquisition authority, the 2,000-pound version probably will be fielded to warfighters first. The Army Soldier Systems Center is working on a 30,000-pound load version.

JPADS will be demonstrated at the Precision Airdrop Technology Conference and Demonstration at Yuma Proving Ground, Arizona, in October. The first military utility assessment under the ACTD is scheduled for December.

E-NEWSLETTER PROVIDES DPO INFORMATION

Information on initiatives of the Department of Defense's (DOD's) Distribution Process Owner (DPO) is available through a biweekly electronic publication. *The DPO Update* provides information on activities and developments within the DPO community and facilitates information sharing through various Web links. The U.S. Transportation Command was designated as the DPO by the Secretary of Defense in 2003 to serve as the single command in charge of distribution and supply chain management in DOD.

Subscribers must request that *The DPO Update* be sent to their inboxes. To do so, send a blank email to join-dpoupdate@mercury.afnews.af.mil. No subject or message is necessary.

CAPSTONE MANUAL PUBLISHED ON ARMY'S BIRTHDAY

The Army released Field Manual (FM) 1, The Army, in June to coincide with the Army's 230th birthday.

FM 1 is one of the Army's two capstone doctrinal manuals. (The other is FM 3–0, Operations.) It establishes the Army's operational concept and other fundamental principles for employing landpower in support of national security, national defense, and national military strategies.

FM 1 converts the joint, expeditionary mindset into written doctrine, emphasizes military transformation, and incorporates the Soldier's Creed and Warrior Ethos.

The 2005 edition of FM 1 is written in an easy-to-read style that avoids jargon and acronyms. Its publication is the first step in a comprehensive revision of all Army doctrine. FM 1 is available on line at www.army.mil/fm1.

One of the major missions of U.S. forces in Iraq is to train Iraqi forces to defend their country against insurgents and ensure domestic stability for their new government. Soldiers of the 122d Corps Support Group, 1st Corps Support Command, train soldiers of the 2d Motorized Transportation Regiment, Iraqi National Guard, at An Numaniyah in southern Iraq. The U.S. Soldiers work with Iraqi soldiers who develop the training on how to operate and maintain vehicles. The training culminates in a convoy live-fire exercise. In the photo above, an Iraqi trainee drives a Russian Y–7A truck through the basic training course.

NDTA ANNOUNCES ANNUAL MEETING

The National Defense Transportation Association (NDTA) will hold its 59th annual Transportation and Logistics Forum and Exposition 10 to 14 September at the Manchester Grand Hyatt Hotel in San Diego, California. Under the theme, "Partnering for Solutions," speakers and breakout sessions will examine current issues and the latest industry trends in transportation and logistics. For more information, visit the forum Web site at www.ndtahq.com/forum.htm or phone NDTA at (703) 751–5011.

NONDESTRUCTIVE TESTERS TO MEET

The 53d Defense Working Group on Nondestructive Testing (DWGNDT) will meet at the Radisson Hotel City Center in Indianapolis, Indiana, from 31 October to 3 November.

Engineers, scientists, technicians, and managers from all commands and U.S. Government activities who are responsible for developing or applying NDT methods in research, engineering, maintenance, and quality assurance are invited to attend. The meeting is hosted alternately by the Army, Navy, and Air Force. This year it is hosted by the Naval Surface Warfare Center in Crane, Indiana.

For more information, visit the DWGNDT Web site at http://members.aol.com/dodndt.

MULTINATIONAL COMMAND CIF EQUIPS IRAQI SECURITY FORCES

The central issue facility (CIF) at Kirkush Military Training Base (KMTB) in Iraq is tasked with equipping two divisions of the Iraqi Army with weapons, vehicles, communications equipment, and

Two Soldiers from the 536th Maintenance Company, 17th Corps Support Battalion (CSB), 917th Corps Support Group, 1st Corps Support Command, repair a high-mobility, multipurpose, wheeled vehicle that was recovered after it was damaged by an improvised explosive device during a combat logistics patrol in Iraq. The 17th CSB, an Active Army unit from Schofield Barracks, Hawaii, is responsible for recovery of vehicles for corps units, multinational forces, and contractors in the Multinational Brigade Northwest area of operations. Recovery teams determine the severity of a vehicle's damage and then haul the vehicle to a place where further assessments can be made. If they cannot make repairs at that site, they move the vehicle to a maintenance site for repair. If the vehicle cannot be repaired, functioning parts are removed for use on other vehicles.

individual gear such as uniforms, boots, body armor, and hygiene kits.

The KMTB CIF, located 56 miles northeast of Baghdad, is one of four such facilities that are operated by the Multinational Security Transition Command-Iraq (MNSTC–I) J–4 (Logistics). The other CIFs are at Al Kisik, An Numaniyah, and Taji.

In a recent 1-month period, the six-man team at the KMTB CIF issued over 25,000 uniforms, 12,586 pairs of boots and 4,997 sets of body armor. In the same period, Iraqi soldiers also received 1,039 AK–47 assault rifles, 364 pistols, 5 fuel tankers, 53 other vehicles, 24 general-purpose medium tents, 80 Russian-made UAZ utility trailers, and nearly 660,000 rounds of ammunition. The team credits the 26 Iraqi civilians that work with them for helping them keep the pace, especially with distribution of weapons and vehicles.

"The hope is that once we reach 85 percent of authorized strength equipped with shoot, move, and communicate items, we can start moving into a sustainment mode," said Captain Susan Kane, J–4's officer in charge of distribution. As the Iraqis take control of their own logistics, the plan is for each Iraqi Army division to have its own CIF. They'll be Iraqi run, with Iraqi purchased equipment."

British Lieutenant Colonel William Mead, the deputy J–4, is encouraged by the successes he has seen in the 6 months he has served with MNSTC–I, especially by how the Iraqi staff officers have integrated into the command's J–4 and the Taji CIF.

"That really is the first step in transitioning," Mead said. "Integration at all levels is vitally important. More and more, they want to take on the responsibility for their own logistics. We just have to make sure they're set up for success for the future, not just in the short term."

Writing for *Army Logistician*

If you are interested in submitting an article to *Army Logistician*, here are a few suggestions that may be helpful. Before you begin writing, review a past issue of *Army Logistician*; it will be your best guide. Keep your writing simple and straightforward (try reading it back to yourself); attribute all quotes; avoid footnotes (*Army Logistician* is not an academic journal); and identify all acronyms and technical terms. *Army Logistician's* readership is broad; do not assume that those reading your article are necessarily soldiers or that they have background knowledge of your subject.

Do not worry too much about length; just tell your story, and we will work with you if length is a problem. However, if your article is more than 4,000 words, you can expect some cutting.

Do not submit your article in a layout format. A simple Word document is best. Do not embed photos, charts, or other graphics in your text. Any graphics you think will work well in illustrating your article should be submitted as separate files. Make sure that all graphics can be opened for editing by the *Army Logistician* staff.

Photos are a great asset for most articles, so we strongly encourage them. Photos may be in color or black and white. Photos submitted electronically must have a resolution of at least 300 dpi (.jpg or .tif). Prints of photos may be submitted by mail. Please try to minimize use of PowerPoint charts; they usually do not reproduce well, and we seldom have the space to make them as large as they should be.

Army Logistician publishes only original articles, so please do not "market" your article. Ask your public affairs office for official clearance for open publication before submission to *Army Logistician*. A clearance statement from the public affairs office should accompany your submission. Exceptions to this requirement include historical articles and those that reflect a personal opinion or contain a personal suggestion. If you have questions about this requirement, please contact us at alog@lee.army.mil or (804) 765–4761 or DSN 539–4761.

Submit your article by email to alog@lee.army.mil or by mail to EDITOR ARMY LOGISTICIAN/ALMC/2401 QUARTERS RD/FT LEE VA 23801–1705. If you send your article by mail, please include a copy on floppy disk if possible. We look forward to hearing from you.

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Coming in Future Issues—

- Who Will Rule Logistics?
- Combat Blood Operations in Iraq
- Joint Modular Intermodal Distribution System
- Preventive Maintenance Checks and Services
- Obtaining Visibility of Stay-Behind Equipment
- Safe Passage
- Joint Theater Logistics Concepts for EUCOM
- Micro Electrical Mechanical Systems Getting Smart With Logistics
- Gun Truck Development
- Logistics-Related Locations Associated With the Joint Force
- Asset Visibility in the Tactical Environment

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