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ARTICLES

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Submissions: Articles and information on all facets of logistics operations and functions are solicited. Direct communication is authorized and should be addressed to: EDITOR ARMY LOGISTICIAN/ALMC/2401 QUARTERS RD/FT LEE VA 23801-1705. Phone numbers are: (804) 765-4761 or DSN 539-4761; Fax (804) 765-4463 or DSN 539-4463; e-mail alog@lee.army.mil. Articles may be reprinted with credit to ***Army Logistician*** and the author(s), except when copyright is indicated.

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COVER

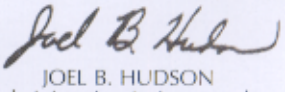
The individual soldier is the Army's "most crucial and indispensable system." To support this invaluable resource, the Army needs a first-class medical logistics system. Articles beginning on page 8 discuss some recent developments in medical logistics. On the cover, logisticians check medical materiel at a field location.

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

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
0016804

Coming in Future Issues—

- Staffing and Training for the FSC
- The Campaign in the Shenandoah
- Class VIII Prepacks for Joint Distribution
- Split Accounting Procedures
- Deployment, Sustainment, and Army XXI
- Brigade Maintenance Meeting
- Reducing Maintenance Backlog
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- CSS Quick Reaction Force
- The Swiss Transportation Troops
- Training Corps and Division-Level Logisticians
- Contingency Contracting MOS for NCO's

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ALOG NEWS

JOINT VISION 2020 RELEASED

The Chairman of the Joint Chiefs of Staff, General Henry H. Shelton, released Joint Vision (JV) 2020 in May. The new document retains the basic structure of JV2010 and the four operational concepts of dominant maneuver, precision engagement, focused logistics, and full spectrum dominance. It incorporates lessons learned from recent operations and extends the vision to address the full spectrum of military operations, alliance and coalition operations, interagency and international organization operations, and emerging challenges and opportunities.

JV2020 focuses on three factors as central to success in the four operational concepts: interoperability, innovation, and decision superiority. Joint force, multinational, and interagency interoperability are needed for success across the full range of military operations; broad-based innovation is the key to transforming the capabilities of the joint force; and decision superiority will be achieved through information superiority.

JV2020 envisions a joint force capable of full spectrum dominance that is persuasive in peace, decisive in war, and preeminent in any conflict. It underscores that both the complex military operations of the future and the transformation of the force today will require people of exceptional talent, mental agility, and dedication.

MTMC ANNOUNCES RESHAPING, MOVE

Major General Kenneth L. Privratsky, commander of the Military Traffic Management Command (MTMC), has approved a proposal that will standardize most of MTMC's military transportation units worldwide. The proposed reorganization will focus on MTMC's twin overseas command groups—the 598th Transportation Group at Rotterdam, the Netherlands; and the 599th Transportation Group at Wheeler Army Air Field, Hawaii—and on its operational battalions, companies, and detachments in the United States and around the world.

The two command groups will be reorganized to near-similar structures and job titles. In the United States, one of the transportation groups under the Deployment Support Command at Fort Eustis, Virginia—the 596th Transportation Group at Beaumont, Texas—will convert to a battalion. The 597th Transportation Group at Sunny Point, North Carolina, will remain.

The battalions will be reorganized into standard 26-member organizations, and their subordinate company and detachment units will be realigned. The 842d Transportation Battalion at Fort Monmouth, New Jersey, will convert to a company. The 956th Transportation Company at Anchorage, Alaska, will convert to a detachment of the 833d Transportation Battalion at Seattle, Washington.

Other reshaping efforts include—

- Combining the finance, personnel, and logistics positions at MTMC's headquarters and at MTMC's major subordinate headquarters with those from field transportation units.
- Returning 28 soldiers in the ranks of private first class to sergeant to regular unit assignments.
- Transferring responsibility for documentation of all container movements by commercial carriers to the Deployment Support Command.

Overall, MTMC strength at worldwide port locations will decline by 4 officers, 37 soldiers, 94 civilians, and 64 foreign nationals. Implementation of the proposal is expected to be complete by 30 September 2001.

MTMC's headquarters has relocated to Hoffman Building II at 200 Stovall Street, Alexandria, Virginia, from the Nassif Building in Falls Church, Virginia, where it has been a landmark for the past 35 years. MTMC will occupy 165,000 square feet of newly renovated office space in Hoffman II, which is sufficient to allow MTMC employees previously located in the Webb Building in Arlington, Virginia, to move to the new location also. For information on how to reach MTMC personnel in their new location, call (800) 756–6862 or go to the MTMC website at http://www.mtmc.army.mil.

(News continued on page 54)

NEWS

(News continued from page 1)

M2A3 BRADLEYS FEATURE ON-BOARD DIAGNOSTICS

The 2d Battalion, 8th Infantry Regiment, 4th Infantry Division, at Fort Hood, Texas, was the first unit to field the M2A3 Bradley infantry fighting vehicle. One major improvement in the new Bradley is an on-board diagnostics capability. The vehicle executes a system-level built-in test when it is powered up and continually monitors system status while in operation. Thus, the crew is alerted to potentially dangerous faults before they occur. The system is easier to maintain because of pre-mission and preventive maintenance checks that are built into the software. Since the vehicle has embedded diagnostic and maintenance software, maintenance personnel no longer have to carry 6 boxes of diagnostic equipment and 13 technical manuals to troubleshoot a failed vehicle.

Other system improvements include segregated electrical power among components, two types of barrels on the 25-millimeter enhanced gun, removable link bridge plates on the feeder, and a video display screen for the dismount squad leader showing what the Bradley commander and gunner see through their sights. The A3's were outfitted with the Force XXI battle command brigade and below (FBCB2) digital communications system this summer. The FBCB2 system will provide situational awareness for all levels of command on the battlefield.

The M2A3 will undergo a "pure fleet" fielding in the 4th Infantry Division (Mechanized), 1st Cavalry Division, and 3d Infantry Division (Mechanized), all of which are part of III Corps. (In "pure fleet" fielding, a particular type of vehicle is fielded to certain units rather than spread piecemeal throughout the force. The unit then stocks parts and provides mechanics for only one type of vehicle rather than many.) III Corps is scheduled to become the first digitized corps by fiscal year 2004.

CORROSION TEST FACILITY HELPS EXTEND VEHICLE LIFE

The Accelerated Corrosion Test Facility at the Aberdeen Test Center (ATC) in Maryland is helping to extend the life of military vehicles by finding ways to eliminate corrosion caused by rain, blowing dust, heat, high humidity, and other environmental conditions. For the Army, the corrosion problem adds up to about $10.5 billion in vehicle repair or replacement costs annually.

The facility, built in late 1998, is designed to simulate tough road conditions and put vehicles through an accelerated program of corrosive abuse that would take years to occur normally. In one test, vehicles are driven through a trough filled with a 5-percent solution of water and sodium chloride. In another, vehicles enter a mist booth where a "salt fog" containing a 1-percent solution of sodium chloride, calcium chloride, and sodium bicarbonate saturates their tops and sides for 2 minutes.

The vehicles also are driven through a grit trough containing 6 inches of water and the same 1-percent solution, along with fire clay dust, residual crusher dust from stone quarries, and beach sand. This trough has a series of bumps that work the suspension systems of the ve-

☐ At the ATC, a 7-ton FMTV replacement under development for the Marine Corps is tested in a 5-percent salt solution (above) and in the grit trough (at right).

hicles as they pass through, enabling the corrosive water and grit to get into these areas. The test vehicles then are parked in a high-temperature, high-humidity chamber for 8 hours to accelerate the corrosion process. A wind tunnel with blowing sand, to simulate the desert environment, and an ultraviolet light chamber are on the drawing board.

The corrosion-test program for the family of medium tactical vehicles (FMTV) put a replacement 7-ton, high-mobility cargo truck under development for the Marine Corps through a year's worth of corrosive exposure in just 10 test cycles, said Bill Mullis, test director for Accelerated Corrosion Surface Engineering at the ATC.

Mullis said that the target rates used to calculate how much corrosion the vehicles are experiencing came from Montreal, Canada. Montreal's acid rain produces one of the harshest environments in the world. "If a vehicle that we're testing can withstand that environment, it is pretty much good to go anywhere in the world," he added.

The current Army standard is to acquire vehicles with corrosion-resistant materials that will last 20 years or more. In the meantime, manufacturers are developing protective coatings to apply to vehicles now in the military fleet. Chip-resistant top coatings of primer and paint significantly reduce corrosion, and a special galvanized metal

also has been found to hold up well. Military vehicle manufacturers also are applying an undercoating to their vehicle systems, as well as silicone sealants to hose ends, fasteners, bolts, and nuts.

The $1.5 million corrosion test facility and its test methodology are the products of a successful partnership between the ATC, the Army's Program Manager for Medium Tactical Vehicles, the Tank-automotive and Armaments Command, General Motors Corporation, and Ocean City Research Corporation, a New Jersey firm that works to reduce corrosion on ships and shipbuilding materials.

CECOM ADOPTS "REVERSE AUCTION" PURCHASE PROCEDURE

The Army Communications-Electronics Command (CECOM) is using a new purchasing process called "reverse auction." In reverse auction, CECOM publishes an on-line list of items it wishes to buy. A prospective private-sector seller bids his price on line for an item and, as other sellers post their prices, he can lower his posted price.

Recent revisions to the Federal Acquisition Regulation, "Contracting by Negotiation," authorized this acquisition method. Under this procedure, the Government must obtain the seller's consent to reveal the proffered price, and only the seller's price, not his name, can be disclosed during the "auction."

CECOM is using commercial software from Frictionless Commerce, Inc., of Cambridge, Massachusetts, to process the bids. The software selects the seller with the lowest price for an item and searches the World Wide Web to locate similar items, ensuring that the bid price actually is the lowest price available. It also profiles the seller, his prices, his performance, and his compliance with previous contractual agreements.

With reverse auction, sellers can modify their prices in order to gain a niche in the Government market, and the Government can reduce the costs of supplies and services through the competitive process. The new process promises to provide significant savings in time, labor, and money for Government and industry alike.

ARMY ESTABLISHES DEPLOYMENT AWARD

The new Chief of Staff of the Army Deployment Excellence Award will recognize deploying units and deployment support organizations that meet or exceed established deployment standards. The purpose of the award is to encourage units and installations within the Army to become skilled in deployment operations. It also is designed to publicize innovative initiatives that

improve the deployment process. The first award will cover the year starting 1 April 2000 and ending 31 March 2001. The Army Transportation School at Fort Eustis, Virginia, is the proponent for the award.

Awards will be presented to active Army, Army National Guard, and Army Reserve organizations in three functional areas: deploying unit, supporting unit, and installation. Unit awards will be presented in small (team or detachment) and large (company to brigade) categories.

Table of organization and equipment (TOE) and table of distribution and allowances (TDA) units and installations that have participated in or supported a training or contingency deployment during the award year may compete. Competing units and installations will submit nominations to their major commands, which will select the best nominations for submission to the Transportation School for Army-level evaluation. Award evaluation includes a visit to the organization for first-hand grading of deployment practices.

Implementing guidance and evaluation criteria are available on the Army Transportation School home page at http://www.transchool.eustis.army.mil/DEA/ DEA.htm.

The first year's awards will be presented at a Pentagon ceremony in October 2001.

ARMY-WIDE FMTV UPGRADE COMPLETED

The driveline upgrade of 2,629 trucks in the family of medium tactical vehicles (FMTV) at Fort Bragg, North Carolina, last May marked a successful and early completion of the Army-wide program to improve the performance of the initial FMTV production model. The program had been slated to run through this year.

The upgrade by Stewart & Stevenson, manufacturer of medium tactical vehicles for the Army, included replacing the flywheel housing, drive shaft, yokes, and seals. The improvements were needed to eliminate the vibration-induced stress on U-joints and drive shafts experienced by the A0 model FMTV trucks when driven above 45 miles per hour on paved highways for long distances.

☐ A mechanic installs an improved yoke in an FMTV truck.

Production is now underway on the latest model FMTV truck. Army Acquisition Executive Paul J. Hoeper gave Stewart & Stevenson the go-ahead in early September 1999 to manufacture the A1, an enhanced version of the FMTV truck, after prototypes successfully completed 100,000 miles of extensive testing at the Aberdeen Test Center in Maryland. The A1 FMTV truck will be an improved model of what already has proven to be a durable and reliable vehicle. Many of the enhancements are the result of the field experience of the FMTV and a number of changes requested by soldiers to make their job easier.

3–D BODY SCANNER WILL MAKE UNIFORMS AND EQUIPMENT FIT BETTER

The Army Soldier Systems Center at Natick, Massachusetts, is using a three-dimensional laser body scanner, known as the whole body scanner, to improve the fit of soldiers' clothing and equipment. The scanner and data extraction software obtain 20 to 30 measurements of the human body in about 30 seconds. The measurements can be used to fit soldiers with properly sized uniforms, body armor, and chemical protective suits and masks.

Researchers will be using data gathered from these scans to update the Army's anthropometric data base. Anthropometry is the study of body measurements, especially variations within the general population. With this information, researchers hope to improve the design, fit, and sizing of soldiers' clothing and equipment.

The scanner captures the body surface by projecting a low-power laser stripe onto the subject. Once the horizontal laser strikes the surface of the body, it is reflected onto a photoelectric panel, which generates digital data that are sent to an adjoining computer. The computer uses the data to create points in space and enhances the image by connecting the points to make a three-dimensional digital model of the human body surface. Engineers then can manipulate the model using computer-aided design and engineering software.

Other uses of the scanner include medical applications such as fitting artificial limbs and fitting garments and masks for burn victims. There is commercial interest in the digitizer for use in cyber-art and computer animation.

The Soldier Systems Center's whole body scanner, produced by Cyberware in Monterey, California, is one of eight in use around the world.

LOADING CONTAINERS IN HALF THE TIME

For the past 2 years, Military Ocean Terminal, Sunny Point, North Carolina, has been the testing site for the direct access rail-to-ship (DARTS) spreader bar, a device that can lift two 20-foot containers simultaneously.

☐ **The DARTS spreader bar in action at Military Ocean Terminal, Sunny Point.**

"The idea behind the spreader bar is to develop a means to ensure that containers of various dimensions can be placed directly onto a ship," said Larry Branch of the 597th Transportation Group at Sunny Point, designers of the DARTS spreader bar. "The bar would allow containers of different sizes to be removed from railcars and placed on board the vessel as soon as they arrive."

Containers of various sizes and widths usually have to be segregated upon arrival and loaded with like sizes. The spreader bar adapts and shifts to allow immediate loading of the shipment. This saves time spent processing equipment and loading containers onto the vessel. The actual amount of time saved depends on how many and what type of containers are being loaded.

"This spreader bar is a great opportunity to leverage commercial technology and to enhance commercial container operations," said Lieutenant Colonel Matthew Gorevin, a concepts and technology analyst in the U.S. Transportation Command's Strategy and Policy Division, Concepts and Technology Team.

According to Gorevin, the spreader bar's greatest boon to the military could be its use during sustainment operations. "Sustainment operations are typically run out of commercial facilities; if adopted for use, the spreader bar could speed up loading containerships," he said. "Any equipment that can decrease loading times is viable to the transportation industry [and] is something to be looked at."

DISPOSITION OF DEMIL-CODED ITEMS EASIER

A searchable data base with instructions for disposing of demilitarization (DEMIL) code "F" items in the Department of Defense supply inventory is now on line at http://aeps.ria.army.mil. More than 67,000 items in the inventory are assigned DEMIL code F. These include weapon systems and their components, flight-safety-critical aircraft parts, and Navy nuclear items.

After obtaining a password, a user can log in, type in either a national item identification number or a key word, and pull up complete Federal Logistics Information System data for those items assigned DEMIL code "F." If material disposition instructions have been entered into the data base, they can be printed out and followed. If instructions are not available, the user can click on a hyperlink and obtain the name and phone number of the appropriate integrated material manager (IMM). Disposition instructions for these items must be obtained from the appropriate IMM before they are turned in to the Defense Reutilization and Marketing Service (DRMS).

In the past, before a military service could turn in a code-F item to DRMS, it first had to confirm that the DEMIL code was F, determine the appropriate IMM, request disposition instructions, and then hold the material until a response was received. That process was tedious and time-consuming and often resulted in the services' retaining physical custody and accountability of the material long after they had declared the item to be excess.

The web site for the data base was developed by Army Electronic Product Support (AEPS), the executive agent for Army Materiel Command web logistics initiatives, as a result of a joint effort by the Defense Logistics Agency, the Defense Logistics Information Service, DRMS, the Army Tank-automotive and Armaments Command, TDF Corporation, AEPS, and the Army Logistics Management College (ALMC). ALMC currently maintains a

demilitarization policy, procedures, and resources web site at http://www.almc.army.mil/demil. To request a copy of the DEMIL Code F User's Guide, send an e-mail to mackeyk@lee.army.mil.

NATICK DEVELOPS ADVANCED FOOD SANITATION CENTER

The Army Soldier Systems Center at Natick, Massachusetts, has developed a new food service sanitation center for use in the field environment. The advanced food sanitation center will replace two outdated systems currently being used—the mess kit laundry and the food sanitation center. The new system will provide a means to clean and sanitize food preparation equipment efficiently without the hazards associated with the old systems.

The mess kit laundry has three M67 immersion heaters that are placed in three 32-gallon waste cans to provide hot wash, rinse, and sanitizing water. The current food sanitation center consists of three sinks, each with a gasoline-powered M2 burner that is placed directly under it to heat the water. The new system will use one modern burner unit (fueled by JP–8) to heat the water for all three sinks simultaneously. Each sink has a steam valve to provide independent control of the water temperature required for that sink. The new unit is safer because food service workers no longer will have to stand

GUARD MAKES RECORD BARGE MOVE

The Indiana Army National Guard, working with the Military Traffic Management Command (MTMC), completed the largest Army National Guard deployment by barge in history last May. Over 1,100 pieces of equipment were transported on 64 barges from Indiana to the port of Alexandria, Louisiana, on the Red River.

The 76th Infantry Brigade (Separate), headquartered in Indianapolis, shipped the cargo in connection with a high-priority 2-week training rotation at the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana. Canal Barge Company, Inc., of New Orleans, Louisiana, loaded all of the military vehicles. Forty-five barges were loaded in Clarksville, Indiana; 15 in Evansville, Indiana; and 4 in Peoria, Illinois.

The 7-day, 800-mile voyage took the barges through 3 river systems—the Ohio, Mississippi, and Red—and 13 locks. Moving 24 hours a day, the barges traveled at an average speed of 8 knots per hour.

Comparing barge movement with rail movement, Major Jim Callahan, the brigade's logistics officer, said that, in shipment by barge, valuable time is saved by not having to shackle vehicles to rail cars and cover windows with tape. "With barges, you drive on and you drive off."

The barge operation also was praised by Richard Lolich of the Maritime Administration, U.S. Department of Transportation. "We just took hundreds and hundreds of heavy military vehicles and their crews off the interstate highway system," he said. "That represents a big savings in fuel and driver costs."

☐ Left, 17 barges of military vehicles arrive in Alexandria, Louisiana. Below, vehicles of the 76th Infantry Brigade come ashore at the port of Alexandria.

over the burner as it heats the water or remove the unit for refueling, and the fuel it uses is more stable than the gasoline used in the old system.

The sinks in the advanced food sanitation center are consistent with national food code standards and have center-mounted drains for quick drainage, compared to the old sinks that drain from the back, making it difficult to fully drain and clean the sinks after each use. Additional components of the new system include tables, fittings, hoses, collapsible drying racks, and a grease separator. Most components of the new system are available commercially, making it more economical. The new system will be available by the fall of 2001.

GENERATOR RETROFIT KITS AVAILABLE

Finding replacement engine parts for the 3-kilowatt electric generators used by the military services is no longer a problem, thanks to an economical retrofit kit available from Defense Supply Center Columbus (DSCC), Ohio.

The Army's gasoline-powered mobile electric power (MEP)–16A all-purpose generators, which cost approximately $9,000 each, have been used for nearly 20 years. They were becoming more and more difficult to repair because some engine parts were obsolete and not replaceable. The Marine Corps was experiencing similar problems with its diesel-driven generator set, MEP–16B.

The Army awarded a contract for the proof of concept that resulted in a competitive technical data package for the manufacture of retrofit kits for its generator engines. DSCC awarded a similar contract for the Marine generators and a subsequent contract for the manufacture of both the Army and Marine Corps kits. Additional kits will be manufactured as needed.

The Army's retrofit kit consists of 53 parts, including a diesel engine. It costs about $2,100, or $6,900 less than a new generator would cost. It can be ordered from DSCC (source of supply number S9C) by citing national stock number (NSN) 2815–01–440–4426.

The Marine Corps' retrofit kit contains 20 parts, including a diesel engine, and costs about $2,600, or $6,400 less than a new generator would cost. It can be ordered from DSCC by citing NSN 2920–01–418–0970.

For more information, call (614) 692–1796 or DSN 850–1796 or send an e-mail to David_Bowling @dscc.dla.mil or Walter_Meyers@dscc.dla.mil.

ALMC OFFERS INTERNET VERSION OF DRMOC-BASIC COURSE

The Army Logistics Management College (ALMC) at Fort Lee, Virginia, has developed an Internet version of the Defense Reutilization and Marketing Operations Course (DRMOC)-Basic. The course emphasizes the detailed mechanics of basic disposal operations, including the objectives, policies, and procedures involved in the reutilization, donation, sale, ultimate disposal, demilitarization, and other special processing of Department of Defense excess and surplus personal property. In this course, students learn the terminology used in the disposal world and the proper way to turn in property, as well as how to obtain disposal property.

Previously available only as a 3-week classroom course, the Internet version of the course can be taken by people who need to know more about DRMO but cannot attend a class. Students have 6 months to complete the course and can work on their own or be part of a controlled group in which the instructor monitors student progress. Weekly chat rooms will be scheduled for students participating in a controlled group.

A pilot instructor-monitored version of DRMOC-Basic began in late April. Anyone wishing to enroll in the program should call (804) 765–4638 or DSN 539–4638 or send an e-mail to broughtv@lee.army.mil.

SOME HUEYS TO GET NEW ENGINES

The Army plans to overhaul 160 T–53 engines for the UH–1 Iroquois helicopters. The "Hueys," as they are called, will be retired in 2004 under the Army Aviation Force Modernization Plan. Until then, units need the aircraft to conduct training and missions.

The Army has 975 UH–1 helicopters on hand; 365 of them are mission capable, and 610 are not flying. Currently, they are being used in the Sinai for the Multinational Forces Observer mission; at Fort Rucker, Alabama, for training; and at Davison Army Airfield, Fort Belvoir, Virginia, to transport Pentagon officials and others. Hueys also are used in Germany, at Fort Eustis, Virginia, and in many reserve component units.

The Army has been using the UH–1 helicopter since the late 1950's. It was referred to as the workhorse of the Army during the Vietnam War, because it was used to transport troops and equipment into combat and to evacuate wounded soldiers.

T–53 engines to be repaired will be drawn from a pool of helicopters that currently are grounded. Repaired UH–1's will be distributed among units on the basis of need, and priority will go to operations such as medical evacuation units.

UH–60 Black Hawks, which can carry more weight, will replace the UH–1's upon their retirement. After retirement, the UH–1's will be moved to the Aerospace Maintenance and Regeneration Center at Davis-Monthan Air Force Base in Arizona. Following processing, they will be disposed of or transferred to other Government

agencies for further use. Other options for retired UH–1's include public auction and donation to historical organizations.

DTIC CONFERENCE SCHEDULED

The Defense Technical Information Center (DTIC) will hold its annual users meeting and training conference 6 to 9 November at the Doubletree Hotel in Rockville, Maryland. The conference theme is "Information Solutions for the 21st Century." For further information, visit the DTIC conference website at http://www.dtic.mil/dtic/conferences.html, call (703) 767 8263, or send an e-mail to jfoscue@dtic.mil.

TRANSPORTABILITY GUIDE ON LINE

Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) Pamphlet 70–1, Transportability and Deployability for Better Strategic Mobility, dated September 1999, is available on the MTMCTEA web page, http://www.tea.army.mil/dpe/criteria.htm. The pamphlet is a guide to transportability and contains information about the various transport

FORT HOOD BATTERY SHOPS PROVIDE ONE-STOP SERVICE

The 602d Maintenance Company, 553d Corps Support Battalion, at Fort Hood, Texas, has created a one-stop service section that allows customers to exchange bad batteries for new ones that are fully charged and ready for operation. This one-stop reparable exchange service is made possible by two means: a Department of the Army battery model shop and a mobile battery shop called the "BattCAVE," which stands for battery charging and verification equipment. The DA model shop is a fixed facility that can pulse and charge 72 batteries every 24 hours, which is sufficient for all the battery needs of the 13th Corps Support Command and Fort Hood units. Pulsing removes the sulfate build-up on battery plates that reduces current flow and battery effectiveness.

The recently fielded BattCAVE is a portable battery shop that can fit into the back of a 5-ton truck or light medium tactical vehicle or on a palletized load system flatrack. It also can be sling-loaded by all but the smallest of Army helicopters. The introduction of the BattCAVE onto the modern battlefield can reduce downtime of battery-equipped systems significantly and save the Army thousands of dollars in shipping, handling, and purchasing costs.

The BattCAVE comes with a small multifuel generator that operates for 14 to 16 hours on one fueling. As an alternative, the BattCAVE can be hooked up to any 5,000-watt or larger tactical generator. It provides commanders with a deployable, modular capability that has the flexibility needed on the Force XXI battlefield.

The BattCAVE contains 8 pulse-chargers capable of renewing 16 to 48 batteries per day. A commercial "smart charger" pulses and charges at the same time. By charging and pulsing simultaneously, the time required to return a battery to service is cut in half. As a safety precaution, the BattCAVE's built-in ventilation system must be operational in order for the charging system to start. This feature can be overridden if required during wartime. Once pulse-charging is complete, the charger automatically shuts down to prevent over-charging that can result in acid boil-over or explosion. Because of these safety features, the portable battery shop meets or exceeds Occupational Safety and Health Administration safety requirements and can be used safely in both garrison and field environments.

☐ Batteries for use by III Corps units are tested and pulse-charged at the mobile battery shop.

modes, transportability testing, the virtual proving ground for transportability, and transportability in the acquisition process.

NUTRIENT PATCHES STUDIED

Scientists in the Department of Defense (DOD) Combat Feeding Program at the Army Soldier Systems Center, Natick, Massachusetts, are working on a nutrition patch that would help sustain soldiers on the battlefield.

The patch, called the Transdermal Nutrient Delivery System (TNDS), would work very much like the patches that are used to curb smoking. Instead of releasing nicotine, the patches would transmit vitamins and nutrients needed by the body. They would not replace food; they would be worn by warfighters only in extreme conditions for a day or two until they had access to food and time to eat it. The TNDS also could be used to transmit other chemicals that would help reduce combat-related stress, hunger, fatigue, or physical problems associated with prolonged exposure to cold weather or high altitude.

According to Dr. C. Patrick Dunn of the DOD Combat Feeding Program, the patch could have civilian as well as military applications. The patch could be worn by workers in stressful or hazardous environments, such as miners, oil rig workers, firefighters, and astronauts. Although the patches are still in the conceptual stage, the project has generated interest from several major companies that are interested in forming a partnership with Natick to explore its feasibility. Pending significant technological breakthroughs, the patch could be available to military personnel around the year 2025.

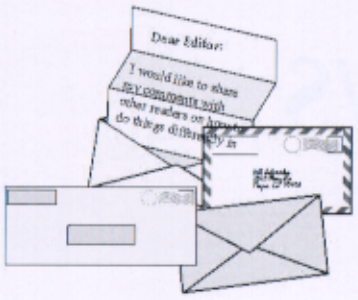
COMMERCIAL TECHNOLOGY REVAMPS LAND WARRIOR PROGRAM

Commercial-off-the-shelf (COTS) technology has revitalized the Army's Land Warrior program. Land Warrior is an integrated fighting system worn by dismounted soldiers that incorporates computerized communications, navigation, targeting systems, and protective equipment. Because the program appeared to be floundering in 1998, Colonel Bruce Jette, Project Manager-Soldier, Army Soldier Systems Center, Natick, Massachusetts, directed system developers to use COTS components whenever possible instead of military-unique items.

Since reversing the direction of the program, developers have implemented dramatic changes that have transformed Land Warrior's design and configuration. By incorporating existing commercial technology, system components can be upgraded as the equipment improves. This reduces maintenance costs, because often it is cheaper to replace a component than to repair it. Today, the system is smaller, lighter, more rugged, and costs less.

Most of the parts needed to retool Land Warrior systems are available on the open market. For example, researchers found 20 video cameras that were good candidates for passing imagery from a soldier's rifle to his headset display. These products offered features that allowed Land Warrior to take advantage of technologies not considered before. "Now we're getting almost everything we want at a reduced cost, plus a bunch of added functionality that we didn't know about," said Jette.

The Army plans to issue 34,000 Land Warrior sets to dismounted infantrymen and rangers. Fielding of Land Warrior 1.0 is expected to begin in fiscal year 2004.



LOG NOTES

Another Force Provider Unit

The article on Force Provider units in your *ALOG News* column in the May-June 2000 issue was missing one unit—the 643d Quartermaster Company (Force Provider). This unit recently was reorganized from a field service unit to a Force Provider. We are an Army Reserve unit located in Lewisburg, Pennsylvania. Thank you.

Ron Curley
Lewisburg, Pennsylvania

Conflicting Viewpoints

In the May-June *Log Notes* column, Ms. Sumrall from Fort McCoy, Wisconsin, commented that "maybe it would be wiser to not put conflicting attitudes on the same subject in the same issue." I have always felt that it is good to show conflicting viewpoints in the same issue. This allows us to immediately consider various facets of a given situation and, perhaps, come to a more reasoned conclusion. Showing the different sides at different times may cause us to forget a previous writer's arguments.

Clifton Officer, Jr.
Fort Polk, Louisiana

Soviet-Built Ships Used by U.S.

This letter is regarding the article, "Cold War Ship Carries Army Cargo," in your May-June 2000 issue. While the ship described in the article may be the first Soviet-built ship used by the U.S. military in the authors' experience, that is not the case in reality.

In 1994, the *Akademik Millionshikav* was contracted by the Military Sealift Command in London. The ship was to take U.S. military cargo from Rotterdam, The Netherlands, to Turkey for an exercise there. The ship turned out to be unsuitable for the cargo and was rejected. At that time, I was the operations officer for the Rotterdam office of Military Sealift Command, and Mr. Wim Schelvis was my assistant. The two of us were able to find another ship in port in Rotterdam that could be chartered to carry the goods to Turkey in sufficient time for the exercise. The replacement ship had been built in a Soviet shipyard 4 years prior, but this was her maiden voyage. I do not recall the name of the ship.

Kevin P. Burns
Kitzingen, Germany

Log Notes provides a forum for sharing your comments, thoughts, and ideas with other readers of *Army Logistician*. If you would like to comment on an *Army Logistician* article, take issue with something we've published, or share an idea on how to do things better, consider writing a letter for publication in *Log Notes*. Your letter will be edited only to meet style and space constraints. All letters must be signed and include a return address. However, you may request that your name not be published. Mail letters to EDITOR ARMY LOGISTICIAN, ALMC, 2401 QUARTERS ROAD, FT LEE VA 23801–1705; send a FAX to (804) 765–4463 or DSN 539–4463; or send e-mail to alog@lee.army.mil.

Writing for *Army Logistician*

Readers: Your comments and ideas can appear in *Army Logistician* on this page, or they can be developed into a commentary, such as those beginning on page 50. If you're not sure how to proceed, call us and we will help you turn your thoughts into printed words.

Managing, Deploying, Sustaining, and Protecting Contractors on the Battlefield

by Joe A. Fortner

In his second article on contractor support, the author continues his discussion of policy and doctrine for using contractors to support Army operations.

In the July-August issue of *Army Logistician,* I discussed the Army's successes to date in institutionalizing the use of contractors on the battlefield. Over the past year and a half, the Army Training and Doctrine Command/Army Combined Arms Support Command's Contractors on the Battlefield (CoB) Integrated Concept Team (ICT) has developed and published synchronized capstone doctrine and policy for using contracted support in Army operations. Those publications are—

- Army Regulation (AR) 715–9, Contractors Accompanying the Force, 29 October 1999.
- Field Manual (FM) 100–10–2, Contracting Support on the Battlefield, 4 August 1999.
- FM 100–21, Contractors on the Battlefield, 26 March 2000.

The two FM's define three types of contractors.

Theater support contractors support deployed operational forces under prearranged contracts or contracts awarded from the mission area by contracting officers serving under the direct contracting authority of the theater principal assistant responsible for contracting (PARC). They provide goods, services, and minor construction, usually through local vendors, to meet the immediate needs of operational commanders.

External support contractors provide support to deployed operational forces that is separate and distinct from either theater support or support provided by system contractors. To support the mission, they may perform according to pre-arranged contracts or contracts awarded during the contingency itself. Contracting officers who award and administer external support derive their contracting authority from PARC's outside the theater.

System contractors support deployed operational forces under pre-arranged contracts awarded by program executive officers, program managers, and the Army Materiel Command to provide specific support to materiel systems throughout their life cycle, during both peacetime and contingency operations. These systems include, but are not limited to, vehicles, weapon systems, aircraft, command and control infrastructure, and communications equipment.

When contractors support Army operations, they must be managed, deployed, protected, and sustained. The CoB ICT has defined and institutionalized significant elements of each of these areas.

Managing Contractors

The Army does not command and control contractors in the sense that it commands and controls military units and soldiers. Instead, contractors are managed, and the management mechanism is the contract itself. A contractor is obligated to do only what is specifically required by the contract. A commander who wants to change the performance requirements of a contractor's employees must work through the contracting officer to change the terms and conditions of the contract. Man-

aging contractors involves planning, visibility, and control, which is not unlike commanding and controlling soldiers.

Planning. As with any other aspect of military operations, planning is critical. During the planning process, commanders and staffs must remain aware of several factors—

- Contractor presence may be required because of force structure choices. For example, if a commander wants to use a high-tech weapon system as part of his operation, he almost certainly will need contract technicians in his area of operation to keep the system operational.
- Contractor presence also may be mandated by preexisting circumstances. One good example is the base camp operations currently supporting operations in Bosnia. These camps are constructed and completely operated by contractors.
- Contractors may impact force projection. For example, if a weapon system requires contractor support, deploying the system will mandate near-simultaneous deployment of the contractor's personnel and equipment. This must be accommodated on the time-phased force deployment list (TPFDL). On the other hand, use of theater support contractors benefits the force-projection process by providing an in-place capability that does not have to be deployed. Moreover, the assets that would have been used to deploy that capability can be used for something else.

To support the planning aspects of contractor use, FM 100–21 defines the requirement for contractor annexes to the commander's support plan. These annexes individually address managing, deploying, protecting, and sustaining contractors.

Visibility. Commanders must maintain situational awareness of contractor personnel, equipment, and operations. This requirement is tempered somewhat by circumstances. For example, the commander always will require fairly detailed accountability of the system contractors who keep his high-tech weapon systems operational. He may not require such scrupulous awareness of the theater support contractor's laborers supporting his base operations. In any case, mechanisms already exist to help the commander achieve that situational awareness. FM 100–21 recommends using existing Army management information systems to maintain visibility of contractor personnel and operations just as if they were military.

Control. Normally, supervisory authority for contractor personnel resides with the contractor. This does not, however, deprive the commander of substantial control. He can exercise indirect control of contractor personnel through contract terms and conditions, assimilation of command directives into employer-employee agreements, and attachment of contractor personnel (with special reporting procedures) to specific military units. The commander can direct a subordinate unit to provide administrative accountability of contractor personnel. Moreover, contractor personnel must adhere to all guidelines and obey all general instructions issued by the commander. Violations may result in limited access to facilities or revocation of any special status the employee enjoys. In extreme cases, the commander can direct removal of an employee from the area of operations.

The control process is complicated by the differing coordination requirements of the various contractors. Theater support contracts exist through the authority of the theater PARC, who is directly subordinate to the theater commander. Coordinating the contractors' activities, controlling their operations, and modifying their contracts are relatively straightforward. But external support contractors and system contractors operate under the authority of other PARC's. Coordinating and controlling their activities and executing changes to their contracts are significantly more complicated. Currently, the Army does not have a good mechanism to resolve this issue.

One specific issue concerning control of contractor personnel that has generated significant debate is the issue of contractor uniforms. In the past, commanders frequently have directed that contractor personnel in their areas of operations wear the same uniforms that their soldiers wear (typically battledress uniforms). While there are no laws specifically prohibiting this practice, neither are there any laws specifically requiring it. Therefore, the CoB ICT treated this issue as a policy matter rather than a legal matter. The resulting policy, published in AR 715–9, states that contractors are not authorized to wear military uniforms. The only exceptions are special-purpose uniform items such as chemical protective gear, extreme climate gear, and mission-specific safety equipment. It is entirely appropriate for contractor personnel to present a uniform appearance, but not in U.S. military uniforms.

Deploying Contractors

Supporting Army operations with contractors requires deploying contractor personnel and equipment into the area of operations. Deploying contractors requires dealing with habitual relationships; TPFDL's; preparation for overseas replacement (POR) or movement (POM); and reception, staging, onward movement, and integration (RSO&I).

Habitual relationships. Habitual relationships exist

at two levels: between the corporation and the Army at management levels, and between the contractor employee and the unit at individual level. Both relationships are important, particularly with system contractors. During both peacetime and war, system contractor employees typically work directly in the unit they support. They effectively become part of the unit. This fosters personal relationships that can be very meaningful in high-stress, dangerous situations on the battlefield. Soldiers usually are more willing to risk themselves to protect their "buddies," even when the buddies are contractors. To the extent permitted by the type of contractor and the nature of the contract, habitual relationships should be fostered.

☐ Civilian contractors working for Brown & Root Services Corporation make repairs on a bomb shelter located near Camp Bondsteel, Kosovo.

TPFDL. During a deployment, the TPFDL establishes the order of priority for moving individuals and units. It establishes contractor importance in the support effort. It is helpful to have established habitual relationships between system contractor personnel and units, because the employees are part of the deploying units and are included on the TPFDL with them. External support contractors may or may not have habitual relationships. Nevertheless, if the support they provide is critical, they will have to deploy as if they were military units. If the contractors cannot self-deploy, the contractor personnel will have to be placed on the TPFDL. This can be difficult; many commanders are less than enthusiastic about putting civilian personnel and equipment into the deployment flow ahead of soldiers and warfighting equipment. This is a major planning issue that must be addressed for each operation. While the basic doctrinal requirements surrounding this issue have been identified, the tactics, techniques, and procedures for accomplishing it routinely still must be developed.

POR/POM. POR/POM is a relatively straightforward process for soldiers and units. The requirements generally are determined by regulations, and they apply equally to all. With contractors, the situation is not so straightforward. For example, soldiers can be required to undergo immunization; contractor personnel cannot, unless the requirement is specified in the contract. Certain types of required training, such as weapons qualification and use of deadly force, may not apply to contractors. However, many POR/POM items are applicable to contractor personnel. These include updated medical and dental records, passports, next-of-kin information, theater-specific training requirements, and identification tags or cards.

For system contractor personnel, POR/POM qualification may be accomplished with the unit. However, external support contractors may not have a habitual relationship with a unit, so their POR/POM qualification must be handled some other way, such as processing the employees in a group as if they were a military unit or sending them to processing centers one at a time. Some contractors have, in the past, obtained the necessary forms and instructions from the Army and prepared themselves for overseas movement.

Whatever the case, there are costs and administrative procedures associated with the POR/POM process that must be planned into the deployment process. FM 100–21 encourages incorporation of standardized procedures into contract language to cover this requirement.

RSO&I. All contractor personnel entering an area of operations to support Army operations must be received, staged, moved onward, and integrated. Theater support contractors are already there, but they also must be integrated into ongoing Army operations. As with POR/

POM qualification, there are several mechanisms to "RSO&I" contractor personnel. The process is affected by distribution system capacity, in-theater training requirements, costs, the best interests of the Government, and the contractor's ability to meet RSO&I requirements. FM 100–21 encourages standardized language in contracts, but the tactics, techniques, and procedures still must be developed.

Sustaining Contractors

Sustaining contractors involves all aspects of Government-furnished life support, facilities, distribution, and Government-furnished equipment.

Life support. Life support includes items such as mail service, field services, medical support, morale support, religious support, legal services, and mortuary affairs support. Contractors need such support just as soldiers do. Generally, it is more appropriate to provide such support from Government or military sources than to have the contractors bring their own capability into the area of operations. Sometimes, however, this is not feasible and contractors have to support themselves. Generally, theater support contractors obtain life support from local sources. System contractors are dispersed throughout the area of operations in habitual relationships with the units they support, so they normally obtain life support along with the soldiers in the unit. This support should be specified in the terms and conditions of their contract. External support contractors obtain life support from the Army or support themselves, depending on the terms of the contract. The decision normally will be based on the number of contractor personnel, the contractors' ability to support themselves, and the best interests of the Army.

Facilities. Contractors must have operating and living facilities. One of the frequent problems associated with contractor living facilities is that the contractors compete with the Government for limited available resources, thereby driving up the costs. Contracts must be written carefully to ensure that this does not happen. In some cases, it may be necessary to write terms and conditions into the contract to house contractor personnel with supported military units. In other cases, the Government may contract with host nation or local national providers for facilities and permit contractor personnel to use them at no cost.

Distribution. When contractors support an Army operation, they impact the distribution system just as military units do. They must be able to ship and receive supplies, move to and from their living and work areas, and maintain their equipment. Contracts should be written to encourage maximum contractor use of commercial distribution capabilities consistent with the military operation the contractor is supporting. This minimizes the contractor's impact on the distribution network.

Government-furnished equipment. Contractor use of Government-furnished equipment minimizes the need for large quantities of commercial equipment in the area of operations. For example, providing the contractors with high-mobility, multipurpose wheeled vehicles means that they do not have to deploy their own pickup trucks into the area of operations. Furthermore, contractor use of Government-furnished communications and automatic data processing equipment helps maintain necessary Government-contractor interfaces. This facilitates both operational and administrative aspects of contractor support operations. But there are costs associated with this. If the Government provides equipment for contractor use, the Government very likely will assume the maintenance burden associated with the equipment. The CoB ICT recommends that the Government provide equipment to contractors at no charge whenever possible. If contractors are required to pay for equipment, that cost, along with contractor overhead and profit margins, is billed to the Government. When Government equipment is furnished to contractors, contracting officers should ensure that the Government receives appropriate considerations and contract cost reductions.

Protecting Contractors

Contractors are not soldiers, and they cannot be specifically and deliberately exposed to the same risks as soldiers. They must be protected. This involves issues such as legal status, personal firearms, security, battlefield location, and nuclear-biological-chemical (NBC) protection.

Legal status. Under the laws of land warfare, contractors are neither combatants nor noncombatants. They occupy a special niche called "civilians authorized to accompany the force." As such, they are entitled to some, but not all, of the protections afforded combatants and some, but not all, of the protections afforded noncombatants. Inherent in this status are some interesting and complex aspects of contractor use on the battlefield.

Contractor personnel cannot be targeted deliberately for military action. But the function they are supporting can be. If the function is targeted and contractor personnel are killed or wounded, the law of land warfare regards them as legitimate collateral casualties.

Contractors cannot engage in activities inconsistent with their status. They cannot perform any purely military functions. They cannot participate in attacks on the enemy, nor can they occupy defensive positions to secure the unit perimeter. This point is critical. Combatants (soldiers) are uniquely privileged to conduct war.

In doing so, they can knowingly and deliberately kill opposing soldiers. No civilian ever has that right. If a soldier kills during warfare and subsequently is captured, he can be held only as a prisoner of war. A civilian who kills during warfare and subsequently is captured can be held, tried, and punished as a criminal. This is a powerful reason for not permitting contractor personnel to wear military uniforms; it avoids the potential for jeopardizing the soldiers' protected status. As long as contractor personnel do not violate their legal status, they are entitled to prisoner-of-war status if they are captured.

Contractors cannot perform functions in direct support of hostile operations. As contractors provide ever-increasing support to the Army, this constraint becomes more and more important. However, it is extraordinarily difficult to determine the limits of this constraint. A system contractor employee who travels to the area of operations to perform minor technical maintenance on a weapon system that is still operational and capable of performing its intended mission may be violating the constraint against support to hostile operations. On the other hand, the same person performing the same maintenance on the same item in a maintenance facility in a safe area may not be in violation of the constraint.

Personal firearms. Contractor personnel can be armed only for self-defense. FM 100–21 defines three conditions that must be met before contractor personnel can carry firearms. First, the relevant commander in the area of operations must approve the carrying of firearms by contractors. Second, the contractor company policy must permit its employees to carry arms. Third, the individual contractor employee must agree to carry a firearm. If all three conditions prevail, contractor employees can be issued military-specification, personal-defense firearms (M–9 pistols). They must be trained to use the firearms; they must be trained in using deadly force; and they must use military-specification ammunition. Above all, contractor personnel must use a firearm only for the purpose of defending themselves.

Security. As stated above, contractors cannot provide their own security; that is a military function. This means that soldiers must protect contractor personnel. This is a significant issue in determining the overall cost of contractor support, and it reinforces the fact that contractors do not and cannot replace the uniformed force structure.

Battlefield location. As contractors increasingly provide support, the Army will have to deal with them virtually anywhere on the battlefield. While contractors normally will not be assigned at division level or below, they will perform many of their functions, circumstances permitting, within the division's operating area. Therefore, commanders always must remain aware of the mission, enemy, terrain, troops, time, and civilian considerations impacting the ability of contractors to perform their duties. Every contract, and every contemplated use of contracted support, requires a risk assessment based on the commander's mission and critical support requirements, the commander's ability to protect contractors, the costs associated with protecting contractors, and the nature and extent of the threat. These items affect any decision to use contracted support. Battlefield location is one of the most pervasive issues affecting a commander's ability to plan contract support into his operation.

NBC threats. Everyone in an area of operations is equally vulnerable to NBC threats, and everyone requires the same minimum-essential protection. There are costs, both in equipment and in training, associated with preparing contractor personnel to survive NBC attacks.

Contractors always have supported the Army and will continue to do so in the future. As contractor use becomes more institutionalized, more and more functions will be contracted out. Commanders and their planning staffs must be prepared to receive significant support from contractors in all military operations and under virtually all conditions.

The Army is only beginning to institutionalize contractor support. In future operations, commanders and their staffs will face ever-increasing requirements to manage, deploy, sustain, and protect contractor personnel. While the capstone doctrine supporting these efforts is written and published, it is not detailed. Doctrine at the tactics, techniques, and procedures level is yet to come. **ALOG**

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Integrating Medical Logistics Assets

by Captain Nina L. Knuckles

When resources were limited and missions were abundant, the 10th Mountain Division (Light Infantry) found a smart way to "do more with less."

In February 1999, the commander of the 710th Main Support Battalion's (MSB's) medical company and the officer in charge (OIC) of the 10th Mountain Division's medical supply office (DMSO) decided they were tired of "doing more with less."

Over an 8-month period, their units at Fort Drum, New York, had supported the division's class VIII (medical materiel) demands for two Joint Readiness Training Center rotations at Fort Polk, Louisiana, two Sinai deployments, one Panama deployment, one 96-hour emergency deployment readiness exercise, task force deployments to Kuwait and Bosnia, immunization of over 10,000 soldiers, and numerous training exercises. All were supported with 98-percent fills on requests and with less than half of the authorized staffs.

After many conversations with branch managers and G1 (personnel, administration, and finance) strength managers, it became evident to the medical company commander and the DMSO OIC that there was no way around the "do more with less" situation. So the two Medical Service Corps officers looked for another way to solve the problem by asking themselves a new question, "How can we do more with less, *smarter*?"

They consulted the chief of logistics at the local medical department activity (MEDDAC), who agreed to help find an answer. The MEDDAC logistics division, also known as the installation medical supply activity (IMSA), is an Army Medical Command (MEDCOM) activity that provides healthcare, dental care, and veterinary support to Fort Drum, an Army Forces Command (FORSCOM) installation, and to qualified recipients in a large portion of New York and New England. For this reason, the IMSA is the DMSO's next higher echelon of support for class VIII. The task of supporting Fort Drum, including the 10th Mountain Division, was the common denominator of the FORSCOM DMSO and the MEDCOM IMSA.

A few hours of collaborative research by the MSB medical company commander, the DMSO OIC, and the MEDDAC chief of logistics revealed the following facts—

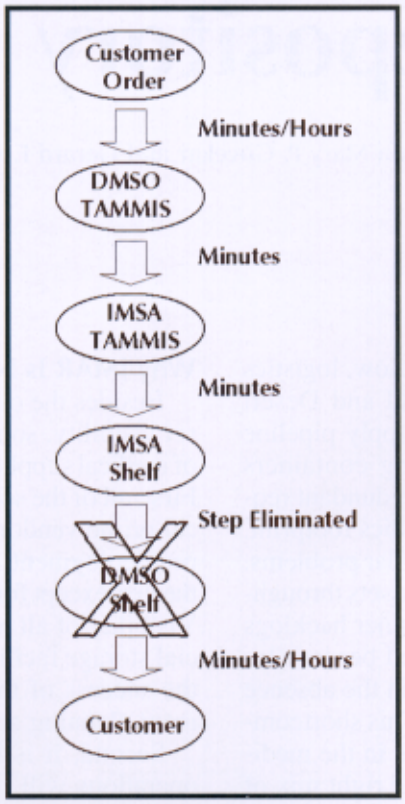
- The DMSO had 192 lines of stock on their authorized stockage list (ASL), and the IMSA carried 80 percent of those lines.
- One hundred percent of the pharmaceuticals and 60 to 65 percent of the medical surgical items on the DMSO's ASL were available from prime vendors, who guarantee a 24- to 48-hour response and a 90-percent or greater fill rate.
- The 10th Mountain Division incurred a $95,000-a-year drug destruction cost that resulted from rotation of stocks in the DMSO warehouse and in the medical equipment sets throughout the division.
- The DMSO staff was authorized one officer and five enlisted soldiers; the IMSA was authorized 2 officers, 6 enlisted soldiers, and 18 civilians.

A thorough analysis concluded that consolidating and collocating MEDCOM and FORSCOM medical logistics assets at Fort Drum would be the *smart* answer. Factors leading to the decision included—

- Collocating DMSO and IMSA would facilitate communication, eliminate confusion, and ensure that the IMSA was fully aware of the division's priorities.
- Because the DMSO would be collocated with the IMSA, there would be no need for the DMSO to keep stocks on hand. The DMSO's ASL could be consolidated with the IMSA's ASL, and the IMSA could increase its stocks to meet the division's requirements on

an as-needed basis. The IMSA would manage the ASL, with assistance from the DMSO.

- Collocating the sections would facilitate better customer service. Once a unit placed an order, the order would be passed immediately through the DMSO's Theater Army Medical Management Information System (TAMMIS) to the IMSA's TAMMIS. The request would be filled directly off the shelf and placed into the customer's bin. The DMSO staff would assist IMSA with warehouse operations, and there would be no more waiting—sometimes for days—before a DMSO soldier could be spared to go to the IMSA to pick up a needed item that the DMSO did not have in stock.
- Since the division no longer would have a tangible ASL, the DMSO would be relieved of the requirement to conduct a separate quality control program. The DMSO would help the IMSA to ensure that all medical logistics soldiers were competent in the critical area of quality control.
- Using prime vendor contracts would eliminate the need for the DMSO to keep deployable stocks on hand for itself and for task force contingencies. Deployment and contingency packages of perishable stocks could be created and added to the prime vendor contract, and nonperishable deployable packages could be maintained by the DMSO in all-weather storage containers.
- Since the division no longer would have a tangible ASL, the need to rotate warehouse stocks would be eliminated. This would eliminate a significant portion of the drug-destruction costs.
- Typically, an IMSA has a comprehensive biomedical maintenance staff of experienced senior maintenance noncommissioned and warrant officers, while biomedical maintenance repairman authorizations in most DMSO's are junior enlisted slots. Consolidating the IMSA and DMSO staffs would mean that an older, more experienced staff would be available to mentor and train young soldiers and, at the same time, reduce the time that division medical equipment is not operational.
- Integrating the MEDCOM and FORSCOM medical sections would expand military occupational specialty training opportunities for DMSO soldiers. In addition, they would be exposed to a greater level of sophistication, thus preparing them for future assignments. Their experience with TAMMIS, the Army Medical Department Property Accountability System, and the Defense Medical Logistics Standard Support System would be increased significantly.



□ Consolidation of IMSA and DRMO assets at Fort Drum eliminated from the class VIII requisitioning process a step that took hours, and sometimes days, to complete.

Integrating MEDCOM and FORSCOM medical sections to support a division is not a new concept. Medical companies of MSB's manage the personnel responsible for providing preventive medicine, optometry, and mental health support to the division. These sections often, if not always, work hand in hand with MEDDAC staffs to support the division and the installation. However, the integration of MEDCOM and FORSCOM *logistics* elements is a new concept.

Consolidating some of the DMSO's and IMSA's supply processing procedures has given the DMSO more time for equipment maintenance and individual skills training. It also has increased the time available to focus on more customer-oriented services, such as customer assistance visits to division medical units.

The integration of medical logistics assets at Fort Drum already has proven to be very beneficial. One of the keys to this success is a comprehensive and viable memorandum of agreement (MOA). This document provides guidelines for both parties to conduct their medical logistics mission in support of the division and installation in a collocated environment. For a copy of this MOA, contact the Fort Drum MEDDAC Logistics Section at (315) 772–4006 or the 10th Mountain Division (Light Infantry) DMSO at (315) 772–3540 (DSN 341–3540).

Fort Drum has established a template for optimized medical logistics support to FORSCOM units that will reap benefits for the 10th Mountain Division for many years to come. This template easily could be used to benefit other medical logistics units throughout the Army. **ALOG**

Captain Nina L. Knuckles is the Division Medical Planner for the 10th Mountain Division (Light Infantry) at Fort Drum, New York. She has a bachelor's degree in English education from Florida Southern College. She is a graduate of the Medical Service Corps Officer Basic and Advanced Courses, the Northern Warfare School, the Air Assault School, and the Human Resources Management Course.

Developing a Joint Medical Asset Repository

by Captain Mary P. Govekar and Gerard F. LoSardo

As most military logisticians know, logistics support during Operations Desert Shield and Desert Storm was a constant nightmare. The supply pipeline was clogged with thousands of shipping containers whose contents were unknown and with redundant requisitions, all of which caused a large logistics footprint. The medical logistics system suffered similar problems. The inability to "see" the flow of medical assets throughout the distribution pipeline created container backlogs and duplicate requisitions. Chaos resulted because logisticians were forced to operate blindly in the absence of the most fundamental asset visibility. This shortcoming led to a widespread loss of confidence in the medical logistics community's ability to get the right mix of supplies and equipment to healthcare providers in a combat zone.

The U.S. Army Medical Materiel Agency (USAMMA) at Fort Detrick, Maryland, is addressing this problem on behalf of the joint medical logistics community. Through its Medical Logistics Total Asset Visibility (MEDLOGTAV) Office, USAMMA began developing the Joint Medical Asset Repository (JMAR) in 1997. JMAR is a data warehouse that will function as the single authoritative source of medical logistics data for the Joint Total Asset Visibility (JTAV) Program. When JMAR development is completed in 2004, commanders at all levels from all military services will have access to the medical logistics data necessary for logistics planning and execution. JMAR will enable medical logisticians from all services to develop and execute logistics support in line with the supported commander in chief's priorities and that is based on joint logistics data that combine assets with needs.

Why JMAR Is Needed

Besides the obvious benefits of establishing total asset visibility, some unique traits and business practices of medical supplies drive the urgency for creating JMAR. First, all of the services rely almost exclusively on medical prime vendors and the manufacturing base for both pre-deployment surge support and sustainment in the theater, except for several hundred military-unique items. Visibility of all medical assets in military and commercial storage facilities and distribution pipelines is key to the success of the joint medical community's deployment planning and sustainment support.

Second, it is likely that medical logistics in future operations will use the Single Integrated Medical Logistics Manager concept, in which one service is responsible for all medical logistics support in a theater. JMAR will provide the tools needed to ensure that medical materiel is managed, allocated, and distributed jointly rather than in a stovepipe fashion within each military service.

How JMAR Works

JMAR does not create new data. Instead, it accesses data in existing service and wholesale medical logistics automation systems. JMAR is designed to act as a "one-stop shop," where all medical logistics information is combined so that logisticians and planners can see what is available, what is incoming, and what is currently in the logistics pipeline.

The scope of JMAR's capabilities will remain consistent with the capabilities required for medical asset visibility stated in JTAV's Functional Requirements Document. JMAR ultimately will provide visibility of

The U.S. Army Medical Materiel Agency is developing a "one-stop shop" for medical logistics information to meet the medical logistics total asset visibility needs for all military services.

all medical assets at the tactical (retail), operational (intermediate), and strategic (wholesale) levels. It will show all assets in storage, in process, in transit, and in theater and will include visibility of blood, blood products, and medical-unique equipment repair parts.

How JMAR Is Being Developed

USAMMA devised a three-phase strategy for developing JMAR. A proof of concept was developed and implemented in phase 1, which was completed in September 1998. The proof of concept integrated six medical materiel data sources and two catalog data sources into the JMAR data warehouse. For the test, JMAR developers selected a small number of medical logistics automated management information systems that represented all services and all operational levels. Data were accessed with a system of canned queries that provided basic visibility of equipment items, war reserve materiel, and selected component items. The queries also allowed users to sort data by a variety of data fields, such as owning service, organization, location, and condition code.

Phase 1 also provided visibility of a small amount of commercially stored assets owned and managed jointly by USAMMA and Defense Supply Center Philadelphia, Pennsylvania. This represented an initial, though extremely limited, step toward using JMAR to show readiness-significant assets at the wholesale level.

JMAR is currently available to medical logisticians on the Internet at http://jmar.detrick.army.mil. After registering and obtaining a password from USAMMA, users will be able to see asset profiles of various service-owned, pre-positioned medical war reserve materiel at both stateside and theater storage sites. Queries and displays are both user friendly and functional. Completing phase 1 established JMAR as the first web-based source of medical asset visibility available to all Department of Defense (DOD) planners and warfighters. However, it represents only an embryonic capability that is based on a small number of participating data sources.

JMAR Development Phases

Phase	Fiscal year
1. JMAR Proof of Concept	1998
2. Active Component Integration	1999-2001
3. Reserve / Wholesale Integration	2002-2004

Phase 2 will provide a much more robust capability than phase 1. First, JMAR will bring in considerably more data by expanding the number of data sources that "feed" the JMAR data warehouse. Second, query capabilities will be expanded and refined. Scheduled for completion by the end of fiscal year 2001, the objective of phase 2 is to capture and integrate all relevant logistics data on all service-owned active component medical materiel and secondary items into JMAR. Additional visibility will include—

- Supply and equipment on-hand balances and shortages for all medical kits in active component, forward-stationed, and deployed Army, Marine Corps, and Air Force units.
- Medical materiel on board Navy ships and in fleet hospital medical materiel sets.
- Assets at all DOD fixed-facility hospitals.
- Service-owned medical chemical-defense materiel.
- Blood inventory status, blood shipments, and disposition data for specific blood products.

One of phase 2's more ambitious objectives is to build a powerful capability for comprehensively viewing and analyzing biomedical maintenance. The JMAR goal goes beyond merely providing the maintenance status of equipment assets and all known sources of applicable repair parts and support kits. JMAR also will allow planners to extract and manipulate management data so they can look into systemic maintenance problems or conduct trend analyses. These data may target a specific item of equipment and include such elements as maintenance history, average equipment downtime, average annual maintenance cost, and average annual man-hours used.

Phase 3 of JMAR's development is scheduled for completion by January 2004. The goal is to integrate data from reserve component medical units and the

wholesale sector into the system. It will interface with emerging medical logistics automated information systems as they are fielded, such as those being developed by the Defense Medical Logistics Standard Support Office. The Readiness Management Application, which is being developed at Defense Supply Center Philadelphia, will be the primary system used to capture wholesale medical asset data.

What JMAR Will Do for the Logistician

JMAR's true value will be realized only when all of this information can be integrated and presented to the logistician in a useful fashion. Therefore, one of USAMMA's key objectives is to embed a certain level of decision support capability in JMAR by fusing asset visibility, requirements data, and materiel sources. For example, JMAR eventually will provide the logistician of a deploying hospital unit with the fill percentage of pre-positioned combat support hospital medical materiel sets that are scheduled to be handed off to his unit upon arrival at the theater reception and staging area. The logistician could compare unit-owned assets to JMAR-identified shortages and include this information in his deployment plan. The logistician then could coordinate with USAMMA, which, as the Army's service item control center for medical materiel, would use JMAR to identify alternative wholesale sources to satisfy known shortages. The unit then could acquire assets rapidly and have them shipped to the theater and included with the pre-positioned materiel.

Another challenge for JMAR's developers is to provide visibility of wholesale-level and commercially available medical materiel. In the last 5 years, Defense Supply Center Philadelphia, acting as the DOD wholesale-level medical materiel provider, has partnered with the armed services to develop acquisition tools that will enable the rapid and economical procurement of medical materiel to support contingencies. These initiatives usually involve innovative contractual agreements with the commercial sector.

One result of this partnership is the stock rotation contract. A stock rotation contract allows for Government-owned medical materiel with short potency periods (such as narcotics or laboratory reagents) to be rotated through a commercial vendor's peacetime sales volume to minimize losses due to potency expiration. Another payoff is the implementation of vendor-managed inventory, in which a commercial vendor guarantees the availability of select medical materiel for military use during a contingency. The challenge is for JMAR to capture and integrate this information from commercial and industrial bases, fuse it with materiel data obtained from military sources, and provide it in a form useful to medical materiel managers, planners, and commanders. For example, a deploying medical unit should be able to obtain an asset and shortage profile for pre-positioned medical equipment sets designated for that unit. The deploying unit commander then could fuse those data with a profile of assets from vendor-managed inventory or current stock rotation contracts to determine potential commercial sources that would meet shortages.

The potential sources will grow in number if and when JMAR is able to obtain true commercial asset visibility of medical prime vendor inventories. Such visibility not only will identify numerous commercial sources for medical requirements, but also will help determine which products to standardize based on usage trends in the commercial market. At its present stage of development, JMAR does not possess a decision support capability. USAMMA's goal is to acquire such a capability during phase 3.

A key issue regarding JMAR's design is ease of user access. Users currently are able to access JMAR through the World Wide Web. The user friendliness afforded by using the web as a gateway fulfills the JMAR vision of access to any user, at any time, on any machine.

Development of medical logistics total asset visibility not only is a key milestone toward the objective of joint management of medical assets; it also is critical to managing medical materiel effectively under the new business practices that the medical community is implementing. To be effective in this environment, MEDLOGTAV must include visibility of both DOD-owned and commercial assets and show items that are unique to the medical logistics discipline, such as blood and medical-unique repair parts. MEDLOGTAV also must offer the data in a flexible and friendly mode that is useful to medical logisticians and planners at all levels. Once completed in 2004, JMAR will deliver this vision. ALOG

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Technologies for Tracking and Caring for Injured Soldiers

by Captain Derek C. Cooper

Reductions in force structure and changed perceptions of future battlefields are forcing the Army to place more emphasis on the individual soldier as part of an integrated fighting system. Advancing technology is requiring every soldier to become a systems manager. Consequently, "mean time to repair" increasingly becomes as important for humans as it is for machines. As the centerpiece of our high-tech systems, soldiers are indispensable. Machines are relatively quick and easy to replace, but soldiers take longer to acquire, prepare for use, and replace. Public opinion, now more than ever, demands extremely low or nonexistent casualty rates, and today's soldiers take for granted the presence of world-class medical care on the battlefield.

When serious injuries occur, the difference between life and death often is determined by the care received within the first "golden" hour. Historical studies show that nearly 70 percent of deaths resulting from injuries received in battle occur within the first hour. Joint Health Service Support (JHSS) Vision 2010 states, "The single most critical time for treatment of a casualty is the first ten minutes."

If the Army Medical Department (AMEDD) is going to remain relevant and continue to provide combat health support for the Army, it must undergo a revolution in medical affairs corresponding to the ongoing Revolution in Military Logistics. Much has been said about Army redesign and its associated combat service support (CSS) concepts. Many of the principles that apply to the logistics community also apply to AMEDD. The adoption of advanced technologies is making CSS more efficient. By using embedded diagnostics and prognostics and other data technologies to gain total asset visibility (TAV), velocity management, and improved maintenance capabilities, the Army is reducing its logistics footprint on the battlefield. If, as former Chief of Staff General Dennis J. Reimer said, "soldiers are our credentials," then the Army and AMEDD must develop and apply technologies that will keep our most crucial and indispensable system, the soldier, in the fight.

AMEDD must use evolving medical and logistics technologies to achieve TAV and velocity management to locate and track patients. It must develop fully integrated medical products along with information and communications solutions to link all echelons and all U.S. military services' medical capabilities effectively in a seamless system. To stay relevant, AMEDD must reduce its footprint on the battlefield by improving its capabilities for locating and treating casualties within the golden hour and returning them to duty as soon as possible. AMEDD must search for emerging technologies in three distinct areas: evacuation and treatment platforms, information and communication technologies, and medical care equipment.

Medical Evacuation and Treatment Platforms

Hospitals are vital to saving soldiers' lives, but they are costly in terms of people, equipment, and space. More importantly, hospitals lack mobility and are located significantly to the rear of the battle. Consequently, for the last 50 years, medical evacuation and treatment platforms have been the centerpiece of AMEDD's wartime role. These platforms have been the primary element used to clear the battlefield.

The Army Surgeon General's current number-one priority for modernizing the medical force is the UH–60Q aeromedical evacuation helicopter, followed closely by the armored medical evacuation vehicle (AMEV) and the armored medical treatment vehicle (AMTV). These priorities are driven primarily by lessons learned during Operation Desert Storm. During that operation, AMEDD found that the speed of combat operations greatly extended lines of evacuation and ultimately exceeded the capabilities of its M113 ground ambulance, M577 emergency treatment vehicle, and aeromedical evacuation paltforms. The AMEV, AMTV, and UH–60Q may well

resolve this disparity for today's Army, but they likely will leave AMEDD no better off in the year 2010 than it is now. Purchasing large quantities of the AMTV's and AMEV's will be a sure sign that AMEDD is looking to fight the last war.

The AMEV is built on a Bradley fighting vehicle chassis and has been clocked at 43 miles per hour. That speed should keep medics close to the warfighters they support. The AMEV dramatically improves nuclear, biological, and chemical protection; mobility; casualty care; and survivability over today's M113 ground ambulance.

The AMTV, which also is built on a Bradley chassis, is equally impressive. In comparison to the M577 emergency treatment vehicle, it provides much improved survivability, protection, interior design, environmental support, and mobility. However, neither the AMEV nor the AMTV currently has production funding, and both use "creep-ahead" technology. AMEDD leaders are trying to get procurement funding in the budget plans for fiscal years 2002 to 2007. Units then would be equipped sometime between 2005 and 2010. By 2010, these systems will be no more capable than the M113 and M577 were during Operation Desert Storm. AMEDD must integrate its modernization plans with those of the rest of the Army.

Although senior Army leaders already are looking for successors to the Abrams tank and Bradley fighting vehicle, they are not planning to replace these aging systems in the next 10 years. Instead, they are investing in future technology. According to the Army Science and Technology Master Plan, "while contributing to both the survivability and lethality of combat vehicles, mobility technology plans call for doubling the cross-country speed of combat vehicles; [and] by 2005, a 40-percent increase of cross-country speed of a 40-50 ton combat vehicle will be demonstrated." In 1997, General Reimer said of traditional technologies—

> All services should commit to a force development strategy that eschews marginal improvements in capabilities that result from the incorporation of "creep-ahead" technologies and focus instead on an approach [that] produces revolutionary improvements in capabilities through the incorporation of "leap-ahead" technologies . . . Our current capabilities are adequate with some focused enhancements to successfully implement the NMS [National Military Strategy] at least through the year 2010. Accordingly, it appears prudent to delay large-scale modernization of some capabilities during the next decade while we invest more significantly in the development of leap-ahead capabilities.

General Eric K. Shinseki, the current Chief of Staff, is considering the possibility of replacing many tracked vehicles in the Army inventory with wheeled vehicles that weigh 50 to 70 percent less. By 2010, the Army likely will begin fielding new combat vehicles; if AMEDD purchases the AMEV's and AMTV's, it will have shiny new vehicles that still will not keep up with supported units. AMEDD must work closely with the maneuver community to develop new ground evacuation platforms on the same chassis as the new combat vehicles.

AMEDD also must work with the joint community to develop its next aeromedical evacuation platform. AMEDD ownership of a fleet of aeromedical evacuation platforms is absolutely essential to saving lives. An aeromedical evacuation platform that allows for en route care fulfills multiple requirements: evacuation, treatment, communication, and speed. For the first time, the UH–60Q program incorporates an advanced medical capability into an Army helicopter. A concern with the UH–60Q is that it is built using the existing UH–60 airframe. Department of Defense is considering establishing a Joint Rotorcraft Technology Office, which could make the UH–60Q a bad long-term investment. The Joint Chiefs of Staff are pushing the services to build a single new platform to replace aging aircraft. They believe they can field a new aircraft "well before 2015." A helicopter with on-board medical equipment is leap-ahead technology; however, purchasing old airframes is counterproductive. Before large aircraft purchases are made, additional research should be conducted to determine the feasibility of establishing forward surgical teams on medium-lift helicopters. Making surgical capability mobile and closer to the patient certainly will aid in treating casualties within the golden hour.

Evacuation platforms long have been, and will continue to be, vital to AMEDD's ability to accomplish its mission. However, the vehicles currently under consideration require long acquisition lead times and are very costly to field. AMEDD can make greater strides in improving battlefield life expectancy, shortening evacuation times, and reducing its footprint on the battlefield by using information and communication technologies.

Information and Communication Technologies

In addition to simply moving casualties faster, it is crucial for AMEDD to identify and track casualties better. Integrating information technologies into combat health support systems will allow AMEDD to project the expert care necessary to sustain future forces. AMEDD must make advances in casualty identification and tracking systems similar to those Army logisticians are making regarding supplies and equipment.

Technologies such as global positioning systems (GPS's) for individuals, personal information carriers, and telemedicine make it possible to improve battlefield life expectancy significantly and reduce the AMEDD footprint.

Global positioning system. TAV permits operational and logistics managers to determine and act on timely and accurate information about the location, quantity, condition, movement, and status of materiel. It includes assets that are in storage, in process, and in transit. For AMEDD, soldiers are the assets on which it must have continuous location, condition, and status information.

This technology is now available commercially. General Motors' OnStar system uses a GPS—a satellite-based system used for accurate positioning and navigation—with hands-free cellular telephone communications systems to track vehicles continuously. Using embedded diagnostics and sensors, OnStar can send emergency crews directly to a vehicle in distress without being contacted by the vehicle operator. Spacelabs Medical, Inc., of Redmond, Washington, provides systems that track patient movement within a hospital. Their advanced systems monitor and transmit patients' vital signs using wireless technology.

The Army already is testing personnel tracking with the Land Warrior System. This system will provide dismounted soldiers with complete real-time battlefield situational awareness. In his *1998 Army Green Book* article, "Army Modernization: Preparing Today For Tomorrow," Assistant Secretary of the Army for Acquisition, Logistics, and Technology Paul J. Hoeper states that within the Land Warrior system, "GPS provides the soldier's location to the computer, integrates the soldier's position with location reports from other soldiers to provide situational awareness, and displays the information on a digital map in the soldier's helmet-mounted display." Using a GPS, Land Warrior communicates information instantly, unlike slow radio or message modes. With TAV for soldiers, AMEDD could identify casualties instantly and move to provide medical care in the first few critical minutes after injury.

Personal information carrier. AMEDD could use TAV to develop a system that provides instant identification of each casualty and tracks him continuously from the point of injury. A personal information carrier (PIC) is a small (2¼ square inches) storage device that works on a principle similar to a floppy disc. It can carry a soldier's medical records and other personal and financial information. A PIC could be used to provide in-process and in-transit visibility, serving as just one element of a digitized medical environment connecting the foxhole to the stateside hospital. PIC's could be integrated with systems such as the GPS and Land Warrior personal status monitors to provide real-time in-transit visibility for every casualty and every healthy soldier on the battlefield.

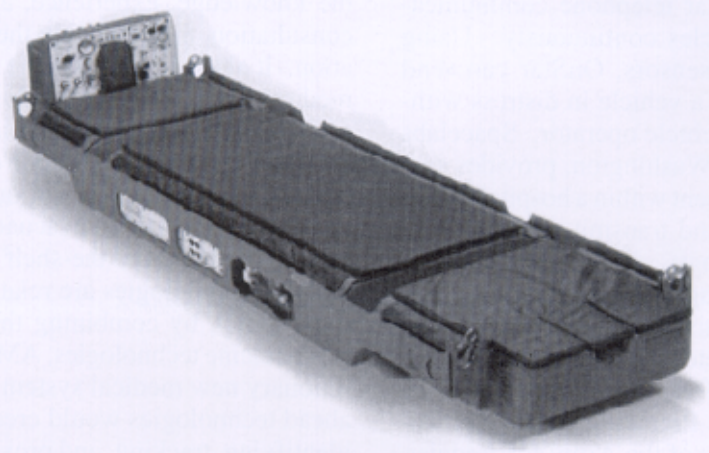
Telemedicine. The last link needed to provide world-class medical support to casualties at the point of injury from a stateside hospital is telemedicine. Combat medics currently provide far-forward medical care on the battlefield with virtually no supervision. Their limited training and experience is focused on life-saving procedures and patient evacuation. Telemedicine can help medics save lives by providing on-site consultation with experts located anywhere in the world. With telemedicine, patient information, such as xrays and vital statistics, is sent digitally to a specialist at a hospital. The specialist provides the on-site medic the expertise needed to treat the patient. Telemedicine can provide the knowledge, experience, and judgment needed for consultation, thus reducing the need for medical evacuation. It also can improve the collection and transfer of medical data. Dr. Stephen Joseph, Assistant Secretary of Defense for Health Affairs, stated that telemedicine will allow for "the obliteration of time and space by electronic means for the care of our patients."

When compared to evacuation platforms and hospitals, commercial-off-the-shelf information and communication technologies are relatively inexpensive. More importantly, by combining the OnStar GPS, PIC, and telemedicine technologies, AMEDD could create a revolutionary new medical system. Investing in these leap-ahead technologies would create a seamless system for identifying, tracking, and providing medical care to soldiers on the battlefield. With the advances provided by these systems, acquiring and inserting advanced medical technology far forward on the battlefield would be practical and desirable for the first time.

Medical Care Equipment

JHSS Vision 2010 calls for changing the concept of "definitive care in theater" to a concept of "essential care in theater and definitive care in CONUS [continental United States]." To make this change in philosophy and doctrine, AMEDD must have adequate evacuation platforms and excellent information and communications systems. But more importantly, it must have state-of-the-art medical equipment on the battlefield. Tracking and evacuating a casualty are critical. However, if adequate medical supplies and equipment are not readily available to treat the casualty, tracking and evacuation will not save his life. More rapid evacuation of patients requires advanced en-route care equipment that is state of the art, lightweight, safe to use, and compatible with all services' evacuation platforms. Advanced technologies such as noninvasive sensors, data infusion, image recognition, and miniaturization are being explored currently and should be acquired and fielded rapidly.

LSTAT. One of the most promising pieces of medical equipment today is the life support for trauma and transport (LSTAT). The LSTAT will increase survival rates by getting sophisticated trauma equipment in the hands of the medic on the battlefield. The LSTAT is equipped with an array of monitoring and patient care capabilities never before employed at the medic level. It integrates several miniaturized, commercially available medical devices into a self-contained platform (litter) that allows seamless transfer of a wounded soldier from one echelon of medical care to the next. In exercises at Walter Reed Army Medical Center in Washington, D.C., the LSTAT was tested as a mini-intensive care unit that allows surgery to be performed within a few miles of the front. Immediate, life-saving surgery could stabilize patients for long-haul transport, using the actual platform where the surgery took place, to a hospital anywhere in the world. Furthermore, the LSTAT is relatively inexpensive compared to vehicles and hospitals. It is just one of the many emerging technologies that will make medical units smaller, lighter, and more mobile.



☐ The LSTAT can provide advanced life support to the patient from the point of injury until he arrives at a medical treatment facility.

Ultrasound. To further improve future clinical capabilities on the battlefield, AMEDD must focus on ways to diagnose and treat complications that develop during evacuation. A Marine Corps' mobile medical monitoring study indicated that "ultrasound and Doppler have proved to be of great value in early examination, diagnosis, treatment and triage of combat casualties." Ultrasound also could provide the capability to diagnose respiratory complications and assess blood flow into extremities during evacuation. With advances in technology, ultrasound, which never has been on the battlefield because of its sensitivity, size, and cost, could become a life-saving reality.

Personal status monitors. These have been used for years in hospitals to monitor patients and by the National Aeronautics and Space Administration to monitor astronauts. Personal diagnostic equipment is being developed for military use. When worn by a soldier as a watch or other piece of his uniform, the diagnostic device could collect data such as the soldier's blood pressure, pulse, oxygen level, and tension. When linked with information and communication technologies, the personal status monitor could track a soldier's vital signs and send out an alert in case of a wound or other trauma. An embedded GPS receiver could provide the wounded soldier's precise location. This system would resemble the embedded diagnostics that logisticians use in military equipment. Noninvasive output monitors and systems are essential to providing hospital-level, world-class medical care to critically injured soldiers on the battlefield. These are minimum requirements for the 21st century Army.

Advanced medical technologies can provide better point-of-injury care within minutes after a soldier becomes a casualty and ultimately will save lives. To do so, however, AMEDD must no longer "let technology drive strategy, rather than letting strategy determine technology," which Alvin and Heidi Toffler call the military's biggest problem in their book, *War and Anti-War*. AMEDD must determine the technologies and systems it needs and implement changes that will allow for fewer healthcare providers on the battlefield and will free critical transportation space for moving warfighters into and around the theater. By incorporating these medical technologies, AMEDD could begin to comply with General Shinseki's intent, ". . . to aggressively reduce the size of our deployed support footprint . . ."

Reducing the AMEDD Footprint

General Shinseki's statement at the October 1999 meeting of the Association of the United States Army, "If we don't deploy it, some maneuver commander won't have to feed it, fuel it, move it, house it, or protect it," provides the foundation for the effort AMEDD must make to reduce its footprint on the battlefield.

Many opportunities to reduce the AMEDD footprint are available through advanced information, communication, and medical technologies. Once these technologies are integrated into a complete system, the number of deployed medical maintenance technicians can be reduced. Optical fabrication (making lenses for

Recommendations for Using the Latest Technologies in Far-Forward Care

1. Discontinue the armored medical treatment vehicle (AMTV) and the armored medical evacuation vehicle (AMEV) procurement programs scheduled for fielding in fiscal years 2002 to 2008.
2. Upgrade the AMEDD's current UH–60 Black Hawk helicopter fleet, rather than purchase new UH–60Q helicopters, until full-scale procurement of a new airframe can begin.
3. Aggressively pursue the development of a personnel total asset visibility system that will interface with the digital battlefield and provide seamless and continuous patient tracking and far-forward care using telemedicine.
4. Recognize the value of the life support for trauma and transport (LSTAT) litter, the personal status monitor, and ultrasound for providing far-forward care never previously provided on any battlefield. Use commercial-off-the-shelf systems, with minor adjustments for battlefield hardening, to acquire and field these essential capabilities rapidly to our medical forces in all services.
5. Ensure that all medical projects and technologies adopted are considered for use in a joint environment.

glasses and mask inserts) likely could be removed from the theater altogether. By using personal status monitors, LSTAT's, and telemedicine, medical personnel can stabilize casualties in theater and prepare them for transport to CONUS, eliminating the need for intermediate care between the point of injury and CONUS. Such practices certainly will challenge the notion stated in Field Manual 8–10, Health Service Support in a Theater of Operations, that "routinely bypassing available triage and care [provided by intermediate facilities] will not be practiced." However, implementing advanced technologies will reduce the number of hospitals and healthcare providers required to deploy to an area of operations.

Integrating Technologies

A revolution in medical affairs will force AMEDD leaders to re-examine the AMEDD structure and challenge the long-accepted basis of resource allocation, doctrine, and organizational structures in order to remain relevant in the future. Many ideas and technologies are being developed and tested in stovepipe programs within DOD today. These efforts should be merged into a single system where joint service coordination is mandatory.

Embedding information and communication systems into evacuation platforms, soldiers' gear, and state-of-the-art miniaturized medical equipment will provide real-time location and status of all personnel and medical assets. These new technologies will allow DOD medical services to coordinate very complex, time-sensitive, high-tempo medical procedures across the full spectrum of operations. Having a clear picture of the battlefield will allow medical planners to allocate assets more accurately, quickly, and efficiently. More importantly, an integrated system will conserve the use of scarce resources by moving information rather than people and equipment. The system will provide state-of-the-art, highly trained medical capabilities to a theater without actually deploying large numbers of personnel or equipment.

AMEDD must continue to provide medical support to soldiers on the battlefield that is comparable to the best civilian standards. The technologies and ideas available today can make that goal a reality if properly integrated into a seamless structure that can provide world-class support to the point of injury from any American hospital in the world.

While the cost of implementing new healthcare technologies may seem daunting, they must be pursued, because the American people expect soldiers to receive world-class care regardless of their location or condition. AMEDD must approach patient tracking and far-forward care technologies aggressively and openly. If AMEDD is to reduce its footprint and still locate and treat casualties within the golden hour, it must exploit and adopt tomorrow's technologies today. **ALOG**

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How DSCC Supports the Army

by Captain Mark M. Herrin

Defense Supply Center Columbus (DSCC), Ohio, is the Defense Logistics Agency's (DLA's) lead center for land and maritime support to America's Armed Forces. Although DSCC supports all services, its high-performance organizational design provides weapon system support specifically for the Army.

DLA's Lead Center Concept

Nearly 4 years ago, three of DLA's four supply centers—DSCC, Defense Supply Center Richmond (DSCR), Virginia, and Defense Supply Center Philadelphia (DSCP), Pennsylvania—boldly began operating as "lead centers." To implement the lead center concept, DLA chose a customer-oriented organizational design that is based on the operational readiness goals of the military services. It provides each service a single point of contact for critical systems. DSCC and DSCR became weapon systems support centers, and DSCP became a troop systems support center.

DSCC, the first supply center in DLA to convert to the weapon systems approach to materiel management, became the land and maritime lead center for DLA. As such, it devotes its efforts to supplying items for land and sea weapon systems.

DSCR is the aviation lead center and provides items for air, aviation, and space support. DSCP is the lead center for troop support systems and general supply items. The Defense Energy Support Center (DESC), at Fort Belvoir, Virginia, the fourth DLA supply center, provides fuel support for facilities, vehicles, and aircraft.

DSCC's Mission

DSCC is a DLA inventory control point for spare parts. It has an active and reserve component work force of over 80 military personnel from the Army, Navy, Air Force, and Marine Corps and nearly 2,600 Federal civil service employees. This team buys, manages, and coordinates shipments of parts for 1,304 active weapon systems for the military services and North Atlantic Treaty Organization units operating throughout the world. By integrating the business techniques and processes adapted from highly successful private corporations with the provisions of the National Performance Review Act of 1993, DSCC has become one of the Department of Defense's (DOD's) largest suppliers of spare parts. It has 22,000 military and civilian customers and is building partnerships with nearly 10,000 contractors. DSCC receives 5 million requisitions annually for nearly 2 million managed items totaling $1.8 billion in sales.

DSCC's vision is "to be the most reliable, responsive, and innovative provider of logistics support and services through a professional, trained, and productive team. Each member is accountable to the customer to provide superior service by reducing process time, reducing costs, and improving quality." To accomplish its mission, DSCC has moved away from relying on large inventory stockpiles to relying on industry; from managing parts to managing the relationships of suppliers with customers; and from managing processes to integrating existing supply chains or creating new ones. This shift to commercial practices ensures that DSCC acquires the best commercially available expertise in distribution, vendor-managed inventories, on-demand manufacturing, corporate contract agreements, and virtual prime vendors.

DSCC has four application groups, each of which manages a set of assigned weapon systems. The Maritime Weapon Systems Group provides customer support for over 340 weapon systems. The Commodity-Based Applications Group manages 1.2 million electronic items, including state-of-the-art microcircuits, and processes more than 2 million requisitions annually in support of all DLA weapon systems. The Aerospace Weapon Systems Group works in partnership with DSCR, the lead center for aerospace weapon systems, in managing nearly 900,000 repair parts and operating supply items. Finally, the Land-Based Weapon Systems Group manages the total supply support and

☐ The DSCC operations center houses a work force of over 80 military personnel from the Army, Navy, Air Force, and Marine Corps and nearly 2,600 Federal civil service employees.

distribution of consumable repair parts for over 715 land-based weapon systems maintained by all of the military services.

The Mighty Land

The Land-Based Weapon Systems Group (known within DSCC as the "Mighty Land" or just the "Land") is the warfighter's consumable item wholesale logistics combat multiplier. The Land "keeps the wheels rolling around the clock, around the world" on vehicles like the M1 Abrams main battle tank; the high-mobility, multipurpose, wheeled vehicle (HMMWV); the heavy, expanded mobility tactical truck (HEMTT); the heavy equipment transporter (HET); and the 6,000-pound rough terrain forklift. The Land also is responsible for other items, including night-vision equipment and small arms replacement parts.

The Land supports forces deployed to Southwest Asia, Europe, Japan, and Korea, as well as forces in Hawaii, Alaska, and the continental United States. Each year, the Land fills one-third of DSCC's nearly 5 million total requisitions, contributing 20 percent of DSCC's $1.8 billion in annual sales.

Because today's Army operates at a faster pace than ever before, with continuous deployments throughout the world, the Land considers weapon systems readiness to be its primary measure of success. The Land supports weapon systems for over 15,600 customers in the Active Army, Army National Guard, and Army Reserve. To ensure that it focuses on the real issues affecting weapon systems readiness, the Land conducts monthly reviews that evaluate information from the following sources—

- Reports on the status of resources and training systems (SORTS). Unit commanders use SORTS information to assess the status of their personnel, equipment, and maintenance training, and the Land uses the information as a weapon systems readiness assessment tool.
- Contingency situation reports from ongoing and previous deployments such as Bosnia, Kosovo, and Southwest Asia.
- Not-mission-capable-supply-coded requisitions received from DSCC's Emergency Support Operations Center.
- Logistics assistance representative activities. Logistics assistance representatives are subject-matter experts placed on the battlefield by the Army Materiel Command Logistics Assistance Program to serve as a bridge between the soldier and the industrial base and to assist in improving readiness, combat efficiency, sustainment, and equipment utilization.
- Reports of DLA customer support representatives. These individuals work on site to support DLA's role in military readiness. They help solve problems and provide information as part of the DLA commitment to world-class logistics service.
- Critical item lists. These are DOD-prioritized lists, compiled from commanders' composite critical item lists, that identify high-priority items and weapon systems. It is used by the services and DLA when selecting systems for production surge planning.
- Reports of weapon systems support managers. These individuals work closely with military service program managers to identify readiness and supply

support issues for DLA-supported weapon systems. They have the authority to direct DLA-wide weapon systems program reviews and to delegate and direct other actions as needed.

Soldier Support Initiatives

As a result of these ongoing reviews of customer needs and readiness levels, the Land has initiated many actions that serve and provide the best value to soldiers. These initiatives include several long-term contracts to support multiple weapon systems with many corporations, including Caterpillar, Oshkosh, AM General, Cummins Engine,and Donaldson. In many cases, soldiers receive immediate and direct delivery of requested parts as a result of these contracts.

☐ The M1114 up-armored HMMWV, which was fielded to troops in Bosnia in 1996 under emergency conditions, will be refurbished and retrofitted in the next 2 to 3 years.

In another initiative, called Automotive Prime Vendor, two special programs have been designed to improve support for the Army's automotive fleet. The first, Automotive Prime Vendor Overseas, provides 1,900 parts from 875 manufacturers to military customers outside of the continental United States. The second program, the Fleet Automotive Support Initiative, will improve supply support at the user level through use of one or more prime vendors who will provide supply support for nearly 21,000 items for military customers within the continental United States.

DSCC also has established corporate contracts and basic ordering agreements with NAPA, John Deere, Komatsu, and Freightliner to deliver automotive and heavy equipment repair parts. Under the terms of these agreements, John Deere and Komatsu offer military customers savings of up to 23 percent and 5-day-or-less direct delivery. NAPA and Freightliner offer military buyers 20 to 50 percent savings. Some stocked items may be immediately available; others will be delivered within 5 days.

Another Land initiative involves the M1114 up-armored HMMWV. The M1114 initially was fielded in 1996 to forces in Bosnia under emergency conditions and in advance of formal logistics planning. It experienced extremely high operating tempo and rough use because of wide-ranging mission requirements. In an effort to increase the reliability of the vehicles, the program manager determined that retrofits were required to improve the vehicle's design. U.S. Army, Europe (USAREUR), also determined that general-support-level repairs were needed to bring the vehicles to full operational capability. Therefore, for the next 2 to 3 years, USAREUR will refurbish and retrofit 409 M1114 up-armored HMMWV's, 140 XM1109 modified armor HMMWV's, and 180 M1097 armor-equipped HMMWV's. The vehicles are being drawn from deployed units in Kosovo, Macedonia, and Bosnia.

Currently, DLA also supports the HMMWV repair program at Kaiserslautern Industrial Center in Germany and the fielding of new HMWVV's. To meet these challenges, DSCC, as the lead center for the HMMWV, awarded a contract to O'Gara-Hess & Eisenhardt, the manufacturer of the M1114 up-armored HMMWV, to provide all numbered parts on the vehicle. As a result, deliveries that sometimes took more than 150 days now require only 10 days. Wholesale support to the M1114 up-armored HMMWV is improving dramatically as this contract is implemented at all DOD sources of supply.

Innovative improvements in weapon systems support have catapulted DSCC and DLA into the 21st century with greater support and flexibility to meet readiness requirements. Because of the dynamic, positive impacts of these initiatives, DSCC and DLA can continue to ensure that the requirements of soldiers deployed throughout the world are met. **ALOG**

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Buying Spare Parts for the Last Time

by Eric A. Snyder

The "life of type" statistical model allows the Army to determine the best way to buy parts that are going out of production.

In the world of Army wholesale supply, keeping the proper number of spare parts in stock is a battle all its own. In order to keep our equipment running, we need to make sure that parts are available when repairs are needed. Peacetime operations, though less demanding than wartime operations, still require weapon systems to be functional so that our soldiers get the training they need and are ready for potential deployment around the world.

In the past few years, because of decreases in funding and vast improvements in weapon systems, we have seen a large increase in the number of spare parts that have become "life of type" (LOT) items. LOT items are those that, for whatever reason, no longer are going to be produced; that means one final purchase of those items is needed to sustain equipment in the field. Making the most prudent decision on these types of buys clearly is essential to maintaining readiness as well as to managing available funds efficiently.

Until recently, the only mathematical model designed to make decisions on what quantities to order was the Variable Safety Level/Economic Order Quantity (VSL/EOQ) model developed by the Army Materiel Systems Analysis Activity (AMSAA) at Aberdeen Proving Ground, Maryland. This model—part of the Army's Commodity Command Standard System—assisted item managers by providing safety levels and order quantities. A safety level is the point (meaning a quantity of a particular item on hand) at which an order must be placed to ensure, to a certain specified probability, that the item will not go out of stock until that order is received in the supply system. An order quantity is the most cost-efficient amount to order in a single procurement.

However, the VSL/EOQ model, although quite capable of producing large savings in the supply system, was not designed to handle the unique requirements of a LOT buy. Item managers were left to make their most educated guesses at how many of an item to purchase. To fill this gap, the Army Materiel Command (AMC) tasked AMSAA to design a model specifically for the purpose of determining the most cost-efficient LOT purchase.

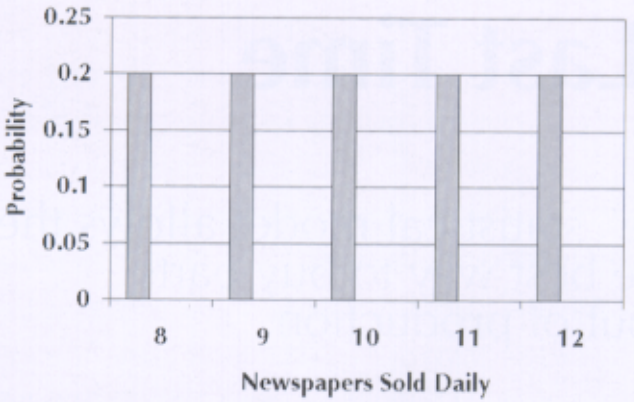
Mathematics of the Model

To discuss the LOT model in detail would require a large amount of mathematics and statistics, so I will provide a basic description of how the model works. The main concern involved in making LOT purchases can be understood best by examining the classic news vendor problem found in the study of operations research. In this problem, we have a news vendor who faces the dilemma of how many newspapers to purchase for a given day for his newsstand. If he does not purchase enough papers and thus runs out, he misses out on potential profit. If, on the other hand, he purchases too many papers, he has wasted his money on papers that will not be bought by customers. So how does the vendor decide on the correct quantity of papers to order?

In the ideal inventory world, each day would be the same: the same number of customers would come to the newsstand, and each customer would purchase the same number of papers. The vendor therefore would order this known quantity of papers, and he always would find the last customer of the day purchasing the last paper of the day. Of course, the real world has this annoying quality that we call uncertainty. To the statistician, it is known as variance.

With uncertainty introduced into his situation, the news vendor must decide which daily order quantity would yield the largest profit. To describe the variance in a system, statisticians use probability distributions. (The most famous probability distribution is the normal

bell-shaped curve.) These distributions are used to describe the likelihood of each possible outcome. For example, let's say that on any given day the newsstand will sell somewhere between 8 and 12 papers with equal likelihood. That is, on one-fifth of the days, there will be a demand for 8 papers, on another one-fifth of the days there will be a demand for 9 papers, and so on. This would thus give us a distribution of the probability of demand shown in the chart to the right.



☐ **Distribution of the probability of demand for the news vendor example.**

If we know how much the vendor pays for the papers (the wholesale price), and for how much he sells the papers to his customers (the retail price), we can determine the optimum quantity of papers to buy mathematically. For example, suppose our news vendor purchases the papers for 25 cents apiece, and, turning a nice profit, sells them for 50 cents each. We can figure his profit margin by comparing each buy possibility with each demand possibility. Multiplying the number of papers sold by the 25-cent profit per paper, and then subtracting 50 cents for each unsold paper, yields the profit margin. The chart below illustrates the results.

The average profit margin for a given buy decision thus can be determined by taking the simple average of all the possible outcomes. If the outcomes had not been equally likely, as is so often the case, then we would have to weight each of the cases by the probability for that event. In the end, as the chart shows, the vendor would decide to purchase 10 papers per day since this would yield the largest expected profit margin.

Papers Ordered	Papers Demanded					Expected Value
	8	9	10	11	12	
8	2.00	2.00	2.00	2.00	2.00	2.00
9	1.75	2.25	2.25	2.25	2.75	2.15
10	1.50	2.00	2.50	2.50	2.50	2.20
11	1.25	1.75	2.25	2.75	2.75	2.15
12	1.00	1.50	2.00	2.50	3.00	2.00

☐ **Profit margin for the news vendor example.**

Applying the Theory

The LOT model, although it has its roots in the news vendor theory, has a couple of major differences. First, the danger of understocking is not the loss of potential profit but rather the loss of availability of the weapon systems that need the part. Maintaining a target availability is a chief concern of the Army supply process. Second, in the news vendor example, if the vendor understocked papers and his supply ran out, there was little he could do about it. However, if there is a shortfall in the supply of a spare part, the Army may resort to a premium purchase to correct the deficiency. Although premium buys seem to contradict the concept of a LOT buy, when the situation requires it, such purchases are made. This often will mean starting up an assembly line or purchasing a commercial product. In either case, the cost is substantially higher than the original production cost.

Choosing the statistical distribution method for the LOT model was an important consideration. In the news vendor example, the distribution was very simple and very limited, with only five, equally likely demand possibilities. In the real world, the number of possibilities for demand for a given part is vast and not as easily predicted. Experience gained in developing the VSL/EOQ model helped to determine the distribution of demand in the LOT model. A cataloging approach based on the negative binomial distribution was selected for the LOT model. [A negative binominal distribution represents how many failures must occur until a predetermined number of successes have occurred.]

The model contains many other features that extend beyond the original theory. The easiest way to understand all the flexibility of the model is to look at the inputs and parameters that the user must supply to the model. In most cases, the user is the item manager directly responsible for the LOT purchases.

Inputs

There are seven inputs to the model for a given part: national stock number (NSN), expected life, unit price, premium price ratio, average yearly demand, average requisition size, and assets on hand. The NSN is a unique 13-digit identifier used in the model to track a particular part. The expected life is an estimate of the number of years the weapon system that contains the part will remain in operation; this number is only an estimate, and it creates an uncertainty that will be dis-

cussed below under the "robustness" parameter. The unit price is the current cost to produce the item.

The premium price ratio is the anticipated ratio of the premium price to the unit price. For example, if a part currently can be produced for $10 and later would cost $50 as a premium buy, this ratio would be set at 5. This again is only an estimate. Most of AMC's major subordinate commands—such as the Tank-automotive and Armaments Command, Aviation and Missile Command, and Communications-Electronics Command—have historical estimates on premium buys available, which can be used to approximate this number.

Average yearly demand is the expected quantity of a part requisitioned from the wholesale level of supply each year based on historical demand data. The average requisition size is the expected number of items requested in a single requisition. This number is important only in that the distribution of demand for a given item is correlated with the average requisition size. Finally, the assets on hand represent the number of items currently in the supply system. These include items that are serviceable (ready for issue), unserviceable (in need of repair), and due in (en route to the inventory control point).

Parameters

While the inputs represent information for a given part, the parameters represent matters of policy that affect how the model runs. For some parameters, policy can be set on an Army-wide basis; for others, it can vary by major subordinate command; and for still others, policy can be the responsibility of the user. There are seven parameters that control the processing of the model: interest rate, storage cost rate, obsolescence risk rate, low procurement cost, high procurement cost, procurement cost breakpoint, and robustness.

The interest rate is important since it further refines cost optimization. If we are comparing the cost of making a larger buy now with making a premium buy later, we need to convert all calculations to present-year dollars. Storage cost rate is expressed as a percentage of the unit price and represents the yearly cost of storing excess stock. Obsolescence risk rate is the chance, expressed as a percentage, that any single item will become obsolete in a given year. An example of obsolescence would be a part no longer being used because of improvements in technology.

The procurement cost is the amount of money involved in each individual procurement decision. This is a fixed cost associated with the process and not the part itself. The Army has two procurement costs associated with each major subordinate command. The low procurement cost represents buys that fall below a certain amount, and the high procurement cost represents buys that exceed that amount. The "amount" in question is the procurement cost breakpoint and is an Army supply policy standard.

Finally, robustness is a special parameter that allows the user to decide on a measure of uncertainty, expressed as a percentage, in the expected life of the item. When set at zero, it assumes that the estimate of expected life is accurate. A robustness factor of 10 represents an uncertainty of 10 percent in either direction from the expected life estimate. For example, if we select an expected life of 10 years and a robustness factor of 30, we are saying that the true life of the item may fall anywhere from 7 to 13 years. This gives the model an added degree of power by compensating for the erratic nature of the expected life input.

Use of the Model

In December 1996, the first LOT model was released to AMC's major subordinate commands. After getting feedback from those commands, some improvements were made, and a second version of the model was released in January 1998. Only the second version contained all of the inputs and parameters described above. More recently, the model has undergone improvement in the area of user interface. Although the mathematical portion of the model is written in FORTRAN, a Clipper user interface originally was included to give users a menu-driven interface. A more advanced Visual Basic interface, which provides a Windows environment for the user, was added in a third version released in March.

Initial results from the field show cost savings for LOT items. Savings are based partly on the ability to predict correctly the optimum quantity of parts to buy and partly on providing discipline to a component of the Army supply process that previously had none. More efficient use of the dollars dedicated to the spare parts wholesale supply system inevitably will free up funding in these times of decreasing defense budgets. Greater availability of the materiel our soldiers depend on, through a more accurate LOT supply system, will increase our Nation's readiness. **ALOG**

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Combined Rear Area Operations in the Korean Theater

by Major Maxine C. Girard

The mission of the United Nations Command/Combined Forces Command/U.S. Forces Korea (UNC/CFC/USFK) is to deter war, maintain stability on the Korean peninsula, and, should deterrence fail, defend the Republic of Korea (ROK) against North Korean aggression. Together, these commands face the world's fourth largest military force, and they must be prepared to engage the enemy in deep, close, and rear area operations.

The combined rear area (CRA) of the Korean peninsula is the same as the area of operations of the commander in chief (CINC), United Nations Command (UNC) and Combined Forces Command (CFC). Operations occurring in the CRA are crucial to the implementation of the CINC's warfighting objectives. Those operations will be successful only when the broad functions performed there are coordinated and synchronized to provide swift, decisive support to the deep and close battles.

CRA Operations

Among the functions performed in the CRA are command, control, communications, computers, and intelligence (C4I); wartime host nation support; reception, staging, onward movement, and integration (RSO&I); and noncombatant evacuation. The CINC outlines the conditions for success in CRA operations by defining the CRA, designating a CRA coordinator, and establishing a C4I network. The CRA coordinator is the primary agent for orchestrating the broad functions of the rear area and integrating the execution of those functions within the operation plan. He also ensures that all aspects of rear operations are focused on the deep and close battles.

C4I

C4I systems are managed centrally and executed decentrally across the spectrum of operations in theater. The end state of effective C4I is information dominance on the battlefield. Information dominance provides an operational advantage to the warfighter in deep, close, and CRA operations. The CFC's main tool for attaining U.S. armistice support in the rear area is an interoperable, secure, reliable, and efficient common operating picture.

The common operating picture provides the CRA coordinator with real-time visualization and awareness of the battlefield. It is an effective decision support mechanism that enhances the CRA coordinator's ability to support the deep and close battle. Assured, combined communications are the bedrock of the common operating picture. On this bedrock rests a structure that includes integrated intelligence and computer-supported information dominance. Intelligence collection, analysis, production, and distribution are essential for planning and conducting successful operations on the Korean peninsula.

Wartime Host Nation Support

Wartime host nation support is a combat multiplier that provides the CINC timely combat support and combat service support resources for RSO&I, as well as sustainment of U.S. forces. This flexibility enhances the flow of forces and the management of time-phased force deployment data.

The USFK wartime host nation support program is based on an "umbrella" agreement between the ROK and the United States signed on 23 December 1992 by the U.S. Secretary of Defense and the ROK Minister of National Defense. The program is designed to augment engineering, communications, transportation, ammunition, field services, supply, medical, petroleum, maintenance, nuclear-biological-chemical, security, personnel, and labor support to reinforcing forces. When available U.S. forces cannot meet requirements, ROK provides support of rear operations, including evacuation of noncombatants.

In addition to providing logistics and planning support for rear operations, wartime host nation support enhances the defense of the peninsula and strengthens the bonds of mutual interest between the ROK and the United States. Host nation assistance missions generate goodwill and solidify the alliance between the two governments.

RSO&I

RSO&I is the heartbeat of CRA operations. RSO&I operations provide vital sustainment to deep and close CFC operations. They are a function of the national

service component command in the CRA (for example, the commander of the Eighth U.S. Army—the senior U.S. Army commander). Consequently, the national service component commanders organize and coordinate RSO&I requirements with the CRA coordinator. The CRA coordinator synchronizes all CRA functions, including RSO&I flow, according to the CINC's priorities. Before unit or sustainment materiel arrives at the port of debarkation, the RSO&I process begins.

Reception is the offloading of personnel and materiel from the aircraft or ship at the port of arrival and their movement to pre-battle positions. The CRA coordinator ensures that adequate assets and materiel are available to support offloading and provides transportation of assets to each unit's staging sites. Detailed planning and coordination link the functions of force tracking, cargo document control, movement control, and security of the reception area to create a synchronized staging process. Reception ends upon arrival at the staging area.

Staging is the organization and preparation for movement of personnel and materiel at designated areas to build forces that are capable of meeting the operational commander's requirements. The size of the deployment, the condition of local infrastructure, and the requirement to disperse arriving forces may call for the creation of multiple staging areas. Each staging area must provide sufficient space to process equipment, track the force, issue basic ammunition loads, and provide life support. Staging areas are highly attractive targets for enemy attacks in the theater, particularly for theater ballistic missiles and weapons of mass destruction, so rapid processing of units through these areas reduces some of the risk.

Onward movement is the relocation of forces to their initial fighting positions. Three areas that require detailed planning and attention during the onward movement phase are transportation, command and control, and security. The CINC coordinates movement requirements with a deputy CRA coordinator assigned from the CINC's staff to help execute rear area operations. The CRA coordinator synchronizes movement times, routes, and route security to meet the CINC's priorities.

Integration is the hand-over of personnel and equipment by the rear area commander to the operational commander so they enter the fight at the proper place and time. The CINC specifies to the USFK commander the readiness level that must be achieved before authority is transferred. Successful RSO&I operations depend on integrated execution within the overall concept of CRA operations. The CRA coordinator synchronizes contacts between U.S. Army and ROK Army operations and simultaneously occurring combined operations.

Integration of personnel and equipment on the Korean peninsula has to be both seamless and timely. Seamless means freedom from operations that potentially can interrupt operating tempo. Integrated, combined planning provides the right mix of personnel and equipment at the right place and time. The process is a challenging task that can be further hampered by attacks from enemy forces in the rear area.

Noncombatant Evacuation Operations

A major concern to the CINC and the CRA coordinator is removing noncombatants from harm's way. Although noncombatant evacuation operations are a Department of State responsibility, they are closely coordinated with, and supported by, the CINC and USFK. Successful evacuation of noncombatants from Korea is a high priority, in part because Department of Defense families and civilians make up such a large part of the population.

The Secretary of State or the U.S. Ambassador to Korea decides when U.S. citizens must be evacuated. When the scope of the ordered evacuation exceeds the capabilities of the U.S. Embassy, the Department of State can request assistance from the Department of Defense. The noncombatant evacuation operations mission in Korea provides life support and secure transportation for departing U.S. citizens and their dependents. To achieve this, USFK maintains and exercises detailed noncombatant evacuation operations plans and works with the U.S. Embassy to improve the plans. Noncombatant evacuation operations present challenges throughout the Korean peninsula that require timely and thorough coordination with the host government and the CRA coordinator.

UNC/CFC/USFK operate in a complex and fluid theater of operations. The CRA offers perfect examples of the complexities that have been faced since the armistice was signed at Panmunjom 47 years ago. A better understanding of the ROK Government, combined operations, close coordination among components—both national and combined—and a thorough understanding of CRA functions will achieve the CINC's objectives for rear operations support. **ALOG**

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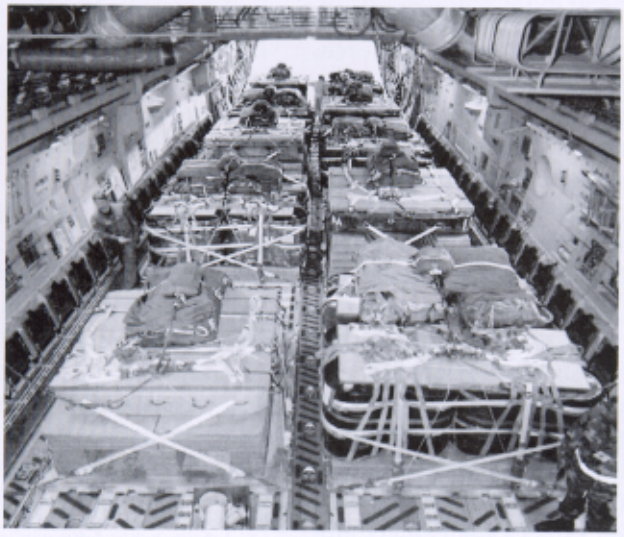
Rail Locks for Strategic Brigade Airdrop

by Captain Mark L. Stoddard

In October 1999, *Defense Week* magazine asked, "What is so important about having a brigade on the ground in 30 minutes?" In response, Colonel John J. Kelly, Director of Operations of the XVIII Airborne Corps at Fort Bragg, North Carolina, said, "Historical studies and recent combat experiences have shown 30 minutes to be the minimum amount of time an enemy would need to adequately respond, following an airborne assault . . . The airborne brigade task force is the lead element of our Army's strategic forced-entry power projection capability."

Successfully putting an airborne brigade task force on the ground in 30 minutes rests on the certification of the revolutionary C–17 dual-row airdrop system (DRAS). Due to the scheduled retirement of the C–141 fleet, the C–17 Globemaster will be the only aircraft available to support strategic brigade airdrop in 2002. To certify the DRAS by 2002, the Department of Defense needs to procure new logistics rail-lock assemblies designed for gravity-release airdrop that will have minimal impact on current airdrop rigging procedures for the 82d Airborne Division.



☐ Cargo loaded on aircraft for dual-row airdrop using logistics rails.

Dual-Row Airdrop System

The C–17 DRAS uses the dual logistics rail systems within the aircraft instead of the aircraft's conventional airdrop rails. The dual logistics rails were designed for rolling vehicles, equipment, and supplies on and off the aircraft, not for airdrop. The DRAS goal is to maximize C–17 airdrop capabilities by simultaneously dropping eight 16-foot modified equipment or supply platforms (20 inches narrower than the type-5 platforms now used) using a gravity-release system. Currently, the DRAS can release loads only in sequence. According to First Lieutenant Dave Huxsoll of the Air Force Aeronautical Systems Center Public Affairs Office at Wright-Patterson Air Force Base, Ohio, the idea of using C–17 logistics rails for airdrop began with a Boeing loadmaster. Boeing proposed the idea to the Air Force, and the C–17 Support Office conducted initial testing in the spring of 1997 at Edwards Air Force Base, California.

Problems with Logistics Rail Locks

According to Thomas Hammond, Chief of the C–17 Test Division, Airborne and Special Operations Test Directorate (ASOTD), at Fort Bragg, the biggest problem encountered thus far with DRAS is the failure of the logistics rail locks to release the airdrop load when the aircraft is at a nose-up deck angle of about 7 degrees, which is the standard attack angle used for all gravity-release parachute drops. The combination of the high angle and the stress of the load weight (14,500 pounds in many cases) causes the rail locks to bind as the load is released. According to Hammond, "The reason the rail locks are failing is because the rails on the C–17 were designed as logistics rails and not airdrop rails." In support of Hammond's statement, Bill McQuillan of the Air Force Flight Test Center Public Affairs Office at Edwards Air Force Base said during early testing of DRAS, "The testers had to determine the optimum angle of the aircraft's deck for gravity-dropping cargo while allowing the locks to function properly . . . the locks were not designed for airdrop operations."

According to Alec Dyatt, the 418th Flight Test Squadron's DRAS project engineer, "There's a fine line with an aircraft that's gravity-dropping cargo. If the deck angle of the plane is too steep, the locks can't retract back into the deck because the weight of the cargo on the side of the lock keeps the lock from moving. If the deck angle is too shallow, the lock can retract easily, but

the cargo falls out too slowly and is dispersed over a wide drop area. The optimum deck angle is as steep as possible while still allowing the locks to retract. This way, the cargo drops quickly and remains close together, making it easier and faster for ground troops to recover the equipment."

□ With an airdrop using the airdrop rails and a 7-degree nose-up angle on the aircraft, loads do not invert.

Effects of Decreasing C–17 Nose-up Angle

When C–17's nose-up angle is lowered to 4 degrees, the logistics rail locks will successfully release all loads using the DRAS. Unfortunately, at a 4-degree nose-up angle, the high center of gravity of the load causes the platform loads to invert past the vertical position upon release from the plane. The platform inversion creates great stress and instability on the platforms and cargo parachutes, causing the loads to turn into each other and become damaged during descent and landing. During initial DRAS testing at Edwards Air Force Base, some platforms broke in half, and about 80 percent of the cargo parachutes were seriously damaged.

To allow safe cargo release from a 4-degree angle, the ASOTD has made the following costly, labor-intensive airdrop component changes: adjusted the center of gravity rearward on all 16-foot platform loads to between 81 and 88 inches instead of 96 inches; used a 22-foot ring-slot stabilizing parachute to prevent platform inversion; and used an existing attitude-control bar that is placed in the riser extensions of the cargo parachute to aid in deployment during exit. Using the stabilizing parachute and attitude-control bar has decreased the rollover problem when using 16-foot type-5 platforms on C–130 aircraft. More modifications to the loads may be necessary since no testing has been conducted using these new gravity-release system components with the new modified platforms on C–17's.

Effects of Center of Gravity Changes

Changing the center of gravity on DRAS loads will have the single greatest impact on strategic brigade airdrop, drastically changing the way the 82d Airborne Division rigs its loads for airdrop. The assembly-line technique currently used at the heavy-drop rigging site at Fort Bragg will have to be completely overhauled to accommodate the new DRAS rigging procedures. For example, some loads using cargo parachutes rigged on the front of the load will have to be rigged at the rear of the load. As a result of the center-of-gravity change, riggers in the 82d Airborne Division will have a hard time meeting the exactness of new procedures for the DRAS loads.

The DRAS changes are slowing the certification of DRAS because they are new, unproven, and labor-intensive. At a minimum, a detailed cost analysis is needed to compare the total cost of procuring C–17 airdrop rail locks to the total cost of the DRAS airdrop component changes being developed by ASOTD. Limiting the number of time-intensive departures from current airdrop rigging procedures by using specially designed C–17 airdrop rail locks is the key to meeting the DRAS fielding requirement in January 2002.

Specially designed C–17 rail locks will permit an increase in the deck angle to about 7 degrees, the proven angle for all gravity release static-line-deployed parachute drops. Using the 7-degree angle will eliminate the need to change the center of gravity or to use an attitude-control bar and 22-foot stabilizing parachute for each load.

Raising the C–17 nose-up angle will simplify rigging and logistics and minimize changes in new rigging manuals as they are published. Existing doctrine and procedures will be used as much as possible with new DRAS loads.

Though the existing C–17 logistics rails are being used for airdrop, they are not intended for such use. The changes in equipment and procedures needed to make the rails work effectively will be costly, requiring purchase of new equipment and a change in rigging procedures. Ensuring the success of the Army's strategic forced-entry power projection capability in 2002 requires attacking the DRAS gravity-release problems at the root by developing and procuring C–17 airdrop rail locks to meet both short- and long-term requirements of the strategic brigade airdrop. ALOG

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Leadership and the Theater Support Command

by Colonel George William Wells, Jr., USAR

In the last of his three articles on the Army's new theater-level logistics organization, the author discusses the final ingredient needed for a successful transition to the theater support command—leadership.

The success of the Army's transition to a theater support command (TSC) will depend on leadership and command direction. For the TSC to work as envisioned, those of us who serve as logistics leaders must be committed to developing the skills and the leadership abilities of the soldiers we command. A TSC can function effectively only when its senior leaders are willing to take the time to train their subordinates in the latest logistics doctrine and battlefield operations. Those young logisticians must be prepared to replace us. What must we do to ensure that our leadership and mentoring is effective?

First, we must educate our young logisticians about the emerging logistics doctrine found in Field Manual 63–4, Theater Support Command, and their role in the revolution in military logistics at the operational and tactical levels. This learning curve can be achieved in a variety of ways, including individual reading and self-study, classroom instruction, preparation for exercises, and participation in such training events as field exercises and simulated role-playing scenarios. It is the duty of senior logisticians to provide an environment in which soldiers can learn logistics doctrine. As former Army Chief of Staff General George H. Decker stated, "Doctrine provides a military organization with a common philosophy, a common language, a common purpose, and a unity of effort." Young logisticians must be given ample time to learn and follow-on opportunities to lead.

People are the heart of the TSC. Teamwork and continuous improvement are empty concepts if we cannot rely on the personal integrity of each soldier. So we must emphasize those individual qualities that contribute to team achievement. The ability to cooperate, coordinate, and communicate enhances teamwork, so we must emphasize role-playing and listening and cultivate an atmosphere of mutual respect. Mutual respect fosters a logistics team spirit that is vital to achieving the level of customer service we seek. Above all, operational effectiveness depends on team cohesion and the maintenance of trust and loyalty. Within a TSC, we must strive for an attitude of professionalism in dealing with our soldiers and with other logisticians. The professionalism of the organization, founded on the integrity of the individual, provides the clear sense of mission and loyalty and the "can do" attitude needed for providing quality service.

We must become surrogate trainers to our fellow logisticians in the field. For example, the reserve contingent of the TSC must act as surrogate trainers to other continental United States (CONUS) logistics organizations that could be called forward in a contingency. These organizations, like the TSC, must be prepared to support each mission by incorporating the latest doctrine and concepts. We also must educate our customers, particularly those in the combat arms, on logistics doctrine. This knowledge can be conveyed through real and simulated joint field exercises, conferences, workshops, personal visits, and writings—all tailored to develop a working partnership with our comrades, whether they are other Army units, the other armed services, or coalition forces.

Throughout the TSC, our junior logisticians must recommit themselves to the professional arms of which they are a part. They must be innovative and aggressive in their military work habits. They must seek out their superiors for knowledge and guidance and enroll in extra training. They must be prepared for challenges, and they must perform at their best when called upon. Logistics leaders of tomorrow must be well rounded and effective. They must understand joint operations. They must be prepared to spend additional hours, beyond their normal drill periods and annual summer training, learning their craft.

Our young logisticians are the most valuable resource we have. It is vital that we not only capitalize on their military talents but also take note of their concerns and care for their needs. A recently completed survey of selected soldiers, along with some think-tank studies, indicates that a number of critical issues are affecting

our soldiers. In the current economic climate, pay and promotion are not their only important concerns. The scope and length of missions, the funding of our forces, the level of trust between leaders and subordinates, the influence of technology, the micromanagement of everyday operations, and the need to be trained and ready for any and all contingencies are rated as vital concerns. These findings identify critical issues that must be reviewed seriously by our Army leadership. As TSC leaders, we must listen and be proactive in responding.

Our ultimate aim is to have a full-up TSC with quality logisticians in every position. We are all aware of the critical need to recruit and retain quality personnel for our future military force structure. However, recent end-strength figures have been below the Army's stated force needs. Even more critical than the overall number of soldiers is the number of qualified mid-level logistics officers and noncommissioned officers (NCO's) who support logistics customers in the field. Across the TSC, the logistics specialists needed to fill middle management positions are at less than the authorized level, which means a loss in logistics expertise. Unfortunately, recruitment efforts are not filling the vacancies created by normal attrition, retirements, and mandatory removals. There is no quick fix to this situation. Logistics leaders must aggressively seek out quality soldiers to fill these vacancies through innovative recruitment and retention techniques. By using internal recruiting teams, advertising, job fairs, and other local community activities, the TSC can play a critical role in reducing the projected lack of logistics specialists.

While we must be inventive in attracting new people, we also must reward those in the ranks today and encourage them to remain. We must overcome perceived negative conditions by providing innovative incentives that attract and keep our quality logisticians. We must recognize those soldiers who exceed normal expectations. Many times the opportunity to recognize quality work and performance is missed. In other instances, by the time recognition is bestowed, it is too late for it to have a positive impact. In a highly competitive environment, rewards may be a critical motivating factor in retaining quality soldiers.

We must recognize that the average TSC reserve logistician is traveling farther for the same pay. Weekend expenses often exceed accrued pay and allowances. We must push for logical legislative changes that will compensate these soldiers' commitment to their Nation's defense. What are we going to be able to offer them in the future if the economy remains strong and the time commitments demanded of them grow?

If we add the possibility of mobilization to the time and financial demands on reservists, we can see why many potential citizen-soldiers will opt to seek other, safer employment opportunities. Today, the average reserve logistician is required to give more time outside of drill. Their concerns about being gone from their families more and more, for little or no additional benefits, certainly influence their decisions to stay or leave. In the reserve components, if the environment is perceived negatively, the decision to leave becomes easy. We must build upon the young logisticians' service and convey to them the importance of that service. We must demonstrate good organizational skills and minimize administrative and operational disruptions. As logistics leaders, we must fill their time away from their families with positives. They should itch to return to drill the following month, and they should look forward to a well-planned annual training event. Our young logisticians must become the best recruiters for our organization.

The personnel system must support the needs of the logistics field. Soldiers needing to convert their military specialties must be given the opportunity to do so. Recent Army reorganizations have resulted in many nonlogistics senior officers and NCO's being assigned to logistics positions. There often is little or no opportunity for these soldiers to be trained in the proper schools because of funding constraints or lack of classroom seats. Correspondence training is not a substitute for realistic logistics training.

Many reservists are veterans of lengthy logistics support operations in Eastern Europe. There is no current mechanism to allow senior leaders to award these soldiers the logistics skill identifiers they deserve based on their accredited service. This need to recognize the skills of these soldiers seems to be lost in a bureaucratic maze. As a result, the personnel system identifies these soldiers as excess. This situation causes morale and retention problems among the affected soldiers; it also curtails promotions and upward mobility.

Logisticians face the same leadership challenges as other military leaders. Our outlook must be proactive and our attitude positive as we seek better solutions to fulfilling mission requirements and soldier needs. We must fully support the Army Chief of Staff's vision of "The Army." We must not forget that lone soldier standing vigil as a sentry at an outpost in some far-off land. So we must retain the vision of that soldier in our day-to-day logistics operations. We must provide him with what he expects in a proficient and timely manner. We must be willing to change in order to achieve the requirements set before us. As logistics leaders, we must serve as effective role models for those who will follow us. **ALOG**

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Forging an Alliance: Army Transporters in Europe

by Major Earl Kennedy

Moving tanks to Camp Able Sentry aboard the Victory Train was a triumph for American ingenuity.

Last April, in an unprecedented use of the Eastern European transportation system, the Army deployed combat forces by train on short notice from their home base in central Germany to Camp Able Sentry in Macedonia.

On orders from the National Command Authorities, the 1st Transportation Movement Control Agency (TMCA), part of the 21st Theater Support Command (TSC), headquartered in Kaiserslautern, Germany, planned and executed the movement. A company of M1 Abrams tanks, a battery of M109 Paladin self-propelled howitzers, and support equipment from the 1st Infantry Division (Mechanized) departed by rail from Germany on 9 April, traveling through Austria, Hungary, Romania, Bulgaria, and Greece to its final destination. By 15 April, the last of the equipment had arrived in Macedonia—ahead of schedule and without incident.

The mission was a rousing success, but more importantly, the story of how it was carried out is a valuable lesson for future operations in uncharted territory. What ended with the enhancement of security at a Kosovo Peacekeeping Force (KFOR) base started months before as a perplexing challenge.

Plotting a Strategic Rail Deployment Route

Colonel Charles Sumpter, the commander of 1st TMCA, put it plainly. "We had, since our initial deployment to Kosovo, been taking units by rail to the northern German port of Bremerhaven, then moving them aboard strategic sealift to Thessaloniki, Greece. From there, we either would drive the equipment north to Camp Able Sentry, load it on commercial trucks or, when possible, rail load it straight up to the railhead in Skopje, about 15 miles from Camp Able Sentry. It was slow, and it was expensive."

Transportation planners knew that commercial rail lines existed through the former Soviet Bloc nations of Eastern Europe to the Balkans. However, they had never moved combat equipment over that route.

For generations, rail has been an effective way to move personnel and materiel quickly in Europe. During World Wars I and II, rail was used extensively to shuttle equipment from one front to another and from the factory to the front line. Even today, rail is an indispensable part of the daily mission to keep U.S. forces in Europe sustained. The North Atlantic Treaty Organization (NATO) has standardized rail procedures somewhat. At 1st TMCA, we were soon to learn that the procedures used in the former Warsaw Pact nations of Eastern Europe were anything but standardized with our own.

Gaining Diplomatic Approval

Starting soon after the initial deployments of U.S. forces to support KFOR, transportation planners began laying the groundwork to open a rail route for strategic deployments. Unlike rail movements during World War II, any movement of forces now would require the approval of each sovereign nation along the way. Each had different customs procedures, oversized cargo standards, and hazardous material restrictions. While one nation might require only 3 days to grant diplomatic approval for transporting military equipment, another could take as much as 2 weeks.

The task of bringing each nation to a common understanding fell to a group of military and civilian transportation experts from a wide variety of commands, agencies, and activities. According to Mike Riedl, TMCA's senior rail planner, "Back in 1995, when we were trying to get things sorted out in support of Bosnia, we decided to try and bring all the nations together for a rail conference to try to hammer everything out. It worked well because we had all the players in one place." Out of that first rail conference came an agreement that set common standards and business practices. So 1st TMCA decided to do the same thing for KFOR.

In October 1999, 1st TMCA hosted the first KFOR rail conference in Bucharest, Romania. Rail, highway, and defense representatives from 13 nations met with

□ At the railhead at Radomir, Bulgaria, a tank is offloaded from the heavy train. Later, the tank was loaded onto a HET and transported to Camp Able Sentry.

transportation experts from 1st TMCA and logisticians from U.S. Army, Europe, the U.S. European Command, and the Military Traffic Management Command. Discussion centered on identifying differences in limitations on oversized equipment, tie-down procedures, tariffs, customs, timetables, and diplomatic and technical clearances.

To use this route, we needed to know if the tunnels and bridges along the way could accommodate our equipment. A set of technical drawings of equipment that potentially could be deployed on the prospective route was submitted to each national railroad. They would match these "profiles" against their infrastructure and tell us which, if any, of our equipment would not be allowed past a certain point.

Each attending nation signed a nonbinding protocol identifying not only what had been agreed upon, but also what was yet to be resolved. The need for continued negotiations, both in a conference setting and individually with each participating nation, readily became apparent. Transportation planners began an exhausting round of negotiations in Vienna, Austria; Budapest, Hungary; Bucharest, Romania; Sofia, Bulgaria; Athens, Greece; and Skopje, Macedonia. These talks were not solely with the heads of the national railroads, but often included Ministers of Defense, Transportation, Foreign Affairs, and Internal Affairs. These efforts were paramount to reassuring each nation that moving U.S. Army combat equipment was vital to the mission of KFOR and not a threat to its sovereignty.

Good News, Bad News

Planners in 1st TMCA set their sights on making the inaugural rail move in the summer of 2000. The pieces slowly began to fall into place as each nation began to consent to the move. Austria, long accustomed to rail movement between U.S. bases in Germany and Italy, was first; Romania soon followed.

Then came the bad news. Officials from Bulgaria notified us that two tunnels southwest of the capital city of Sofia were too small to allow the M1 tanks to pass. What had been a promising concept to slash deployment times appeared to have a fatal flaw. Without the ability to get our largest and most powerful combat vehicle to Macedonia, the use of an Eastern European rail route was now questionable.

"We had put in far too much effort to simply give up on this plan," said Major Margaret Devereux, 1st TMCA's senior KFOR planner. A look at maps of the countries involved offered a possible solution. Macedonia, the final destination, is adjacent to Bulgaria, but because there are no rail lines from Bulgaria to Macedonia, rail traffic was forced to continue south into Greece to just north of Thessaloniki before turning north into Macedonia and, eventually, to Skopje. Perhaps there was a way to rail everything except the M1's all the way to Skopje. If so, the tanks could be offloaded somewhere relatively nearby in Bulgaria and moved by heavy equipment transporters (HET's) overland to Camp Able Sentry.

The plan to test the route developed into two parallel efforts. A test train would be sent along the proposed route with equipment that had been cleared all the way to Skopje. That train would be accompanied by rail experts from 1st TMCA, who would establish timelines and validate necessary technical procedures, particularly

☐ A Bulgarian police officer helps provide security during offloading of the trains from Germany.

at the critical border crossings.

The second effort would be to figure out how to get the M1 tanks to U.S. forces in KFOR, which meant finding a suitable route from Bulgaria to Macedonia. We needed to know how close to the border the M1's could be railed, which involved identifying the exact route and determining if it could sustain such oversized loads.

A Possible Solution

The last rail stop before the tunnels was the sleepy little hamlet of Radomir, which lies approximately 25 miles southwest of Sofia. The map showed a road that snaked from Radomir through the Bulgarian border town of Gyushevo west to Skopje, less than 125 miles away. But could the railhead support the offload? Could the road support the move? Would the bridges and overpasses allow a HET loaded with an M1 tank to get to Skopje? Within days, transporters were on their way to Radomir to find out.

The team, made up of transportation planners and engineers, began the meticulous process of analyzing the route from Radomir to Skopje. A joint U.S.-host nation inspection included grades, roadbed conditions, access through populated areas, and the capacity of the bridges, overpasses, and tunnels. The commander of the Bulgarian National Logistics Coordination Center assembled a team that included Army logisticians, customs officials, border police, and national railroad representatives to assist in a reconnaissance of the railhead at Radomir and the route from there to the border. Although the railhead was spartan, the Radomir accommodations and support inadequate, and the route narrow and hilly, it looked like it would work.

Bypassing a Fatal Flaw

The following week, the TMCA team met with a similar group of experts in Macedonia to conduct another reconnaissance, this time from Skopje back to the same border crossing. The freedom of movement agreements signed earlier by the Macedonian Government and NATO eliminated many of the difficulties normally associated with opening new routes.

However, one problem threatened the entire operation. Macedonian bridges, designed to withstand the weight of a Soviet-built HET transporting a main battle tank, would not support the combined weight of a heavier U.S. M1 tank and the HET carrying it. An engineering study by bridge stress experts from the University of Skopje and validated by structural engineers from the U.S. Army Corps of Engineers concluded that there were 15 bridges along the route that were of concern. Twelve of them were deemed marginally suitable, but three were ranked as incapable of sustaining the proposed load. Engineers from the 21st TSC and representatives of the Ministry of Transportation and Communications in Skopje worked to find a solution.

We knew that neither the truck nor the tank alone exceeded the maximum. Together, the Macedonians and the transporters from TMCA devised a plan in which the trucks would stop before crossing the first bridge, download the tanks, and drive the tanks and the trucks separately across all three bridges. Luckily, the three bridges were less than 2 miles apart.

Victory Train

A test train was launched from Germany in December 1999 and proved, at least in a limited sense, the potential for a rail movement. During the test, 1st TMCA observers aboard the train were able to resolve communication problems that caused delays at several borders. Putting observers on every train during a major movement would be impractical, so Colonel Sumpter decided to place transportation liaison officers in every country along the route. This practice had started during the Implementation Force's early days in Bosnia. Those liaison officers were able to handle most issues that came up and to interact with both the host nation and the U.S. Embassy staffs. They had established a reliable network that provided in-transit visibility, "put out fires," and expedited movements often beset by local bureaucracies.

We focused all of our efforts on moving forces to and from KFOR during the scheduled May-June 2000 rotation. A second rail conference, held in Sofia and hosted by 1st TMCA during the first week of February, nailed down the final details.

The tactical situation on the ground in Macedonia soon moved up the date of the first operational use of the new rail route and drastically compressed the planning timeline to execute it. Tensions in nearby Kosovo rose with the spring temperatures, and senior commanders

☐ An M1A1 tank offloaded from a HET is driven across a bridge in Macedonia on its way to Camp Able Sentry.

decided that deployment of additional firepower to Camp Able Sentry would send a strong message and act as a credible deterrent to possible action against that vital U.S. support base.

Plans to enhance the force structure at Camp Able Sentry included moving a tank company, a battery of howitzers, and long-range surveillance soldiers on short notice. The total package, dubbed the "Victory Train" in honor of V Corps, was approved for deployment on 1 April, with a projected departure date of 10 April. Preparations to operate out of Radomir went into overdrive.

A team that included preventative medicine experts was dispatched to Radomir to evaluate food, water, and medical facilities. After intense negotiations, both the Bulgarian and Macedonian Governments agreed to provide security, traffic control, medical support, interpreters, and assistance at the Gyushevo border. Commercial HET's were contracted to augment the U.S. Army HET's already in the Balkans.

Movement control teams from both 1st TMCA and V Corps would provide complete coverage of the entire route. Military police from the 95th Military Police Battalion in Mannheim, Germany, would control the vital bridge crossings and provide route and convoy security. Brown & Root Services Corporation, the Army's Logistics Civil Augmentation Program contractor and the logistics backbone of Camp Able Sentry, would provide portable toilets, vehicles, fuel, and other services. All of these elements, organized as Task Force Radomir, arrived in Bulgaria on 9 April.

The 1st Infantry Division's equipment was loaded onboard the Victory Train at two separate railheads in Germany. The equipment that had been cleared through to Skopje was loaded on one, called the "light" train, and 14 M1 tanks and an M88 recovery vehicle were loaded on another, called the "heavy" train. Both departed ahead of schedule on 9 April. The light train arrived at the Skopje railhead on 14 April. The heavy train arrived in Radomir on 13 April.

At Radomir, the task force, under the command of Major Devereux, quickly offloaded the equipment, uploaded it aboard U.S., allied, and commercial HET's, and moved it by convoy. Using cellular phones, FM radios, and the Defense Transportation Reporting and Control System (DTRACS), the convoy maintained constant communication with its Macedonian counterparts and its higher headquarters both at Camp Able Sentry and in Germany.

Just west of the Bulgarian-Macedonian border crossing, U.S. military police supervised the difficult task of downloading the tanks from their HET's, moving them safely across both bridges, reloading them, and continuing the convoy to Camp Able Sentry.

"Our major problem was controlling the civilian traffic," said First Lieutenant Jason Clark, commander of the military police. "The bridge crossing required us to stop traffic in both directions until all the equipment was across and uploaded. That stopped everything for a couple of hours. We worked closely with the 21st TSC Provost Marshal and the Macedonian police. They made a tough job a lot easier."

The M1 tanks were delivered to Camp Able Sentry ahead of schedule, and Task Force Radomir packed up and headed back to Germany.

"It was a tough few days," said Devereux, "but it created an educational environment. We learned that we could move on this route, that we could do it safely, that we could do it faster and cheaper than by sea, and that we could meet the commander's intent to strategically deploy by rail through Eastern Europe."

The hard work of the soldiers and civilians who made the Victory Train a success proved more than the viability of a route. It proved the U.S. Army's ability to open new doors with new countries and forged an alliance that offers our Nation faster strategic deployment. **ALOG**

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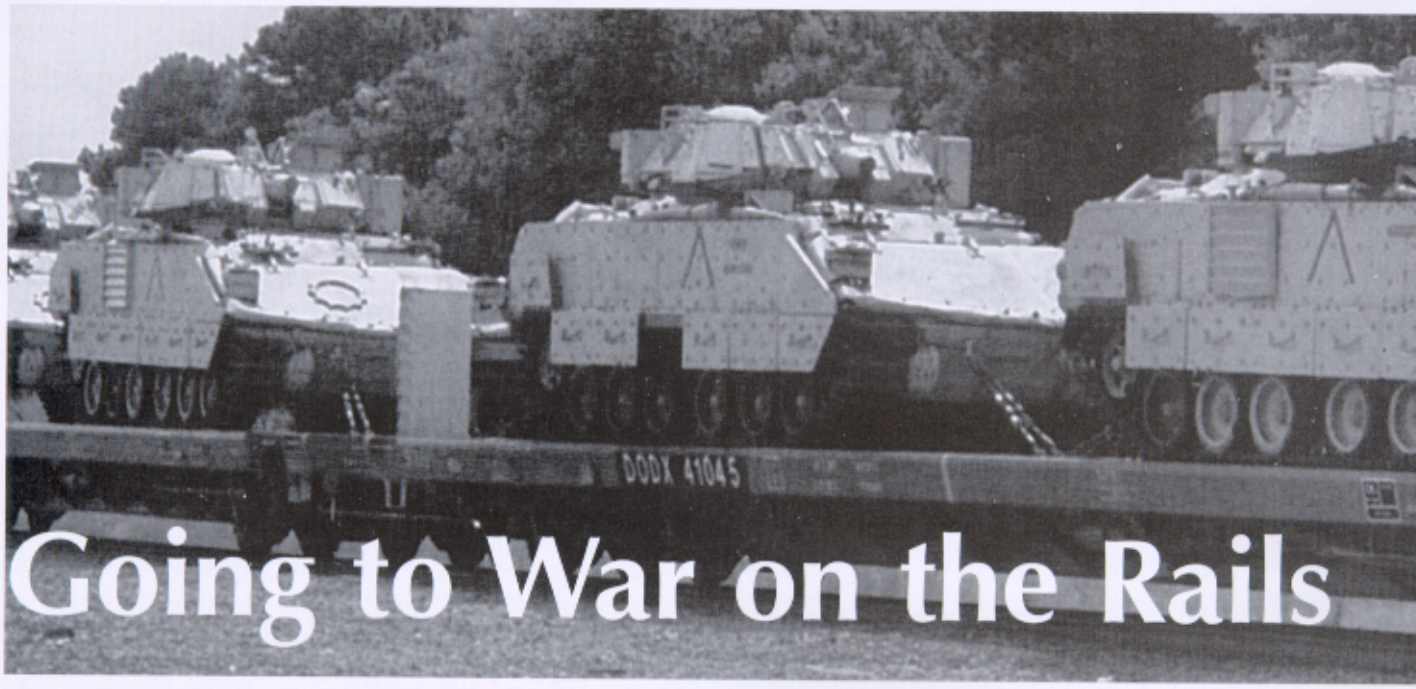

Going to War on the Rails

The song, "I've Been Working on the Railroad," has special meaning for George Gounley, manager of the Defense Freight Railway Interchange Fleet, or DFRIF, and his staff of nine. Together, they keep track of over 2,000 railcars that have been purchased by, or leased on behalf of, all branches of the Armed Forces for use on the commercial railroad system. The DFRIF is owned and operated by the Military Traffic Management Command's (MTMC's) Deployment Support Command (DSC) at Fort Eustis, Virginia.

The DFRIF fills two critical gaps in military support that the railroad industry does not provide. First, the DFRIF fills the void created when railroads do not have sufficient traffic to warrant stocking the railcars the Department of Defense (DOD) needs. Second, because the DFRIF fleet is owned by the DOD, railcars can be placed strategically at installations and depots to be ready for any use, including mobilization.

Railroading for the DOD today is vastly different from what it was 60 years ago, when much of the installation trackage was built. On-site rail assets and services to meet daily installation peacetime requirements have declined since World War II. Today's railroads are oriented much more toward trainload, or "wholesale," transportation. Even so, the value of installation railroad assets required for deployment has greatly increased as a result of the Army Strategic Mobility Program.

Most of the general-purpose flatcars managed by the DFRIF are assigned to specific Army and Marine Corps installations to support mobilization. The remaining cars are not assigned to any particular installation and are dispatched as needed to support peacetime traffic. General-purpose tank cars are used to move fuel and are divided into pools assigned to specific loading points. A small number of special-purpose cars move such items as ship components, fuel, oxidizers, and motors.

MTMC recently assumed ownership of 50 Army tank cars in Alaska needed to support the intrastate movement of military fuels. These cars had not been part of the DFRIF, because they were located outside of the continental United States (OCONUS). However, DFRIF railcars based in CONUS do routinely operate into Alaska and Canada in support of training exercises. The technology and design standards are the same throughout North America, and regulatory requirements are coordinated among the United States, Canada, and Mexico.

In 1996, the DFRIF began to change from an obsolete maintenance and movement data base system to the Asset Management System (AMS), a state-of-the-art rail management program developed by MTMC. Railcar managers now go online to arrange for the movement of empty railcars to customers, repair shops, and mobilization pools.

DFRIF field equipment specialists perform annual railcar inspections and perform contracting officer's representative duties, such as verifying shop estimates and approving railcar repairs. They also audit and approve repair bills from the railroads and maintain the AMS maintenance data base.

AMS soon will be on the Internet, which will allow installations to go on line to request railcars, track empty cars being sent to fill their requests, report car arrivals

☐ Left, M2 Bradley infantry fighting vehicles sit on a DODX 4100-series flatcar. The locomotive below weighs about the same as a tank but is longer and exerts a more concentrated load on the deck, which has to be strengthened accordingly.

at and departures from the installation, and report railcars needing repair. Customer access to AMS will enhance the in-transit visibility of the rail fleet greatly, and with that should come an increase in customer confidence in the product the DFRIF provides.

"We are working with the information management folks to come up with a user-friendly website," said Gounley. "My goal is that if you can order a book on line, you can order a freight car on line. I also want our site to work for the installation as well as for us. I hope that the [installation] transportation officer will be able to use our site to maintain his inventory of rail cars on hand and their locations, for example, and not just for DFRIF cars but for commercial cars as well."

The DFRIF employees' efforts have produced revenues more than sufficient to cover the costs of managing and maintaining the fleet for the past 11 years. Following a string of deficits dating back to 1969, the DFRIF staff began marketing the railcars to military shippers the command had not previously served. They reduced costs by awarding long-term repair contracts to a few shops instead of having cars repaired by many shops. Revenues went up and costs went down, and the readiness of the fleet improved as the cars were used more often.

A reserve balance is maintained by the DFRIF from one fiscal year to the next, because railcars have periodic maintenance requirements that are not spread out uniformly over the life of the cars. Also, unlike other Defense Working Capital Fund activities, the DFRIF's revenues cannot be adjusted to make up prior-year shortfalls or to meet unforeseen expenses, because its revenue source is the railroads rather than DOD shippers.

The DFRIF's goal is to improve military preparedness to go to war on the rails. To do that, the military and the railroads need to understand each other better. "Too often, the military's lack of knowledge of railroad operations is matched by the railroads' lack of knowledge of military operations," said Gounley. "MTMC DSC's management of the DFRIF helps to bridge that gap." DSC helps to bring the railroads and the military together, not only when DFRIF railcars are involved, but also on occasions when only railroad-supplied cars are used. For example, it assisted the Army in Japan and Korea in dealing with car repair procedures and car replacement policies.

With DSC's expertise in owning, managing, and controlling the DFRIF fleet, warfighters can be assured that railroad assets required for deployment will be available whenever and wherever they are needed. **ALOG**

The Army Logistician *staff wishes to thank June M. Pagan of the Military Traffic Management Command Deployment Support Command Public Affairs Office for her contribution to this article.*

Oil Analysis— A Powerful Maintenance and Environmental Tool

by Matthew P. Caputo and Major Bonnie Morrow

Although designed and used as a maintenance diagnostic tool, the Army Oil Analysis Program (AOAP) for ground systems has become an environmental success story with far-reaching, but unheralded, impacts.

In the 1970's, Army maintainers began looking for ways to increase the reliability and readiness of ground combat systems. They needed a system that would detect potential failures, lower support costs, curtail excessive component wear, and reduce resource usage. Thus began the ground combat systems Army Oil Analysis Program (AOAP).

The AOAP, administered by the Army Materiel Command Logistics Support Activity (LOGSA) at Redstone Arsenal, Alabama, is part of a Department of Defense-wide effort to detect imminent component failures and determine the condition of used oils by periodically collecting and evaluating samples. Early detection of problems allows maintenance to be performed before more severe damage to the equipment occurs. Since its inception in 1975, the AOAP has prevented consumption of millions of barrels of oil, eliminated disposal of used oil and filters, and saved resources that would have been required to pump, refine, transport, and package new oil. Savings from the program have increased as more tactical wheeled vehicles and construction and support equipment have been enrolled in the program.

These benefits directly correlate with the "U.S. Army Environmental Strategy Into the 21st Century," a comprehensive document signed in 1992 by Secretary of the Army Michael P.W. Stone and Army Chief of Staff General Gordon R. Sullivan. This strategy charges each individual in the chain of command with environmental stewardship of every facet of the Army's mission. It further recognizes that environmental factors weigh heavily in protecting our Nation and commits Army leaders to eliminating unnecessary adverse impacts on the environment. From that strategy came this environmental vision: "The Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission."

The Army environmental program is described in terms of four "pillars": compliance, restoration, prevention, and conservation. By preventing needless use of oil and filters and conserving resources, the AOAP is a major participant in the prevention and conservation pillars of the environmental program. In essence, the AOAP has been a silent hero that has helped to conserve the Nation's resources and has met environmental challenges since 1975—long before the environmental program came of age. (The March-April 1993 issue of *Army Logistician* contains a summary of the Army's 21st century environmental strategy.)

How the AOAP Works

Currently, the Army has enrolled 1,751 individual ground system components in the AOAP. Oil and filters in these components are changed only when recommended by an AOAP laboratory. Oil samples are evaluated in one of the AOAP's 5 laboratories located outside of the continental United States (OCONUS) or in one of its 19 CONUS labs. Oil analysis diagnoses the physical condition of the lubricant, such as its viscosity, fuel dilution, or water content, and the condition of the engine, transmission, and hydraulic systems from which the sample is taken. The analysis can determine problems such as contamination, faulty air-induction systems, leaking cooling systems, loose fuel-return lines, and abnormal wear rates of moving metal parts.

The labs use spectroscopy to determine the kind and quantity of contaminants in the oil, such as metal particles, fuel, coolant, or water. (Spectroscopy is the

science that studies the way light interacts with matter, which can indicate what the matter is made of and how much of each component is present.) Ferrography (wear particle analysis) detects metals that cannot be identified by spectrometric analysis and also determines the kind of wear, such as spalling (fragmentation), cutting, and rubbing. Repeatedly, AOAP has proven its ability to detect potential failures before they have become catastrophic.

USAREUR Savings

The magnitude of the AOAP's environmental impact is illustrated in a study by the Office of the Deputy Chief of Staff for Logistics (DCSLOG) at Headquarters, U.S. Army, Europe (USAREUR). For the study, USAREUR analysts selected 25 ground systems and calculated the costs of changing oil by lubrication orders and of performing routine AOAP sampling for a 2-year period. (See sample cost calculations below and on page 38.) A 2-year period was chosen because several systems require lube order changes every other year. USAREUR researched engine and transmission capacities, oil costs, filter requirements and prices, labor costs based on maintenance allocation charts, oil and filter disposal costs, AOAP lab processing fees, and sampling supply costs.

The study compared changing oil and filters based on standard lube orders to oil changes directed by AOAP labs for nearly 15,000 of USAREUR's combat and tactical vehicles. During the 2-year period, USAREUR saved more than 1.4 million quarts of engine and transmission oil by performing AOAP-directed changes on these vehicles. That amount of oil in 55-gallon barrels stacked on top of one another would extend nearly 4 miles. During the same period, USAREUR avoided replacement of 69,000 oil filters. Prevention of this consumption thus eliminated the need to dispose of the same amount of oil and filters.

The USAREUR study also showed that AOAP lab-directed oil changes saved money. These oil changes proved to be 58 percent less expensive, excluding labor costs, than changing oil according to lube orders, or $3.55 million to change oil by lube orders compared to $1.55 million for AOAP sampling and lab-directed oil changes. With labor costs included, AOAP lab-directed oil changes were 52 percent less expensive. Lube order oil changes cost $4.8 million compared to $2.24 million for AOAP lab-directed changes.

Army-wide studies demonstrate even greater savings. LOGSA estimated that the Army realized an 86-percent saving in fiscal year (FY) 1999 by following AOAP guidance rather than following lube orders for changing the oil in M1A1 Abrams tanks; M1075 palletized load systems; M1037 high-mobility, multipurpose, wheeled vehicles (HMMWV's); 120T diesel-electric locomotives; MEP–005A generators; and PU798 power units. Specifically, analysts computed AOAP-directed costs at $500,000 for those vehicles, compared to $3.6 million if the lube order changes were made. In the same fiscal year, the AOAP program director at LOGSA estimated that, overall, the Army avoided the disposal of 47.1 million pounds of various fluids by using the AOAP, for a saving of $7.8 million.

Early prevention of maintenance problems avoids more costly repairs later. USAREUR labs claim a cost avoidance when a maintenance problem identified on a Department of the Army (DA) Form 3254–R (Oil

Calculating Cost of Annual Engine Oil AOAP Sampling

1. **System.** Enter system name.
2. **Annual Usage.** Enter actual miles or operating tempo.
3. **AOAP Engine Oil Sampling Interval.** Enter the AOAP sampling interval as found in DA-Pamphlet 738-750.
4. **Annual Number of Engine Oil Samples.** Enter the number of annual samples required based on system usage and sampling interval.
5. **AOAP Supply Costs Per Sample.** Enter the estimated cost of miscellaneous AOAP supplies; e.g., bottles, tubing, sacks, etc.
6. **AOAP Lab Processing Cost Per Sample.** Obtained from the lab that analyzes oil.
7. **Total AOAP Cost Per Sample.** Calculated automatically by the spreadsheet by adding AOAP supply costs and the lab processing cost pe sample.
8. **Annual Engine AOAP Sampling Costs Per System.** Calculated automatically by the spreadsheet multiplying the annual number of sample required by the AOAP cost per sample.
9. **Equipment Density.** Enter the quantity of the system in unit.
10. **Annual Total Fleet Cost.** Calculated automatically by the spreadsheet by multiplying equipment density by the annual engine AOA sampling costs.

Cost Calculations for Annual Engine Oil AOAP Sampling

System	Annual Usage: Miles/Hours or OPTEMPO	AOAP Engine Oil Sampl Interval: Hours/M Calendar Ti Measure That O	Annual Number of Engine Oil Samples	AOAP Supply Cost Per Sample (Est.)	Lab Processing Cost Per Sample	Total AOAP Cost Per Sample: Supply Cost + Lab Cost	Annual Engine Sampling AOAP Costs Per System	Equip-ment Density	Annual Total Fleet Cost
HMMWV	1,975 miles/yr - OPTEMPO	Every 6 Mo 100 hours	2	$ 0.40	$6.20	$ 6.60	$ 13.20	6,400	$ 84,480.00

SAMPLE

Analysis Recommendation and Feedback) is solved at the organizational or direct support level. Because general support maintenance is avoided, the lab uses an average general support repair cost of $15,905 for tracked vehicles and $7,173 for wheeled vehicles to compute cost avoidance. The labs do not capture cost avoidance for a system repaired at the general support level.

During FY 1998, estimated cost avoidance in USAREUR for ground systems maintenance totaled $2.37 million. This figure is estimated, because actual repairs avoided cannot be determined precisely. Cost and maintenance avoidance can be confirmed only when the AOAP laboratory receives a completed report from the unit after maintenance action is taken in response to a DA Form 3254–R. These forms frequently are not returned to the lab, and AOAP fails to capture critical information. However, if even a fraction of these costs is avoided, the program more than pays for itself.

USAREUR's AOAP Structure

USAREUR provides an excellent example of why OCONUS laboratories should remain in operation. USAREUR operates three fixed and one mobile laboratory, which are located near their primary customers to provide timely and responsive support. The Coleman Barracks lab is near Mannheim, Germany, and primarily supports the 1st Armored Division there, the Southern European Task Force in Italy, and Task Force Able Sentry in Macedonia. The Coleman Barracks lab also provides support to Belgium, Kuwait, Luxembourg, the Netherlands, Saudi Arabia, Sinai, Turkey, and the United Kingdom.

The Bamberg lab, which is about 200 miles from Coleman Barracks in Germany, supports the 1st Infantry Division (Mechanized) and the 7th Army Training Center.

A mobile, semitrailer-mounted lab has been on site in Bosnia supporting Task Force Eagle. Recently, that mobile lab was converted to a fixed facility lab and the semitrailer and equipment were returned to CONUS. Similarly, a mobile semitrailer-mounted lab that supports air and ground systems in Kosovo soon will be converted to a fixed-facility operation and the semitrailer will be returned to CONUS.

These four "hub" labs have a robust AOAP mission and support more than 20,000 aircraft and ground systems. On average, they process more than 40,000 samples annually. These strategically located hub labs are key to a responsive USAREUR AOAP and significantly improve its ability to comply with sampling requirements.

Changing Sampling Intervals

Although the AOAP has proven highly effective in determining maintenance requirements, the number of directed maintenance actions is low. When an oil analysis indicates a problem, a lab, using a DA Form 3254–R, recommends a maintenance action. During FY's 1996 to 1998, the percentage of DA Form 3254–R's issued was less than one percent of the number of samples analyzed. This indicates that Army equipment is perform-

Calculating Costs of Annual Engine Oil and Filter Changes by Lubrication Order

1. **System.** Enter system name.
2. **Annual Usage.** Enter actual miles or operating tempo.
3. **Engine and Oil Change Interval.** Enter the engine oil and filter change interval as specified in the lube order.
4. **Annual Number of Engine Oil and Filter Changes.** Calculate annual number of engine oil and filter changes based on the system's annual usage and the oil change interval.
5. **Engine Capacity/Quarts.** Enter the oil capacity of the engine crankcase as specified in the system's technical manuals.
6. **Cost of Oil Per Quart.** Enter the cost per quart of oil.
7. **Cost of Oil Per Change.** Calculated automatically by the spreadsheet by multiplying the cost of oil per quart by the engine capacity.
8. **Total Annual Oil Costs.** Calculated automatically by the spreadsheet by multiplying cost of oil per change by the number of annual changes.
9. **Filter(s) Cost Per Change.** Determine price of required filters.
10. **Total Annual Filter Costs.** Calculated automatically by the spreadsheet by multiplying filter(s) cost per change by the annual number of oil and filter changes.
11. **Total Cost of Annual Engine Oil and Filter Changes.** Calculated automatically by the spreadsheet by adding the total annual oil and filter costs.
12. **Equipment Density.** Enter the quantity of the system in the unit.
13. **Total Fleet Cost.** Calculated automatically by the spreadsheet by multiplying density by the total cost for annual engine oil and filter changes.

Cost Calculations for Annual Engine Oil Changes by Lubrication Order

System	Annual Usage: Actual Miles/Hours or OPTEMPO Estimate	Oil & Filter Change Interval; Hours/Miles & Calendar Time (Use Measure That Occurs First)	Annual Number of Oil & Filter Changes	Engine Capacity/ Quarts	Cost of Oil Per Quart	Cost of Oil Per Change	Total Annual Oil Costs	Filter(s) Cost Per Change	Total Annual Filter Costs	Total Cost for Annual Engine Oil and Filter Changes	Equipment Density	Annual Total Fleet Cost
HMMWV	1,975 Miles - OPTEMPO	3,000 Miles or Semiannually	4	8	$1.02	$8.16	$16.32	$2.14	$4.28	$20.60	6,400	$131,840.00

SAMPLE

ing reliably. In addition, from FY 1996 to 1998, oil labs in USAREUR recommended only 9 percent of the oil changes that would have been required if lube orders had been followed. This means oil is remaining in the vehicles much longer than when following lube orders.

Both of these figures suggest that sampling intervals probably could be extended significantly without adversely affecting maintenance readiness or reliability. An easy solution would be to conduct sampling on the same schedule as the lube orders. For instance, if a lube order directs oil changes twice a year or every 1,500 miles, an oil sample would be drawn then instead of changing the oil. If the manufacturer predicted the equipment would operate effectively for 6 months or 1,500 miles without changing the oil, a similar sampling interval seems adequate. Additional studies are needed to quantify the average length of time oil remains in vehicles to determine effective, efficient sampling intervals.

Currently, oil is sampled every 60 days or 25 operating hours for combat vehicles, every 90 days or 100 operating hours for tactical wheeled vehicles, and every 180 days or 100 operating hours for HMMWV's, which creates substantial administrative work for units. Sampling delinquency rates are monitored closely and receive command attention. A lengthier sampling interval would help ease this burden as well as save AOAP costs.

Recognizing Compliance

Other actions that could help with Army-wide compliance and support of AOAP are positive recognition and education. In USAREUR, units that achieve a 2-percent or less delinquency rate for 12 consecutive months receive a Certificate of Appreciation signed by the DCSLOG. In a recent 12-month period, the DCSLOG awarded 104 certificates to units and activities in USAREUR.

The two most frequent causes of delinquent sampling are untrained personnel and failure to post data properly in maintenance records. The USAREUR AOAP director administers a unique AOAP monitor training and certification program that offers 16 hours of classroom training and a tour of an oil laboratory. Students learn first hand how the laboratory processes oil samples and observe how the instruments detect dirt, viscosity, and metal particles. Personnel successfully completing the course receive a DA training certificate and a wallet-sized certificate. Certification is valid for 2 years.

Industry Use of AOAP

Industry uses oil analysis extensively. For instance, Alumax Extrusions, a line-haul trucking company, used extensive oil analysis as the basis for extending their oil drain interval to 20,000 miles and continues to do random oil testing as part of their ongoing maintenance. Alumax Extrusions analyzes the oil in all of its vehicles and tracks the analysis for each vehicle.

Trucking companies extend oil change intervals through the use of heavy-duty oil, synthetic oil, and special filter systems. For example, Mack Trucks, Inc., has announced new oil change intervals of 40,000 miles or 800 hours running time, which is advertised as the longest recommended drain interval standard in the industry. To use increased oil change intervals effectively, vehicles must operate in a sustained high-mileage line-haul operation exceeding 100,000 miles per year. The majority of Army vehicles do not meet this requirement.

The lesson that Army maintainers can apply is that industry maintenance directors believe in the merits of oil analysis and have used it extensively to make logical and scientific maintenance changes that save money but do not detract from equipment reliability. Likewise, the Army has the power and potential to improve maintenance practices based on its extensive oil analysis data base. Army planners continually are encouraged to study industry practices and apply those that may be useful in military operations.

Any changes to the AOAP should retain the enormous environmental benefits the program now reaps and not detract from its effectiveness as a maintenance tool that improves readiness. The benefits of the AOAP should continue to outweigh the effort and cost required to comply with the program.

Responsiveness to the Army's readiness needs and ease of use for the unit and soldier should be the foremost factors in designing the AOAP. In addition, oil analysis data should be used to draw smart conclusions and determine logical guidelines for sampling intervals or maintenance actions that will strengthen readiness and streamline the AOAP. ALOG

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Collapsible Petroleum Tanks: Past, Present, and Future

by Major John A. Leggieri and William Perdue

The Army provides bulk petroleum to all land-based forces in a theater of operations. Depending on the size of the operation, this may mean that several million gallons of fuel must be received and stored each day. To accomplish this task, Army petroleum units must be able to establish large fuel storage and dispensing systems quickly. The collapsible fabric petroleum tanks used by active and reserve component petroleum units to set up these systems are vital assets. Expired, defective, poorly stored, or inadequately maintained tanks negatively impact a petroleum unit's wartime readiness posture and adversely affect its ability to provide fuel storage. Conversely, well maintained, properly stored, and serviceable petroleum tanks provide fuel to fighting forces when and where they need it.

The life cycle, storage, and testing of petroleum tanks have been subjects of great debate in quartermaster circles over the past several years. Inspection procedures have been revised, and several initiatives are underway to improve the procurement, management, and use of collapsible tanks.

Past—High-Maintenance, Labor-Intensive

Collapsible fabric tanks have provided critical tactical bulk petroleum storage for military operations for over 50 years. Beginning in the 1940's with the 900- to 3,000-gallon pillow tanks, collapsible fabric tanks have evolved into the primary tactical fuel storage vessels now used by all of the military services.

Initially, fabric tanks were used to supplement large, bolted steel fuel storage tanks and to store small quantities of fuel in remote locations. Early collapsible tanks were made from thick, nitrile thermoset materials (synthetic rubber-like materials that do not soften when heated) that were heavy and required many soldiers and a lot of materials-handling equipment to deploy.

Technological advances in materials and fabrication techniques led to the manufacture of larger and lighter fabric tanks made from thinner thermoplastic urethanes. The new technologies permitted the development, manufacture, and fielding of collapsible tanks with a capacity of over 200,000 gallons. These tanks can be deployed rapidly and recovered using fewer personnel and less equipment. The success of the large-capacity collapsible tanks rendered the labor-intensive bolted steel tanks obsolete, and they were removed from the Army inventory.

Present—In Search of Storage Solutions

Today, a typical petroleum supply company is authorized over 100 10,000-, 20,000-, and 50,000-gallon collapsible tanks for its fuel storage and distribution mission. These tanks cost between $7,000 and $10,000 each, so the total value of the collapsible tanks in each petroleum unit's inventory ranges from $700,000 to over $1 million.

Many variables, such as storage location, environmental conditions, and storage container design, affect the storage and useful life of collapsible fuel tanks. Determining their shelf and service life, establishing procedures for their serviceability, and finding suitable storage options have proven extremely difficult.

In July 1996, the Army Aviation and Troop Command (ATCOM), the original program manager for petroleum and water tanks, issued a maintenance advisory message (MAM) that contained detailed guidance on extending the shelf life of collapsible fabric petroleum and water tanks. The MAM coded the tank storage life as extendible, provided each tank passed an elaborate examination. Test procedures required filling tanks to 80-percent capacity with water, waiting 24 hours, and then checking for leaks. If no leaks were found, the water could be emptied and the bag refolded and placed in storage.

The original procedures for this examination were cumbersome, time- and labor-intensive, and potentially hazardous to the tanks and the environment. Reserve petroleum units had a particularly hard time complying with the guidelines, because it was very difficult to complete the examination during a normal 2-day reserve drill period. Time and personnel constraints made testing all tanks in reserve component units impossible. These procedures also wasted water, contaminated petroleum tanks' interiors with water, and released tainted water into the environment when the tank was emptied.

Reserve component petroleum units presented their

Defects	Inspection Criteria	Repair	Disposal
Holes, tears, and cuts	Holes, tears, and cuts greater than 6 inches in length through the coated fabric.	None.	Dispose of tank.
Holes, tears, and cuts	Holes, tears, and cuts less than 6 inches in length through the coated fabric.	Defects can be repaired temporarily with the tank's mechanical repair kit. Permanent repairs can be made with an adhesive repair kit (A-A-52022), NSN 5430-01-359-1078 (for both fuel and water tanks) or 5430-01-352-6073 (fuel tanks only).	Not applicable.
Abrasions	Areas of the coated fabric at which the nylon fabric is exposed.	These areas can be recoated with adhesive from an adhesive repair kit (A-A-52022), NSN 5430-01-359-1078 (for both fuel and water tanks) or 5430-01-352-6073 (fuel tanks only).	Not applicable.
Delamination of seams	Lifting or separation between the two surfaces joined at the seam.	None.	Dispose of tank.
Severe discoloration	Slight discoloration of the exterior coating is normal for fuel tanks that have been put into service. Severe discoloration is present when dark, rust-colored stains are found along seams or when an entire panel is darker than the adjacent panel.	None.	Dispose of tank
Cracking of exterior coating	When cracking is present, the coated fabric has become brittle and has lost its flexibility.	None.	Dispose of tank.
Blisters	Area where the coating appears to have lifted away from the fabric or fluid has leaked between the layers.	Puncture and cut away the lifted coating. The defect can be repaired temporarily with the tank's mechanical repair kit. Permanent repairs can be made with the adhesive repair kit (A-A-52022), NSN 5430-01-359-1078 (for both fuel and water tanks) or 5430-01-352-6073 (fuel tanks only).	Not applicable.
Fungus growth	Usually present in the form of a dark purple or green stain.	None.	Dispose of tank.

☐ Tank inspection criteria.

concerns about unrealistic test procedures to the Quartermaster General in May 1997. In response, the Petroleum Advisory Committee formed a subcommittee to examine the situation and recommend possible solutions. The study group, consisting of representatives from Active Army, Army Reserve, and Marine Corps organizations, tank manufacturers, coated-fabric manufacturers, and civilian technical personnel from the Army, Air Force, and Marine Corps, recommended suspension of the water test procedures in August 1997. The group's short- and long-term recommendations included leaving petroleum tanks in the original manufacturer's crates instead of removing them to perform test procedures, establishing a maximum time for depot and unit storage, creating limits on tank service life, and investigating technologies to extend service and shelf life further.

Based on the study group's recommendations, the Army Tank-automotive and Armaments Command (TACOM), the new program manager for petroleum and water tanks, published revised guidelines for shelf and service life of tanks in March 1998. TACOM's interim MAM rescinded the water test procedures and eliminated the ability to extend tank life. Instead, units were directed to inspect visually all tanks with a contract date of 1987 or earlier and those stored at the unit level for 5 years or more. The inspection criteria (see chart above) are still applicable and should be used to inspect petroleum tanks. TACOM further instructed units to conduct inspections at deployment or training sites if insufficient time or resources prevented them from doing so at their home station, as is the case for many reserve petroleum units.

Additional guidance in the message set rated fill capacities, established maximum wetted service life, and required record keeping at the unit level. TACOM directed that each tank be filled only to the capacity in-

Size of Tank (Gallons)	Percent of Rated Capacity	Estimated Height
10,000 or less	100	Refer to technical manual
20,000	80	4 feet, 3 inches
50,000	80	4 feet, 3 inches
210,000	80	5 feet

☐ **Tank rated capacity.**

dicated in the chart above. The message defined a tank's "wetted service life" as beginning when a petroleum product was introduced into the tank. The maximum wetted service life of petroleum tanks was set at 3 years. It may be less than 3 years under some climatic conditions, such as extreme heat or cold, but will never exceed the 3-year limit. Tanks exceeding the 3-year service life limit must be discarded. Units also were instructed to maintain detailed historical records for all petroleum tanks on hand that included date of manufacture, date of receipt at the unit, and date of initial fill. The initial fill date must be marked permanently on each tank.

In addition to their concerns about unrealistic test procedures, Reserve units raised the issue of inadequate tank storage facilities to the U.S. Army Reserve Command (USARC), Fort McPherson, Georgia. Many tanks are stored outside with little or no protection from harsh weather except for their wooden shipping crates. Adequate storage facilities do not exist at the regional support command or unit level. Equipment concentration sites, which normally house reserve unit equipment, do not have the assets to store or properly care for the tanks.

Storage and maintenance of petroleum tanks are particularly challenging for reserve petroleum units organized under Logistics Unit Productivity System modification tables of organization and equipment (MTOE's). These units normally are authorized a large amount of equipment but few personnel. As an example, the 877th Quartermaster Company in Albuquerque, New Mexico, is authorized 111 collapsible fabric petroleum tanks but only 69 soldiers to maintain them. The ratio of 1.6 tanks per soldier makes it difficult to store, maintain, and use tanks properly during normal peacetime operations.

In response to the units' inquiries, the Office of the Deputy Chief of Staff for Logistics, USARC, placed collapsible fabric petroleum tanks on the command's intensively managed item list and directed a reserve-wide inventory of tanks to determine the magnitude of the problem. Data collected from the field confirmed that there was a problem. Reserve units reported having over 2,600 collapsible petroleum and water tanks on hand, with most of them stored under less than ideal conditions. A significant number of the tanks were at or near their expiration dates. Better storage solutions were required desperately.

USARC initiated research, which is still going on, into the feasibility of changing MTOE's of reserve petroleum units to reduce the number of tanks they are authorized while maintaining the current required levels. Efforts also were started to locate long-term storage facilities that could house tanks in a climate-controlled environment. Such facilities would store most of the reserve component petroleum tanks, leaving only a small number at the unit level. Turning in old tanks, replacing them, and then storing the new ones in the same locations makes no sense and will not remedy the storage problems. However, USARC still requires reserve petroleum units to dispose of old tanks, reorder new ones, and store them either at the unit's location or in a regional support command-run equipment concentration site.

Numerous lessons learned about the storage and service life of petroleum tanks were gleaned at Petroleum Exercises (POLEX's) '98 and '99 at Fort A.P. Hill, Virginia. During POLEX '98, several 50,000-gallon collapsible tanks that had been used to store fuel during a reserve unit's annual training in 1997 were unfolded and inspected. The tanks had been manufactured in the fall of 1987 and put into service in June 1997. In several cases, fuel left in a tank had leaked through its walls (see photo at right), primarily in areas where the tank had been folded for repacking after use. Such tanks were deemed unserviceable and marked for turn-in. The degradation of these tanks could be attributed in part to the age of their material but also to extended contact with fuel remaining in a tank during storage. This situation is hard to avoid because it is difficult to remove all residual fuel from the tank after use.

The tanks inspected during the petroleum exercises had been stored for over 5 years in an unprotected outdoor location in the original wooden packing crates constructed by the manufacturer. The crates had deteriorated to a point that most were unusable. Significant

□ Arrow points to wetted surface of tank showing fuel weeping from seams during storage.

reconstruction of the crates was required before the tanks could be repacked and shipped back to home station.

In June 1999, TACOM released a MAM that contained new guidance on collapsible fabric petroleum and water tank shelf and service life. The guidance, based on the results of tests conducted at Sierra Army Depot, California, during September and October 1998, set the depot shelf life of petroleum tanks at 12 years and defined depot storage conditions as a dry indoor environment. Tanks not stored under such conditions were given a shelf life of 5 years from date of receipt or 12 years from date of manufacture, whichever comes first.

The MAM reiterated the maximum 3-year wetted service life of petroleum tanks. Visual inspections are still the only way to ensure tank readiness for deployments. TACOM encourages the removal of serviceable components, such as valves and fittings, from tanks destined for salvage.

USARC recently approved inclusion of fabric, collapsible petroleum tanks in the Minimum Essential Equipment for Training (MEET) program. This allocates a small number of tanks to units for use in annual training petroleum missions. The rest will be housed in expanded equipment storage facilities at annual training locations or in long-term storage facilities at deployable equipment preparation sites. This decision means a reduced maintenance and storage burden for user units, more efficiently maintained tanks at expanded equipment storage facilities and deployable equipment preparation sites, and enhanced access to tanks for training and mobilization made possible by pre-positioning them near training sites and power-projection platforms.

USARC has located ample indoor, climate-controlled storage space in Ogden, Utah, that appears to be suitable for petroleum tank storage. Once the availability of that space is confirmed, the arduous task of moving tanks to that location will begin.

Future—A Revolution in Petroleum Logistics

New ideas, concepts, and technologies are bringing about a revolution in military logistics. Nowhere is this more evident than in the area of petroleum tanks. Collapsible tanks are, and will continue to be, the primary tactical fuel storage system of all military services.

Current initiatives to improve the storage and service life of collapsible tanks include reducing the quantity of tanks in petroleum units; adopting reusable, durable containers and improved smart-tank material; and reassigning tanks from class VII (major end items) to class II (durable items).

Reduced tank quantities. The requirement for increased quantities of fuel and simultaneous development of larger capacity collapsible tanks will allow the Army to reduce the total number of tanks authorized to each petroleum unit without reducing the unit's total storage capacity. Replacing 10,000-gallon tanks with 20,000-

☐ Tanks stored at unit level for more than 5 years or with a contract date of 1987 or earlier should be inspected visually.

gallon tanks at the corps level and above will remove at least 24 tanks per company. This action will cut procurement costs, storage space requirements, and the amount of time spent inspecting tanks.

Reusable containers. Current procurement specifications for all sizes of collapsible tanks require that a durable, reusable storage and shipping container be provided with each tank. These containers increase the initial cost of the tanks, but they produce cost savings and improve readiness by providing better protection. The fuel system supply point, the primary storage system that uses fabric tanks as components, also will be transported in standard 20-foot containers. The packing of the complete system in containers will help to increase the storage life of the collapsible tanks further.

Improved smart-tank material. Future tank material research will focus on developing a tank material that can store water or fuel better. Ideally, materials will be lighter, be able to sense the onset of material failure, and will improve tank storage and service life. These initiatives, if successful, will reduce procurement and logistics management costs, improve readiness, and diminish environmental hazards.

Transition from class VII to class II. Collapsible tanks are being reclassified from class VII, which includes major end items such as vehicles and major weapon systems, to class II, which includes durable equipment such as tents and tool sets. Replacement tanks no longer will be free-issue items to units. Tanks will be provided as part of the initial issue of a complete system, such as a fuel system supply point. Replacement tanks will have to be budgeted, requisitioned, and paid for by the using unit. This change will eliminate shortages, allow stockage of all sizes of tanks, and reduce order ship time. The transition will take effect in fiscal year 2002.

Collapsible tanks have stored fuel for warfighters successfully for several decades. The tanks have evolved into the single most effective tactical fuel storage system on the battlefield today. Their flexibility, limited transportation requirements, and low cost will continue to make fabric tanks an attractive bulk fuel storage alternative for many years. Recent initiatives and innovations have lessened the storage and service life difficulties and reduced storage-space dilemmas. The Army's continued quest for improved materials, lighter fabrics, and better manufacturing techniques ensures that its fuel storage systems will meet the needs of the combat soldier in the 21st century. **ALOG**

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The Most Decorated Ammunition Company in Vietnam

by Brigadier General Richard F. Allen, USAR (Ret.)

No ammunition company that served in Vietnam received more recognition for its outstanding performance than the 148th Ordnance Company (Ammunition). Stationed at Vung Tau and Dong Tam during the early years of the war and later posted to Long Binh, the company was awarded the Meritorious Unit Commendation three times for superior performance. The first award was one of only three Meritorious Unit Commendations awarded to an ammunition company standing alone, rather than as part of a larger force. The unit received its subsequent awards while serving as part of the 2d Maintenance Battalion and the 3d Ordnance Battalion.

I would like to share the story of that first award, which was bestowed on the company for its diligent service before, during, and after the 1968 Tet offensive. I had the honor and privilege of commanding the 148th from October 1967 until June 1968, so most of what follows is based on first-hand observation.

148th Ordnance Company

I knew the 148th had the potential to be a great unit as soon as the officer I was replacing told me about the men I would be commanding. How so many of the Army's most knowledgeable and experienced ammunition noncommissioned officers (NCO's) wound up in one small unit at the same time I will never know—I was just glad to see them. My two warrant officers also were special. One was a seasoned explosive ordnance disposal sergeant before the war, the other had many years of experience as an ammunition NCO, and both were highly trained and motivated. My two lieutenants, though young and inexperienced, were conscientious and willing to work.

The mission of an ammunition company is to receive, store, and issue to its customers all of the ammunition they need to conduct combat operations. Support generally is provided to all units fighting in a given area, but no unit presenting the proper request is ever refused service if the needed items are on hand. The 148th's support area was the IV Corps Tactical Zone, otherwise known as the Mekong Delta; part of the III Corps Tactical Zone; and the Vung Tau Special Zone, an area lying southeast of Saigon and north of Vung Tau. Our primary customers were the 9th Infantry Division and its "Riverines" based at Dong Tam in the Delta; the 164th Aviation Group, which flew helicopter gunships throughout the Delta; the Australia and New Zealand Task Forces that operated in the Vung Tau Special Zone; and a number of artillery battalions that provided fire support in the area. We also supplied certain munitions to the Air Force and Navy and issued some items to the South Vietnamese Army and their U.S. Army advisors.

A 1967-vintage ammo company's wartime authorized strength was 5 officers and 238 enlisted men. Inexplicably, the 148th was organized at level 3, which usually was a peacetime level. At this level, the unit was authorized 5 officers but only 191 enlisted personnel—and we never had more than 90 percent of that authorized strength.

The company operated 24 hours a day, 7 days a week, in two locations: the main ammunition supply point (ASP) at Vung Tau and a small detachment, usually about 20 men, at a small ASP in support of the 9th Division at its Dong Tam base. A number of soldiers were permanently attached to the base security force, and occasionally we had to furnish troops for special details. Just getting enough people to the ASP's to handle the tremendous tonnages of ammunition required to support wide-ranging combat operations was a constant challenge. Still, when possible, we tried to give every man a half-day off each week, our rationale being that we could get more work out of our troops in 6½ days than we could in 7.

Fortunately, most ammunition arrived in palletized loads and was issued or shipped the same way, or we would have sunk under the work load. Ammunition pallets, of course, are quite heavy. So we were at the mercy of our materials-handling equipment: eight 6,000-pound rough-terrain forklifts and a 20-ton crane. Our continuous operations took a toll on machinery as well as men, and blowing sand, alternating with rain and the

hot sun, exacerbated maintenance problems. The maintenance section worked diligently, though often hampered by a scarcity of repair parts, and kept us operating. A day with six operating forklifts was a pleasant rarity; two-forklift days were more common. Sometimes a work shift would start with four or five forklifts up and running, only to have all become deadlined at some point in the day. The 20-ton crane, though slow and cumbersome, was used extensively to handle 8-inch and 155-millimeter howitzer ammunition and 175-millimeter gun projectiles because of their shipping configuration.

Palletized loads, however, were a mixed blessing. So many pallets were damaged in shipment that labor-intensive repalletizing was an ongoing requirement. Both men and steel banding material were always in short supply, and banding machines wore out frequently. Our NCO's requisitioned, then literally begged, borrowed, or stole, what they had to have to get the job done. NCO initiative and leadership has made many officers look good in many wars, and the 148th, too, benefited from NCO competence.

Vung Tau

The town of Vung Tau is located on a narrow, hilly, 10-mile-long peninsula bounded on one side by the South China Sea and on the other by Vinh Ganh Bay. The U.S. logistics complex at Vung Tau began just outside of town, with the airfield occupying most of the usable land, and extended about 2 miles along the southeast side of Highway 15; the port was on the other side of the road. In addition to the airfield and the port, the complex included a hospital, an equipment maintenance facility, the only floating depot-level aircraft maintenance facility in the world (aboard the *Corpus Christi Bay*, anchored just off shore), a number of storage facilities for nonexplosive supplies, and, of course, the ASP.

An ASP should be large enough to accommodate widely dispersed storage of high explosives, and it should be built with a solid foundation to support heavy truck traffic and extremely heavy stacks of ammunition. The Vung Tau storage facility consisted of 33 storage pads, each about 100 feet wide and 150 feet deep, that were made of pierced steel planking like that used for airfield runway construction. The pads rested on nothing but sand, but they were remarkably stable and withstood not only the heavy weight of the ammunition but also the wear and tear inflicted by the large, heavy forklifts used to stack and retrieve the mostly palletized munitions.

The 600 or so acres set aside for the ASP between the airfield and a swamp were not enough to provide the separation needed for safety requirements, so a causeway had to be built into the swamp to accommodate the last three pads. This was done with considerable effort and skill by Army engineers using the only material readily available—sand. Once finished, however, the pads in the swamp were as functional as those built on the already existing sand piles.

In order to reduce the distance between the storage pads while providing as much safety as possible, berms 12 to 14 feet high were constructed of sand around each pad. As soon as the berms were completed, however, they began to erode. Several methods of erosion control were tried; the most workable solution was to spray the sand with a tar-like substance used to seal roadbeds just before the asphalt is laid. This technique held up well until someone, usually a guard at night, walked on

□ To construct a new bunker after the April 1968 rocket attack on Vung Tau, soldiers made sandbags after completing their daily ASP work. Vietnamese laborers then used the sandbags to build the bunker.

the crusty surface and punched holes in it, allowing rainwater access to begin its destructive work.

The ASP office, which maintained the records showing the quantities and locations of all items and controlled receipts, issues, and inventory, was just outside the only entrance to the ASP. Across the road, and also outside the gate, was the area where inert items returned by customers, such as brass shell casings, were checked to ensure that no explosives were present and then processed for shipment home.

The gate was guarded by the base security force, and several observation towers were manned during the day. At night, the tower guards were reinforced with jeep-mounted patrols and foot patrols with dogs. During my tenure, the ASP was penetrated only twice at night; in both cases, the perpetrators were quickly brought to bay by the dogs. In both instances, the terrified detainees turned out to be teenage boys running away from the South Vietnamese Army's Revolutionary Development School, our neighbor to the north.

The ASP was surrounded by a 10-foot-high, barbed wire fence that was still under construction in late 1967. The portion of the fence on dry land was finished, but the fence ran right through the swamp for about ¾ mile. Being a member of the fence construction crew had to be the worst job in Vung Tau. The four men and their NCO chief worked off a raft they built just for the job, and they spent all day either in the burning sun or in the brackish swamp water (emerging when necessary to remove leeches). The wire was strung underwater to a depth of at least 3 feet. To my amazement, no snakebites were ever reported, and the crew actually seemed disappointed when the job was finished and they had to return to normal guard duty.

Dong Tam

The base for the 9th Infantry Division's Riverine Force was on the north bank of the Mekong River, at a place called Dong Tam, about 45 miles upstream from where the great river emptied into the South China Sea. The 53d General Support Group, of which the 148th Ordnance Company was a part, operated a forward support activity (FSA) there that provided backup logistics support to the division. An FSA was a provisional unit made up of elements of a general supply company, a maintenance company, an ammunition company, and other units as needed; it usually was commanded by a major from the group staff. The 148th supplied a detachment of about 20 men to operate the small ASP at Dong Tam. Dong Tam was hit regularly by rocket and mortar fire. Ground probes by the Viet Cong (VC) were not uncommon. In September 1967, several members of the 148th were wounded in a mortar attack.

There was no easy way to get from Vung Tau to Dong Tam. The most frequently used method was by air, although resupply boats sailed from the Vung Tau port early each morning. On the west side of Dong Tam, a harbor had been dredged to create a port that was safely out of the river's strong current. Next to the harbor near the western perimeter was the Dong Tam "International Airport."

The ASP ran parallel to the northern half of the air strip. This ASP was unsatisfactory in almost every aspect. It was too close to the airstrip and too close to the FSA's living quarters, and its ammo "pads" (nothing more than wood pallets) were too close to each other—all serious safety violations. Earth berms separating the pads were only about 4 feet high and provided no protection at all. A new ASP was under construction across the harbor on a strip of land between the harbor and the river. The new site provided a safe distance between ammunition and living areas and the airfield. It was to be a "modular" ASP, meaning that a number of contiguous pads or modules would be laid out side by side in a straight line separated only by high earthen berms. They were still too close to each other, but ammunition safety requirements had to be sacrificed because of the space restrictions. Later, after the new ASP was completed, one of its modules took a mortar round; the resulting fire skipped from module to module, leaping over the berm as if it didn't exist, and destroyed most of the ammunition on hand.

I visited Dong Tam regularly to let the troops know that their mission was important and they were still a part of the 148th. The officer and senior NCO we dispatched to Dong Tam after my first trip reorganized the detachment, cleaned up the ASP, and generally improved the operation and the condition of the men, who rotated in and out every 6 weeks.

Tet 1968

In late January 1968, I was at the Saigon Support Command at Long Binh to meet with the ammunition staff to discuss the disposition of unserviceable ammo that had been accumulating at the ASP. Everything from small arms ammo to such high-explosive items as 81-millimeter mortars, Bangalore torpedoes, and antitank mines needed to be destroyed or shipped to Long Binh for demolition. I convinced the staff that my demolition-trained magazine platoon leader, Chief Warrant Officer John Warren, was perfectly capable of safely destroying anything on hand. We planned to burn the small arms ammunition in an old French coastal artillery bunker. Demolition of the high-explosive items would be done safely on one of the uninhabited islands in Vinh Ganh Bay. It was agreed that we could start immediately.

After the meeting, the officers I was visiting told me that there had been a general lull in combat activity initiated by the enemy. The feeling at II Field Force Head-

quarters was that the VC were beaten and that the war would be over soon.

Back in Vung Tau, we heard on Armed Forces Radio that the South Vietnamese Government and the VC had agreed to a 3-day truce beginning on 30 January. There had been truces before, and any violations usually were relatively minor. About half of the Vietnamese Army was given leave, and the 53d General Support Group issued instructions in Vung Tau for our soldiers to be careful in town and not interfere with the Lunar New Year celebration.

☐ A typical scene in the marketplace in Vung Tau.

On Monday, 29 January, I received a call from Captain Cary King, an old friend from my days in the artillery in Europe who was with the 1st Infantry Division, telling me that, because of the lull, he had been given a 3-day pass. On the afternoon of 30 January, I picked him up at the airfield and took him to the Pacific Hotel. We agreed to meet for dinner later. After an excellent meal, we walked back to the hotel, which was the transient bachelor officers quarters for Vung Tau. It was still early, but the malaria pill I had taken the day before was causing more problems than usual, so I decided to turn in for the night. I was soon asleep, despite the incessant rattle of firecrackers. When the alarm clock went off the next morning, I felt so bad that I called company headquarters and left word for the first sergeant that I might be in later, depending on how I felt.

At about 0830, there was a knock at my door, and when I opened it, there, to my surprise, stood Cary. He had just stopped by on his way to the airfield to say goodbye. Laughing, he told me that at 0330 he had been awakened by the club officer, dressed in civilian clothes but wearing a steel helmet and a flack jacket and carrying a double-barreled shotgun. The club officer told him that the VC were attacking all over the place and that an attack on the officers' club could occur at any time. Cary, who had seen plenty of combat, just said, "Right," and went back to sleep. When he went down for breakfast, however, there was still much excitement, so he called his unit. He was told that all hell had broken loose and he was to get back ASAP! As bad as I felt, I quickly dressed and went to work. I was not sure what was happening, but I was not going to miss it because of illness!

When I got to the company, the situation was still far from clear. All we knew at first was that we were getting a lot of requests for ammunition. At about noon, I was summoned to battalion headquarters for a commander's call. The battalion commander told us about the same thing Cary had told me. The area was on heightened alert, but we were to continue to perform our missions as usual. As more information became available, they would let us know. There was no need to man the perimeter at this time, but no passes were authorized and town was off limits except for those who lived there.

Back at the ASP, business was booming (no pun intended). Units from the Baria area brought news of VC attacks in several nearby locations and reported that the town itself had been shot up pretty badly. The tone of the requests for ammo support was becoming increasingly urgent, and the shipping priorities being assigned, such as "combat essential," "emergency," and "tactical emergency," reflected the seriousness of the developing situation. Men and equipment were strained almost to the limit to make sure no request went unfilled and no shipments to the airfield were late.

As the afternoon of 30 January wore on, rumors were rampant. There were reports of large numbers of VC soldiers seen south of Baria heading our way, but still no alert order came down. I took my officers and the first sergeant to inspect the perimeter of the ASP to make sure we knew where we would position our men and machineguns and to identify on the ground where we would link up with units on our left and right. We were to occupy the northeast quadrant of the ASP boundary overlooking the swamp.

Back at the company area, I issued orders for everyone to draw weapons and put our basic load of ammo on trucks. The night crew went to work, and the day crew nervously waited for something to happen. Finally, just as it was getting dark, full alert status was announced, and we dashed to the ASP. As I walked the perimeter checking on my men and verifying their fields of fire, I could almost feel the presence of the enemy in the swamp. Some of my men were sure they could see movement or subdued lights among the lizards and lily pads.

While the day crew manned the perimeter, the night crew continued to operate the ASP, although under blackout conditions. This made their work, which even in good light was dangerous, downright hazardous. Regardless of the risk, we had ammo that had to be delivered to the port, where it would be loaded on "mike boats" (landing craft, medium) in time for their dawn departure for Dong Tam to resupply the 9th Infantry

Division. At about midnight, much to everyone's surprise, we received the order to stand down. The day crew went to bed, the night crew finished the night's work, and we didn't get to see how the unit would react to a ground attack. But there were no complaints.

I spent the night in my office, just in case something unexpected happened. At about 0100, the ASP office called to ask what they should do about shipping documents that were to be delivered to group headquarters. Orders had been issued earlier in the evening directing everyone to stay off the roads since the presence of small enemy units or individual infiltrators had not been ruled out. If orders were going to be violated, I decided I should be the one to violate them. So I got a driver and another man for security, and, despite a spooky trip, we delivered the documents to group headquarters without incident.

The next morning, my lieutenants and I drove into town to clean up. Our usual route took us on a dirt road that ran between the ASP and the back side of the airfield. As we passed the airfield, we gained a greater appreciation of how widespread the VC attacks really were and how safe Vung Tau was. Just about every square inch of space on the airfield was occupied by some kind of airplane! It looked as if every C–130 transport and every helicopter in Vietnam had been flown down to Vung Tau for safekeeping. Within a few days, however, all the planes were gone. That's when I knew we had won the battle. The Army never would have risked moving all those planes if the situation had not stabilized.

Weeks of hard fighting and mopping up still lay ahead, and the ammo mission would continue to be intense, but the Tet offensive had been a military defeat for the enemy. Little did we know then what a political and propaganda victory they had achieved back home.

In early April 1968, five 122-millimeter rockets slammed into Vung Tau. One struck a barracks a few yards from the 148th, injuring several men in the adjacent unit. One hit just outside the ASP and threw up a lot of sand, but it did no damage. The other three hit the port, the airfield, and the town, killing several civilians and destroying one airplane. The rockets were fired from the same island in the bay we used for destroying unserviceable high explosives. A sweep of the island by South Vietnamese troops turned up nothing, so we continued to detonate material there. But we took more care with security from then on.

The story of the 148th Ordnance Company is not the story of larger-than-life men doing heroic deeds. Rather, it's about ordinary soldiers at the small unit level going to extraordinary lengths to support the war effort. The unit's work was hard and its triumphs relatively small, but it is the cumulative effort of many small units like the 148th, working hard and accomplishing missions, that enables our Army to do great deeds.

The citation accompanying the first award of the Meritorious Unit Commendation to the 148th records the facts, if not the tension and frantic pace of the effort. It summarizes the unit's contributions as well as I could—

> The 148th Ordnance Company (Ammunition) distinguished itself in support of military operations in the Republic of Vietnam during the period 1 April 1967 to 30 April 1968. Demonstrating professional competence and determination, the company's members accomplished their vital mission of providing ammunition support to the entire IV Corps Tactical Zone, part of the III Corps Tactical Zone and the Vung Tau Special Zone in a truly outstanding manner. They effectively handled more than 240,000 short tons of ammunition, overcoming numerous difficulties in order to ensure that there was never a serious ammunition shortage in their area of responsibility. While operating the ammunition supply point at Dong Tam, members of the 148th Ordnance Company (Ammunition) were continually exposed to enemy rocket and mortar attack, but suffered no reduction in efficiency or mission output. Their singular performance during the enemy's TET offensive reflected accurately upon their technical proficiency and perseverance. During the weeks following TET, the men handled more than twenty-seven thousand tons of ammunition, responding flawlessly to four emergency resupply demands, one tactical emergency and thirty-one combat essential resupply demands. Because of their willingness to work long and arduous hours, no requests went unfilled. Through their initiative, resourcefulness and dedication, the company's men contributed immeasurably to the United States effort in the Republic of Vietnam. The remarkable proficiency and devotion to duty displayed by the members of the 148th Ordnance Company (Ammunition) are in keeping with the highest traditions of the military service and reflect distinct credit upon themselves and the Armed Forces of the United States.

Brigadier General Richard F. Allen, USAR (Ret.), is the Civilian Aide to the Secretary of the Army for Alabama.

Commentary

A Conscientious Approach to Combat Service Support

by Major Luis A. Delgado, USAR

In the 19th century, Prussian Field Marshal Helmuth Von Moltke said, "No plan survives contact with the enemy." This is not just an empty phrase; it's a caveat to logisticians on the execution of their planning. By the same token, it is a warning to logisticians that not every logistics situation can be covered in a nice, neat combat service support matrix. There are too many event-driven decisions and actions that must take place before a soldier can shoot a round of ammunition, hit a target, and achieve the desired result. Time permitting, the logistician starts out with a well-crafted, planned sequence of events and procedures to support the warfighter. However, once execution of the plan is underway, he can reach a goal only by adapting to events and situations that arise and to the realities of the military distribution systems.

Most military operations take place on unfamiliar terrain in a foreign land. Sometimes the forces of nature add to the drama, imposing constraints on resources such as transportation, personnel, communication links, maintenance, and supply and services. Logisticians need a basic knowledge of how these interdependent systems affect soldier support. This knowledge will give them the ability to minimize obstacles, prepare for the unexpected, and always be ready to adjust the plan to fit the situation.

Even when you are well prepared, unexpected challenges can occur because of training shortfalls or because of a faulty logistics decision based on hasty assumptions. Did you ever hear of the "that's the way we did it back in____" syndrome? Careless logisticians often offer "cookie cutter" solutions that do not quite fit the scenario. These familiar solutions create complacency and lead to obstacles that can slow down or threaten the flow of support. To resume the flow of support, a conscientious logistician will identify and remove these barriers. He must recognize where the gaps develop between planning and execution and make adjustments to meet current and projected situations. Adjusting to change is a vital part of an effective logistician's thinking process.

Right after first contact with the enemy, a flurry of information emerges. During this data frenzy, there is an exchange of endless bits of electronic and paper-based information that eventually will impact directly on the combatant's readiness. Because the human factor is involved, a conscientious logistician should never forward information, or act upon it, without first verifying it. Once they are set in motion, logistics actions based on incorrect information can cause lost time, money, and manpower.

Armed with accurate information, the logistician can adjust combat service support plans properly. This information comes from every corner of the battlefield, including the combat commander's current and future intent, levels and locations of ammunition and fuel, composition and requirements of weapon systems, serviceability of all command-regulated items and replacements, levels of life-support supplies, distribution channel capabilities, and manpower availability.

With these indicators, logisticians can decide what support is needed for the next maneuver, visualize where the support is needed most, and put a plan into action. Again, once information is received, it is necessary to react quickly. The combat commander relies on information about the unit's logistics posture to make crucial decisions about offensive and defensive actions.

The logistics clock never stops ticking. Someone is making managerial decisions throughout the entire lifespan of materiel designed to support soldiers or equipment. The clock starts ticking in the research and development phase at the manufacturer. Once manufactured, the product continues its journey to an installation or depot, where it is held until needed. From the temporary storage site, it is sent to the farthest supporting logistics base. Then it can be drawn from the supporting activity to take care of soldiers and equipment or to carry out the combat commander's intent. Whether the logistician is behind a computer screen at the depot or behind the wheel of a truck somewhere on the battlefield, there is a soldier who is counting on him to make the correct decision and deliver the needed combat service support. The bottom line is that logisticians must design a solid combat service support plan, execute it efficiently, and adjust it constantly to the current situation by using verifiable information.

Major Luis A. Delgado, USAR, is an Active Guard/Reserve officer who is serving as the maintenance officer for the 311th Corps Support Command, Fort Lewis, Washington. He has a bachelor's degree in industrial management from the University of Puerto Rico and a master's degree in human resource development from Webster University in Missouri.

Commentary

Physical Training Strategy

by Major Leslie J. Pierce

During my command of a divisional combat service support company, I made the following observations about physical training (PT): the routine exercises often called the "daily dozen" are boring; timed PT events are only effective for the motivated; junior leaders don't have ownership of the PT program; and some soldiers are afraid of the Army physical fitness test (APFT). I confirmed my suspicions with the first sergeant, and we developed a plan to correct the problems. Although the reactions of the platoon sergeants, platoon leaders, and the training noncommissioned officer (NCO) to our plan were mixed, everyone agreed to support it for a 90-day trial period, with after-action reviews every 30 days.

To change the routine, one of the four platoons was assigned responsibility for the company's PT events each week, on a rotating basis. What the first platoon planned for week one was what the entire company did during that week. For this part, the ground rules were fairly simple: the PT plans were scheduled a month in advance; each week, the platoon leader responsible for the next week's PT plan would brief or give handouts on the upcoming plan to other leaders within the company; PT could be carried out at any level from squad to company; and, to avoid boredom, we agreed that PT activities could not be the same during the week or on the following Monday. The goal was to vary the PT routine so we did not have a major PT event such as the daily dozen more than once within 4 PT days. As company commander, I imposed only two company-driven events. The first was a company run on the first Friday of each month, and the second was a company-wide APFT on the last Friday of each month.

I observed that, during exercises that were timed events, some soldiers were doing very few exercises while others were doing up to one a second. So we implemented a plan in which, at least for pushups and situps, soldiers had to complete a specific number of exercises. Those who finished quickly either watched and encouraged everyone else or did more of the exercise until the other soldiers finished. I believed that, if we performed to a quantity standard, the soldiers would have no option but to do the required number and (if done to standard) the faster the better.

By having the platoons come up with the PT schedule, we exposed the junior leaders to the execution of different types of PT events. We encouraged the platoon sergeants and platoon leaders to canvass their squad leaders for input into the PT schedule and events. In this way, we had the ideas and experience of 24 NCO's and officers to aid in PT scheduling and variety. This also took away the often-heard training arguments, "the only thing we ever do is the daily dozen," and "I sure wish they would let us ____, but we never do, so I'll keep quiet."

While trying to make PT fun and less routine, we needed to deal with the fear of the APFT that some soldiers have. I believe that some soldiers manage to avoid the APFT through sick call, temporary profile, car problems, and so forth because they are afraid they will fail. Our solution was to incorporate the APFT into the company PT plan so everyone took either a record or diagnostic APFT at the end of each month. This solution allowed everyone to practice the APFT, making the test less traumatic for those who feared it and offering a physical fitness tracking tool for leaders.

With each after-action report, we improved our planning and execution. Motivation for the new PT program remained high as soldiers were challenged, junior leaders were critically involved, and the individual and overall APFT scores increased. By the end of the 90-day trial period, all of our APFT "escapees" had passed the APFT.

In the following 90-day period, we further challenged the squad leaders by making squad APFT scores a part of their NCO evaluation reports. We found that about 40 percent of the squad's APFT scores remained high, 50 percent improved as squad leaders motivated and encouraged their troops during PT, and 10 percent kept passing but with slower progress.

I believe this program is based on some fundamental truths about the value of variety in training and the importance of junior leader participation as a multiplier in any program worth doing well. It was successful because it transformed a boring PT routine into a valuable program that gave participants input and junior leaders accountability.

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Combat Service Support and Combat Arms: Avoiding a Cultural Chasm

by Colonel Christopher R. Paparone

In a recent lecture at the Army War College, a senior military officer (Speaker A) stated that logistics and operations were moving closer and closer together, and soon they would be virtually indistinguishable. The forces he cited as driving this merger included the U.S. military's maturing force-projection strategy, technological advances, and just-in-time logistics. These three factors are causing operations and logistics to be so interdependent that the military may soon reach the point when there is no longer any reason to treat them as separate functions.

Speaker A went on to say that, for example, at the tactical level, precision-guided munitions and more fuel-efficient equipment could lessen logistics requirements. At the operational level, total asset visibility and predictive maintenance technologies could make operations more agile. At the strategic level, use of commercially viable technologies and transportation capabilities by the military could make strategic projection as fast as the Army Vision requires.

Another senior military leader (Speaker B) talked about the "unity of command" that is being achieved down to brigade level. He said that, with the implementation of Division XXI concepts, which take logistics out of the maneuver battalions and place it in the forward support battalion (FSB), the "desirable" unity of command for logistics is now a reality.

What is disconcerting about Speaker B's remarks is the conceptual disparity from Speaker A's vision of the merging of operations and logistics. This disparity is a cultural one. The culture required in Speaker A's emerging reality calls for throwing out the traditional "pecking order" of combat arms versus combat support versus combat service support. The resilient branch insignias of the Army and the "unbreakable" historic ties to these stovepiped specialties probably would have to be broken also. Speaker A's scenario, which is very much in line with the Army Vision, would require the reengineering of officer and noncommissioned officer specialties to create a more multifunctional soldier. One option would be to look at the Marine Corps system that "raises" every Marine as an infantryman first, cradle to grave. In any case, the call for a more flexible and multifunctional organization is clear under Speaker A's forecast.

Speaker B's description of how the Army could break the final "inefficiency" of logistics structure in the brigade called for the FSB commander to use his logistics "fire hose" to support a mission. According to Speaker B, "No logistics should ever be idle—we just can't afford that." But to say that there would be a better unity of command is misleading. Unity of command implies command over a multitude of battlefield operating systems. The maneuver battalion task force actually relinquishes unity of command over organic logistics to a direct support unit.

The problem with Speaker B's scenario (separating logistics and operations) is that it is diametrically opposed to Speaker A's concept (a clear and present merging of logistics and operations at higher levels of Army and joint organizations). Speaker B's scenario exacerbates an already-growing cultural chasm between the logistics and operations communities. The Division XXI brigade will produce leaders from junior officers on up to brigade commanders who have little command interest in logistics. "I don't know much about logistics except that I need some," will become the maneuver commander's fallback position. The FSB commander, however, must know virtually every detail of a combat maneuver, or a travesty will result. (Even so, he still will not have to fear for his career, since his rater is the division support commander—possibly another "loggie.")

Perhaps a compromise can be found to fix this impending cultural disparity. One alternative would be to place the FSB under the brigade as an attachment instead of having it under the division support commander. At least the maneuver brigade commander and his staff would learn the command responsibilities for logistics, although the maneuver battalion commanders still would be at risk.

The Army sees both Speakers A and B as correct. Regardless of the final course of action selected to overcome this cultural disparity, senior leaders first must recognize the impending train wreck that eventually will occur if this dual view is sustained. If senior leaders

truly believe the Army Vision, then Division XXI logisticians at the brigade level should practice cognitive dissonance (believing one thing and doing another). Otherwise, future senior leaders will not be equipped with the understanding of logistics and operations that is necessary to make good decisions—a shortfall that eventually will cripple our National Military Strategy.

Colonel Christopher R. Paparone, a Quartermaster Corps officer, is a graduate of the Army War College. He has served in various command and staff positions at division, corps, theater, and national levels. He is participating in the Army War College Professorship Program and is completing studies leading to a Ph.D. degree at Pennsylvania State University.

Commentary

Toward a Multinational Future

by Joseph R. Bainbridge

The next large deployment involving U.S. forces will be a joint operation, and likely multinational as well. In a joint operation, one service may dominate, but two or more military services contribute. Certain functions are performed by one service in support of all. Department of Defense structure makes this cooperation and dependence inevitable; participation in multinational operations makes it vital.

All potential Army commanders need basic, operational-level awareness of joint and multinational operations and logistics. The U.S. Joint Forces Command's Joint Warfighting Center in Suffolk, Virginia, certifies that joint commanders and joint task forces possess capabilities not found in single-service elements and trains them to use these skills effectively. The Army Logistics Management College at Fort Lee, Virginia, offers the Joint Course on Logistics, which addresses multinational operations, but not in detail.

Given the world we live in, we can expect to participate in multinational operations in the future. Those operations can be very successful because consensus, created when a number of autonomous states band together toward a common goal, sends a powerful message. Operation Desert Storm, to which 38 nations sent forces and which many more formally endorsed, demonstrated this.

While officers are exposed to some multinational experiences as they progress through their careers, these may not be enough to prepare them to serve as logisticians in a multinational operation. There should be a multinational logistics course for them.

Bold leaders assess circumstances and make plans and decisions on the spot. Yet having suggestions, a framework, or a pattern as a starting point is easier and faster than starting from scratch. The Army has published multinational doctrine in Field Manual 100–8, The Army in Multinational Operations. Joint Publication (Pub) 3–16, Joint Doctrine for Multinational Operations, was published in April, and Joint Pub 4–08, Joint Doctrine for Multinational Logistics, is under development.

Multinational operations may include some unfamiliar relationships. The person responsible for an operation may have to persuade or coerce commanders from other nations to follow or adopt his strategy and procedures. Participating nations may pledge cooperation but reject subordinate status. Operations that do not involve fighting may be controlled even less tightly. Humanitarian assistance missions are dominated by logistics, yet nations opting to join a coalition may be unwilling to relinquish control of their logistics resources to commanders from other nations. Consider that the United States belongs to an international organization (the United Nations) to which most of its potential enemies also belong. What a challenge it must be to come to a consensus on issues in United Nations meetings.

Our military logisticians need to be trained to function effectively in multinational operations. The Army Logistics Management College is developing a multinational logistics course. If you would like more information about this course, or if you have suggestions for course content, call (804) 765–4713 or DSN 539–4713 or send an e-mail to bainbrij@lee.army.mil. For information on the Joint Course on Logistics, call (804) 765–0285 or DSN 539–0285, or send an e-mail to ruggieroa@lee.army.mil.

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Given the world we live in, we can expect to participate in multinational operations in the future. Those operations can be very successful because consensus, created when a number of autonomous states band together toward a common goal, sends a powerful message. Operation Desert Storm, to which 38 nations sent forces and which many more formally endorsed, demonstrated this.

While officers are exposed to some multinational experiences as they progress through their careers, these may not be enough to prepare them to serve as logisticians in a multinational operation. There should be a multinational logistics course for them.

Bold leaders assess circumstances and make plans and decisions on the spot. Yet having suggestions, a framework, or a pattern as a starting point is easier and faster than starting from scratch. The Army has published multinational doctrine in Field Manual 100–8, The Army in Multinational Operations. Joint Publication (Pub) 3–16, Joint Doctrine for Multinational Operations, was published in April, and Joint Pub 4–08, Joint Doctrine for Multinational Logistics, is under development.

Multinational operations may include some unfamiliar relationships. The person responsible for an operation may have to persuade or coerce commanders from other nations to follow or adopt his strategy and procedures. Participating nations may pledge cooperation but reject subordinate status. Operations that do not involve fighting may be controlled even less tightly. Humanitarian assistance missions are dominated by logistics, yet nations opting to join a coalition may be unwilling to relinquish control of their logistics resources to commanders from other nations. Consider that the United States belongs to an international organization (the United Nations) to which most of its potential enemies also belong. What a challenge it must be to come to a consensus on issues in United Nations meetings.

Our military logisticians need to be trained to function effectively in multinational operations. The Army Logistics Management College is developing a multinational logistics course. If you would like more information about this course, or if you have suggestions for course content, call (804) 765–4713 or DSN 539–4713 or send an e-mail to bainbrij@lee.army.mil. For information on the Joint Course on Logistics, call (804) 765–0285 or DSN 539–0285, or send an e-mail to ruggieroa@lee.army.mil.

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