ARMY LOGISTICIAN

NOVEMBER-DECEMBER 1996

Logistics Support in Bosnia—Special Section

—Page 20

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ARTICLES

DEPARTMENTS

COVER

Operation Joint Endeavor will reach its 1-year anniversary in December. The scene in the cover photo, captured at Lukavac Air Base, Bosnia, last January, shows that the supply pipeline was fully active early in the operation. Air pallets are loaded with much-needed winter clothing, items of individual equipment, and repair parts. Throughout the year the logistics system has sustained the needs of the operation. Stories contained in the special section, beginning on page 20, describe a variety of logistics support activities for Bosnia.

Mission: *Army Logistician* (ISSN 0004-2528) is the Department of the Army's official bimonthly professional bulletin on logistics, prepared at the Army Logistics Management College and published by the Army Combined Arms Support Command, Fort Lee, Virginia. Its mission is to publish timely, authoritative information on Army and Defense logistics plans, programs, policies, operations, procedures, and doctrine for the benefit of all logistics personnel. Its purpose is to provide a forum for the exchange of information and expression of original, creative, innovative thought on logistics functions.

Disclaimer: Articles express opinions of authors, not the Department of Defense or any of its agencies, and do not change or supersede official Army publications. The masculine pronoun may refer to both genders.

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 SUITE C300/2401 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 speightt@lee-dns1.army.mil.

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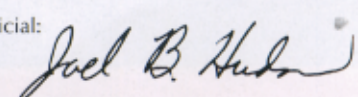
By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant
to the Secretary of the Army
02441

Coming in Future Issues—

- An Extra Christmas Present
- Is Battlefield Distribution the Answer?
- Rail Support of Logistics Operations
- Ten Problems an LAO Can Solve
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- Digitizing Transportation Data
- Let Maintenance Improve Aircraft Readiness

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ALOG DIGEST

SARSS-O EXTENDED TO BOSNIA

To assist their NATO Implementation Force (IFOR) units with current operations and future redeployment, V Corps accelerated the extension of the standard Army retail supply system-objective (SARSS-O) to units in Bosnia. SARSS-O is the Army's new retail supply system that replaces the standard Army intermediate level supply system, the direct support unit standard supply system, and SARSS-interim.

After special training in the United States, a system extension team of trainers and file conversion experts traveled to Germany for "down range" staging. From there they were bused to Slavonski Brod, Croatia, where, in a large manufacturing building, they set up two classrooms with computers shipped from Germany.

Extension training was conducted for 191 SARSS operators and supervisors in two sessions that ran from 16 July through 18 August. The training covered SARSS supply operations, new computer equipment, system administrator procedures, the materiel release order control system, and the automated manifest system.

File conversion procedures, which included the download of data from the supporting computer in Kaiserslautern, Germany, and the building of files at each SARSS site, were completed on 25 August. Onsite monitoring by contract employees from Development Center Lee, Fort Lee, Virginia, continued until 20 September.

Extension of SARSS-O to Bosnia provides IFOR units with more efficient warehouse supply operations, better communications capabilities, modern automatic data processing equipment, improved asset visibility and cross-leveling, and reduced order and shipping time. Fielding to the rest of the Army also has been accelerated. System extensions to III Corps and remaining U.S. Army, Europe, units will be completed by the end of second quarter, fiscal year (FY) 1997; units in Korea and the Pacific will begin fielding during second quarter FY 1997. It is anticipated that all active Army, Army National Guard, Army Reserve, and table of distribution and allowances activities will have SARSS-O by mid-FY 1998.

RESERVE PERSONNEL RECORDS CONVERTED TO ELECTRONIC FORMAT

The Army Reserve Personnel Center (ARPERCEN), St. Louis, Missouri, is transferring data from more than 600,000 personnel records from paper and microfiche formats to 12-inch disks. This change will allow rapid access to Army Reserve personnel records with a touch of a button.

The personnel electronic records management system (PERMS) is based on optical digital imagery. Images of the records are scanned electronically and reproduced on 12-inch disks. One disk holds 3,000 images to support personnel records for 400 to 700 soldiers. The disks can be accessed by computer with images taking only 20 seconds to appear. This is a drastic change from the days or weeks it once took to locate and view a record.

The conversion process for 85 million images began in 1987 and should be completed by the end of this year. The conversion is expected to cost $18.7 million, with an additional $36 million for hardware and software. PERMS will save money in the long run by saving the time personnel officials spend searching for and reviewing personnel records.

Retiree records will be housed in the same building with Army Reserve personnel records; however, the records will not be converted to PERMS. They will be stored in boxes in the current format. The National Archives and Records Administration (NARA) manages retiree records for active Army, Army National Guard, Army Reserve, Navy, and Air Force. Requests for retiree records information can be sent to NARA, ATTN: Military Personnel Records, 9700 Page Avenue, St. Louis, Missouri 63132. Requests for information should include the retiree's service number or Social Security number, return address, and signature.

MULTINATIONAL GUIDE COMPLETED

The Army Training and Doctrine Command (TRADOC), Fort Monroe, Virginia, has completed a guide for soldiers who work with troops from other countries. Field Manual 100-8, The Army in Multinational Operations, describes all aspects of military operations, including command structures, battle dynamics, and other considerations for soldiers in oversea locations. FM 100-8 is designed to help leaders and commanders identify ways to form effective partnerships with other countries' military organizations.

Soldiers who deploy to locations outside the

continental United States must prepare to fight alongside troops from other nations. One annex to the manual that should prove useful to leaders is a checklist of factors to consider when deciding how to organize operations, such as the capabilities, qualifications, and equipment of the allied elements.

The draft was staffed with the Navy, the Air Force, the Joint Chiefs of Staff, and a North Atlantic Treaty Organization doctrinal working group. Comments from other nations, such as Turkey and the United Kingdom, were incorporated in the manual. Reviewers from other countries said that the manual gives them a good idea of how the U.S. Army works in the multinational environment.

FM 100-8 is being distributed through routine publication channels. Also, this manual and other TRADOC doctrinal publications can be accessed through the Internet on TRADOC's web site (http://www-tradoc.monroe.army.mil/).

DS-PLUS INCREASES READINESS

The direct support-plus (DS-plus) program, launched in October 1991, continues to enhance tank fleet readiness and improve soldier training while reducing repair costs. The program, which is administered by the Tank-automotive and Armaments Command (TACOM), Warren, Michigan, was designed to reduce the number of M1 Abrams tank engines sent back for depot-level repair and maintenance.

DS-plus calls for logistics assistance representatives (LAR's) to be specifically trained to do certain tasks to support M1 tanks. The LAR's are assigned to several large installations and major activities to provide direct-support maintenance, facilitate class IX supply, and reduce order and shipping time for repair parts.

Dennis Pigott at the logistics assistance office at Camp Doha, Kuwait, reports exceptional success with their DS-plus program that is executed by a civilian contractor. At Camp Doha, the DS-plus team consists of a TACOM LAR, four technicians, and two mechanics' helpers. In addition to performing maintenance and repair tasks, the DS-plus team provides training on the M1's air induction system with emphasis on keeping the system clean and dust-free in a hot, dusty environment. This training is critical as soldiers are frequently deployed to be tank crew members in the Middle East without specific knowledge of the unique hazards to equipment in that part of the world. The additional soldier training in M1A1 engine maintenance has led to fewer repairs and reduced expense for repair parts. The team reports that fewer class IX parts are being requested and the tank readiness rate remains high.

☐ A worker at Red River Army Depot, Texarkana, Texas, welds together one of the first 18 steel tow-bars that were manufactured and shipped to Bosnia in June. A total of 100 tow-bars were scheduled for fabrication and shipment to fill a shortage in the military supply system that was discovered in May. The depot submitted the lowest bid to fabricate the tow-bars and guaranteed the quickest initial delivery. Machinists and metal workers produced the first 18 tow-bars in 10 days. After the initial delivery was made on schedule, the depot began producing about 20 tow-bars a month to meet the contract requirements, with most of the new tow-bars going into Army stockpiles for issue to units when needed.

JOINT FORCE ID CARD CONTEMPLATED

The Reserve Forces Policy Board (RFPB), which advises Secretary of Defense William Perry on reserve component matters, is proposing adoption of a joint identification (ID) card for use by both active duty and reserve personnel. The board—made up of 24 high-ranking civilian and military officials—has

given the Secretary three purple prototype cards for his consideration.

Currently, active duty service members carry a green ID card, and reservists carry a pink card. If reservists are called to active duty for 30 days or longer, they exchange their pink cards for green ones. When they return to reserve status, they get their pink cards back. Some reservists have complained that carrying around cards that are different from those of active duty personnel makes them feel like second-class citizens. A single card would send the message that reservists are part of the total force. In addition, observers at mobilization processing sites feel that the current ID card procedure is too time-consuming and could result in a bottleneck in the event of a large-scale mobilization.

The RFPB is considering recommending the addition of appropriate technology (computer chip or magnetic strip) to the purple ID card to meet military requirements. The card could be altered easily if the holder were called to active duty for 30 days or more. The card could be read when it was passed through a reader at medical facilities or commissaries to determine the holder's allowed benefits.

INTERMODAL TRANSPORT GUIDE RELEASED

A recent publication of the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA), Newport News, Virginia, offers guidance on securing military equipment to intermodal containers for surface transport. MTMCTEA Reference 96-55-23, Containerization of Military Vehicles and Equipment, focuses on the use of International Organization for Standardization (ISO) containers, both dry-cargo (enclosed) and platform (flatracks).

The securing methods described in this manual are intermodal, which means they are appropriate for rail, highway, and ocean transport. Intermodal transportation ensures quicker and more efficient movement through ports and other terminals. Cargo is secured at the point of origin and remains secured until it arrives at its destination.

This manual is one in a series published by MTMCTEA to ease deployment by all surface modes of transport. Other publications in the series are—

- MTMCTEA Pamphlet 55-19, Tiedown Handbook for Rail Movements.
- MTMCTEA Reference 92-55-20, Tiedown Handbook for Truck Movements.
- MTMCTEA Reference 95-55-21, Lifting and Tiedown of U.S. Military Helicopters.
- MTMCTEA Reference 95-55-22, Marine Lifting and Lashing Handbook.

These manuals are weather-resistant and will fit inside soldiers' battledress uniform pockets. To order copies of MTMCTEA publications, call (757) 878-4646 or DSN 927-4646, or send a request to Director, MTMCTEA, ATTN: MTTE-DP, 720 Thimble Shoals Boulevard, Suite 130, Newport News, Virginia 23606-2574.

MORE FOOD VARIETY PLANNED

The number of ready-to-eat meal (MRE) menus will increase from one dozen to two dozen choices by the end of 1998, and several items will be discontinued. New menus will include more ethnic entrees, spicy foods, and commercial items.

New menu items include a spicy Jamaican pork chop with noodles, beef teriyaki, spicy Oriental chicken, black bean and rice burritos, and beef ravioli. Commercially produced beef jerky, corn chips, hard candies, granola, and candy bars will be new snacks. Some of the discontinued items are scalloped potatoes with ham, pork with rice in barbecue sauce, and tuna with noodles.

The Sustainability Directorate at Natick Research, Development and Engineering Center, Massachusetts, estimates that by the end of 1998, 70 percent of MRE items will be commercial off-the-shelf or nondevelopmental items instead of items produced specifically for military use.

CIVILIAN DEPLOYMENT GUIDE PUBLISHED

Department of the Army (DA) Pamphlet 690-47, DA Civilian Employee Deployment Guide, informs Army civilian employees, management officials, and field commanders of policies and procedures that affect civilian employees who are deployed overseas to support U.S. military operations. The pamphlet is sponsored by the Assistant Secretary of the Army (Manpower and Reserve Affairs) and incorporates information mandated by Department of Defense (DOD) Directive 1404.10, Emergency Essential (EE) DOD U.S. Citizen Employees, and AR 690-11, Mobilization Planning and Management.

DA Pamphlet 690-47 contains guidance on topics such as legal assistance, medical screening, salaries, customs processing, danger pay, the Uniform Code of Military Justice, and redeployment procedures. As the Army transitions to Force XXI, it will rely in-

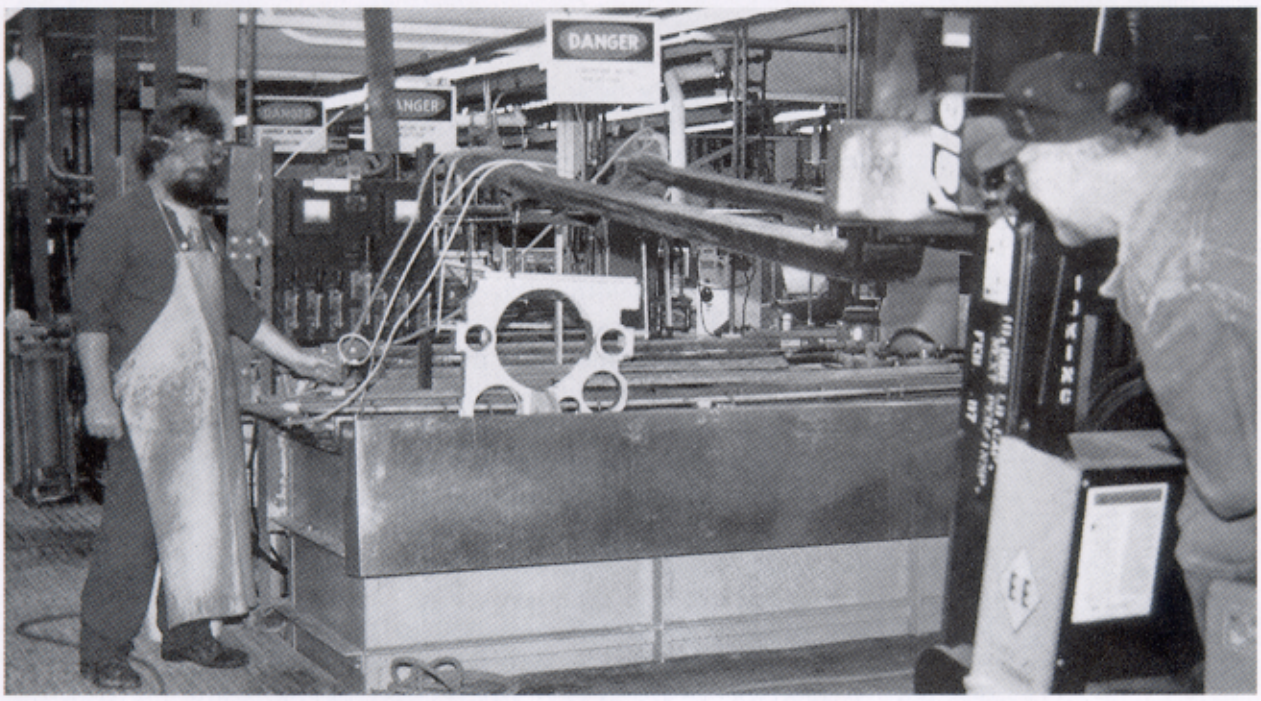
creasingly on the technical skills of both DA civilians and contractors. A similar handbook for contractor personnel deployed overseas is in the final stages of staffing by the Department of the Army.

DUTCH CIVILIANS TRAIN FOR DEPLOYMENT

The Military Traffic Management Command (MTMC) Europe, in Rotterdam, the Netherlands, provides training for its Dutch civilian employees to prepare them for possible deployment to military threat areas. The civilians attend a 1-week militarization course at the Center for Peace Keeping Operations in Ossendrecht, the Netherlands. They are given instructions in team building, map reading, military drill and discipline, personal hygiene, gas mask use, and characteristics of particular threat areas. Medical and mental examinations determine which course graduates can deploy.

Early this year, trained MTMC civilians were sent to Croatia to support British forces who were moving their materiel into Bosnia on U.S. ships. Plans are being made to send civilians to the former Yugoslavia to assist in the drawdown of U.S. military materiel. In recent years, Dutch MTMC Europe civilians have deployed to set up and complete port operations in Bahrain, Egypt, Jordan, Kenya, Kuwait, Oman, Qatar, and Saudi Arabia.

All Dutch civilian employees at MTMC Europe are civil servants with the Dutch Ministry of Defense. When deployed, the civilians wear the Dutch military uniform with a rank equivalent to their civilian pay grade. Militarized civilians are not deployed to war zones and cannot carry or use weapons.



☐ A 400-pound tube-launched, optically tracked, wire-guided (TOW) long-range missile yoke is lowered into an electroplating bath by an operator using a forklift. The electroplating shop at Tobyhanna Army Depot, Pennsylvania, processed nine TOW missile yokes for Letterkenny Army Depot, Pennsylvania. Tobyhanna routinely does cadmium-plating, which pretreats metal to prevent rust and corrosion. However, the missile yokes weighed 350 to 400 pounds each, compared to the usual 2- or 3-pound item. A forklift with 9-foot forks was used to lift the yokes and place them in the plating tanks, and additional power cables were installed to handle the heavy load. Each yoke was cadmium-plated and baked in an oven for 23 hours at 350 degrees. They then were dipped in an acid bath and a bronze plating solution. The TOW missile yokes are attached to the launcher and hold the missile cylinders in place.

ALOG EMPHASIS

CHEMICALS INCINERATED

The Army, as the executive agent for the Department of Defense, began destroying U.S. chemical weapon stockpiles at a Tooele, Utah, disposal plant in August. The disposal facility is the first in the continental United States that is designed solely for the purpose of destroying chemical weapons. The weapons stockpile includes 13,000 tons of nerve and blister agents stored in quantities ranging from large, bulk containers to mines, rockets, and artillery shells. The Army continues to work closely with Utah officials to protect the interests of the local community regarding the storage and safe destruction of these munitions. Public law requires the Defense Department to destroy the stockpile at Tooele by the year 2004.

ARMY HELPS FIGHT FIRES

Army troops were sent to areas in the western United States to assist with fighting more than 50 major forest fires that were destroying national forests in late August. The Army provided UH-60 MEDEVAC helicopters and command and control vehicles, such as high-mobility, multipurpose, wheeled vehicles, to support the firefighting efforts. Teams from the National Interagency Fire Center, Boise, Idaho, went to Fort Carson, Colorado, to train Army engineer, artillery, and armor units in firefighting techniques and safety precautions. Nearly 600 soldiers from the 4th Infantry Division's 3d Brigade Combat Team and various installation support agencies at Fort Carson made up Task Force Smoke. The task force deployed to northern California to fight fires in Mendocino National Forest. Soldiers who participated in the firefighting effort also gained experience in team building and deployment.

ARMY AGREES WITH LOCKHEED

The Army Industrial Operations Command, Rock Island, Illinois, and a division of Lockheed, one of the nation's largest Defense contractors, have signed a new contract that includes an agreement to seek alternative resolutions to disputes before going to court. Ordinarily, contract disputes between Government and industry lead to costly litigation. Under the new agreement, disputes will be presented first to a neutral party, then to a nonbinding mediator, and, as a last resort, referred for litigation. The contract calls for Lockheed Martin Ordnance Systems to work with the Industrial Operations Command to produce 2.75-inch Hydra-70 rockets that are designed to be launched from aircraft. To help cement the new partnership, members of the Hydra-70 team from Lockheed and the Industrial Operations Command attended a team-building course and have plans to attend similar classes in the future.

(Continued on page 48)

ALOG EMPHASIS

(Continued from page 1)

SCIENTISTS TRADE PLACES

The Army Materiel Command, Alexandria, Virginia, has established an international science exchange program to share scientific and engineering information and training with other nations. The scientist and engineering exchange program gives military and civilian personnel opportunities to work in allied nations. Scientists and engineers with interest in technical areas relating to conventional weapon systems and equipment can gain practical experience in military research and development, production, logistics, and testing activities. All costs are borne by the originating organization. For more information on this program, call the International Office at Army Soldier Systems Command, Natick, Massachusetts, (508) 233-4086 or DSN 256-4086, or send e-mail to jlanza@natick-amed02.army.mil.

JOINT PUBS IN NEW FORMATS

The joint electronic library now is available in CD-ROM format and can be ordered using the normal publication ordering process. Also, joint doctrine publications are on the World Wide Web at http://www.dtic.mil/doctrine.

AR 725-50 REVISED

Revised AR 725-50, Requisitioning, Receipt, and Issue System, contains numerous changes. The revision adds manual procedures for matching parts requisitions to existing national stock numbered items and ensuring that requisitions are not cancelled if advice code 2A (unavailable locally) is present, updates policy on logistics reassignment of supply items, modifies the materiel returns program, and changes the dollar value criteria for reporting General Services Administration-stocked items for return.

LOG INTRO AIDS CAREER CHANGE

Military and civilian personnel assigned to or anticipating assignment to Army logistics positions for the first time could benefit from a new course that will be available in fiscal year 1997. The 2-week Army Logistics Introductory Course (ALIC), offered by the Army Logistics Management College at Fort Lee, Virginia, will provide a basic understanding of the functional areas of the Army Logistics System and its interface with external systems. The course will be especially beneficial to personnel who are entering the logistics career field because of downsizing in other areas throughout the Department of Defense. Functional areas covered in the course include supply, maintenance, transportation, and field services at the tactical, operational, and strategic levels. The ALIC is tentatively scheduled for 10 to 21 March, 5 to 16 May, and 8 to 19 September 1997. For more information, call (804) 765-4719 or DSN 539-4719, or send e-mail to maclaugm@lee-dns1.army.mil.

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NAVY HOSTS LOG SYMPOSIUM

The U.S. Navy International Logistics Symposium '97 will take place 16 to 18 June 1997 at the Hyatt Regency Crystal City, Arlington, Virginia. The American Society of Naval Engineers (ASNE) and the Navy International Programs Office will co-sponsor the event. Topics for discussion and exhibit range from computer-assisted programs to the latest in foreign military sales programs. Representatives from Government, industry, and foreign nations are expected to attend. For registration information or to reserve exhibit space, call ASNE at (703) 836-6727, or fax to (703) 836-7491.

PEACEKEEPING INFO AVAILABLE

A bibliography of studies on peacekeeping operations is available to authorized persons. Write to—USALMC, ATTN DIR DLSIE ATSZDL, 2401 Quarters Road, Fort Lee, VA 23801-1705, send e-mail to jkirklan@almc-lee.army.mil, or call (804) 765-4007 or DSN 539-4007.

DECA GETS HAMMER AWARD

In ceremonies held on 27 August 1996 at the Fort Myer commissary, the Defense Commissary Agency (DeCA), Fort Lee, Virginia, was presented two Hammer Awards by Bob Stone, National Performance Review (NPR) project director. The Hammer award was created by Vice President Al Gore to recognize Government agencies that have achieved excellence in "reinventing" Government in support of the President's NPR principles. Those principles include cutting red tape, putting customers first, empowering employees, and getting back to basics. DeCA's selection was based on the accomplishments of the agency's Directorate of Facilities and Office of the Inspector General. Major General Richard E. Beale, Jr., DeCA's director, accepted the award.

A Logistics Task Force Mentality

by Colonel Larry D. Harman

Most logistics operators and planners agree that the logistics task force (LTF) is an ideal, temporary formation of logistics capabilities tailored to sustain a force. Because the LTF concept is so widely accepted and employed, I believe that an LTF mentality should be clearly discernible in our sustainment and deployment doctrines, force structure authorization documents, institutional training programs, and readiness reporting process. Unfortunately, this is not yet the case. However, there are many LTF-wise leaders in the field who, despite inadequate institutional guidance, understand the process of forming, commanding, deploying, sustaining, employing, protecting, and redeploying LTF's.

Three basic points should be made when we consider the use of LTF's and the need for developing an LTF mentality. First, logistics headquarters are extremely lean in today's Army. Once a mission analysis mandates formation of an LTF, the headquarters involved in that formation experiences the unavoidable unraveling of its routine practices, day-to-day operations, and standard procedures. A headquarters that is experienced at LTF operations can cope with the stresses, adjust quickly, and actually improve its overall unit effectiveness (though often at significant costs).

Second, logistics headquarters help themselves immeasurably by planning and preparing ahead to be an LTF headquarters. This preparation makes a world of difference when they are directed to contribute to an LTF.

Third, and most important, the Army as an institution must accommodate the LTF concept in two ways: First, by upgrading the command, control, communications, computer, intelligence, and information management (C^4I^2) system in the tables of organization and equipment (TOE's) of fixed logistics headquarters used to command LTF's; and second, by producing more comprehensive LTF doctrinal literature. With these enhancements, the potential for LTF sustainment responsiveness improves dramatically. At present, however, the situation is far from ideal.

Challenges of LTF Formation

The commanders of gaining and losing units involved in forming an LTF face a dilemma. To illustrate, an LTF commander normally resources three distinct organizations: his advanced echelon (ADVON), the main body, and his stay-behind rear detachment. Obviously, each is critical. However, the commander usually does not have the internal assets to resource all three adequately. So he either requests external assistance, if available, or accepts some level of risk in one or more of the organizations.

In many cases, the commander is willing to accept risks of varying degree in the rear detachment. But doing so can create potential problems affecting continued mission support operations, command and control, staff coordination, and the welfare of soldiers' families at home stations.

The commander who detaches assets from his unit to an LTF faces the dilemma of seeing precious assets, both human and material, departing from his command for an undetermined period. As a result, his unit's ability to perform its day-to-day mission or meet any future contingency mission is degraded.

LTF formation also affects force readiness and readiness reporting for all involved units. The commander who detaches forces to an LTF must assess the residual effectiveness of his stay-behind elements. This status is reported as accurately as possible up the chain, though accuracy is often clouded by the reporters' subjective judgments.

Meanwhile, the commander of the deployed LTF must assess the readiness of his force to perform its mission. But the reporting method he uses may be of local design. The result is that the losing commands and their higher headquarters at home stations frequently have an inaccurate picture of their deployed units' actual readiness status until they redeploy home. This is an unacceptable standard for employ-

ing LTF's in today's environment. Fortunately, the structural, situational awareness, resource, and training-related voids are known and can be solved.

Preparing for LTF Formation

Creating a first-class, LTF-oriented logistics headquarters begins with the command group's decision to prepare its force for the eventuality of LTF formation. The implications of that decision have far-reaching impact on virtually every aspect of the command's performance from then on.

Immediately after the decision is made, the TOE of the fixed headquarters is reconfigured into three sections: the ADVON, the main LTF headquarters cell, and the stay-behind rear detachment headquarters cell. The battle-rostered members of each section are aware of their responsibilities and orient their training to focus on those responsibilities. Periodic assessments and exercises validate the preparedness of the headquarters.

The ADVON learns to act independently, train independently, work as a self-contained team, and, in a contingency, deploy its members and equipment package in a time-sensitive environment.

The main LTF headquarters cell learns to deploy without the assistance of the ADVON, which may already be deployed. The ADVON and the main LTF headquarters will link up in the new area of operations. The main LTF headquarters cell also trains to operate its logistics operations center without assistance from members of the rear detachment cell, which, of course, stays behind at the home station. In addition, the main LTF headquarters plans for and will provide base support; this task is primarily the headquarters commander's responsibility.

The rear detachment headquarters cell also trains as a team. Its primary initial task is to coordinate the deployment of the ADVON and LTF main body from the command's well-equipped emergency operations center. As the deployment clearinghouse, the rear detachment headquarters cell also coordinates family support group activities, reception of attachment units, and home-station sustainment support to the deployed force until no longer required. As deployment-related activities subside, the focus of the rear detachment headquarters turns to daily mission support, staff operations for stay-behind forces, and family support activities. Ultimately, the rear detachment headquarters cell relieves the deploying LTF commander of major home-station responsibilities.

Employing this trisectional headquarters configuration assists greatly when the LTF is the sustainment formation of choice. But, again, it is no panacea. A trisectional logistics headquarters generates its own requirements. Each of the control cells requires a lightweight, deployable C^4I^2 package. With this C^4I^2 capability, situational awareness is enhanced; the ADVON becomes a potent entity; the LTF commander and his principal staff are capable of performing at optimal capacity; and the probability of confusion, miscalculations, and poor decisions decreases dramatically. A state-of-the-art C^4I^2 package—one that permits continuous, worldwide access to important data bases and to the headquarters involved in forming the LTF—is urgently required for the logistics community and, in particular, for the LTF headquarters cells.

Improving Army Use of LTF's

All this leads to six recommendations. First, the Army must invest in the C^4I^2 system and ensure that the logistics community receives what it requires. Second, certain logistics headquarters authorization documents must change to accommodate LTF personnel and equipment requirements. Third, our sustainment doctrine writers must address LTF operations in a more comprehensive manner. Fourth, our deployment doctrine must be reviewed and updated to accommodate LTF's. Fifth, our educational institutions must teach LTF operations in great detail. Finally, the method of assessing and reporting LTF readiness and effectiveness requires review; so does the readiness impact of LTF formation on commands that detach elements to an LTF. These six recommendations, when implemented, can create startling new conditions for LTF operations.

With our minds on the future, we logisticians must still cope with the immediate reality of less-than-optimal conditions for LTF's. At some point, however, the logistics community will have the state-of-the-art C^4I^2 for superior situational awareness, the force structure authorizations for trisectional leadership, the doctrine to undergird LTF operational practices and institutional training, and the comprehensive mechanisms for assessing unit and LTF readiness. Together, these will make a profound difference in the most serious business of Army logistics. **ALOG**

Colonel Larry D. Harman, a Transportation Corps officer, is assigned to the 21st Theater Army Area Command, Kaiserslautern, Germany. He previously served as G4, 1st Corps Support Command, and Commander, 264th Corps Support Battalion, Fort Bragg, North Carolina. He has master's degrees in business administration from Florida Institute of Technology in Melbourne, Florida, and in military art and science from the Army Command and General Staff College. He is also a graduate of the Army School of Advanced Military Studies and the Army War College.

Designing Systems the T

The Persian Gulf War confirmed what the armor community realized long ago: the M1 Abrams tank epitomizes lethality and survivability on today's battlefield. Unfortunately, there is a negative corollary to that truth: the Abrams tank is expensive to operate, support, and maintain.

To improve maintenance support to the Abrams tank, the Army has developed an expert system called turbine engine diagnostics (TED). Soldiers and Army civilians outside of the armor and maintenance communities may have limited interest in TED as a system, but they should be very interested in the process used to develop TED. That is because the TED development model can be adapted to systems other than the Abrams that will be used by many branches of the Army. [For more information, see Major Malham's article, "Turbine Engine Diagnostics," in the September-October 1995 issue of *Army Logistician*.]

The TED Success Story

The Army Ordnance Center and School at Aberdeen Proving Ground, Maryland, and the Army Research Laboratory at Adelphi, Maryland, seized the challenge of improving Abrams tank maintenance support. The result is a diagnostic expert system that provides apprentice direct support (DS) mechanics the ability to diagnose and repair the Abrams full-up power pack (FUPP) like expert mechanics.

The user test has proven that TED is a viable expert system for the DS mechanic. The Army projects that, by using TED, it will realize a cost avoidance of over $8 million per year. These facts have generated strong interest in TED in and outside the Army. The Project Manager for the Abrams plans to field TED to forward and main support battalions. The National Guard Bureau currently is fielding TED to units in 28 states. Meanwhile, the Marine Corps is evaluating TED for possible integration into its maintenance system, and several foreign countries have expressed an interest in TED.

Model Overview

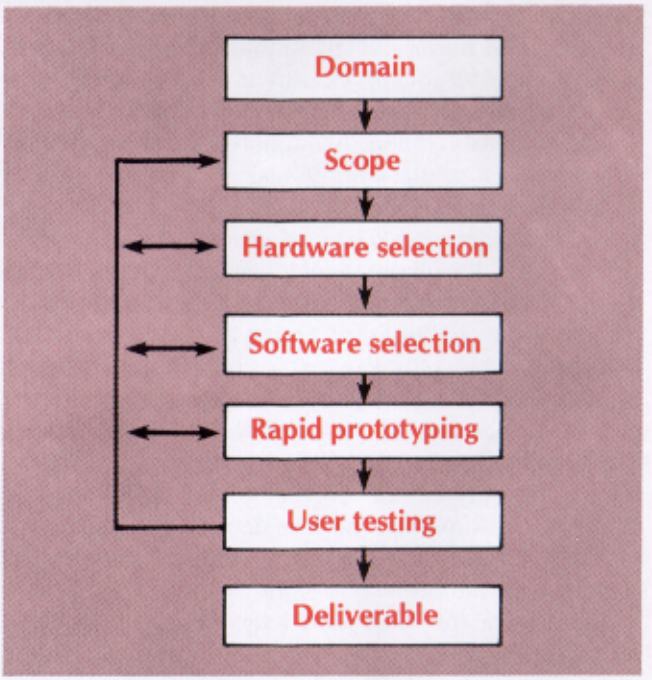
TED was developed according to the model shown at right. Before describing the model's phases, I should note that the model portrays an ideal approach to constructing an expert system. While it is valid as an illustration, we all know that any system development project will face real-world constraints that the developers must manage if the user is to receive the software program he demands.

For example, a software engineer will want to proceed through user testing and then loop back once to rapid prototyping in order to refine the product. However, the user test may indicate serious problems with the software program that require the engineer to look again at the software, hardware, or even the scope of the project that was originally selected. With such real-world constraints in mind, here are the phases of the model used in developing TED.

Domain Selection

Domain selection is critical, because it serves as the foundation on which the system is built. The domain is the problem to be solved or the requirement to be met. Software is expensive to develop, so expert systems should be used only to solve difficult or expensive problems. The domain of a system development project should be narrowly defined, although that definition can be expanded according to the needs of the user.

For the Abrams tank, the Army Ordnance Center and School focused on the FUPP because studies indicated that its maintenance problems were costing



☐ This model shows the phases of the TED development process.

ED Way

by Major Mark C. Malham

the Army money. For instance, one study concluded that maintenance costs for the AGT-1500 engine represented the largest portion of the engine's operation and support costs. Those costs were $95 per operating hour. Another study determined that in 1 year, 39 percent of 360 engines evacuated to the depot level were reported by depot mechanics as "no evidence of failure." The unnecessary costs generated by moving and examining engines that had no evidence of failure were $18.2 million. So the FUPP became the domain of TED development.

Scope

Next to domain, scope is the most important step in ensuring that the system development process has a specific and properly defined focus. The scope determines the depth and breadth of the domain. In other words, what specifically will the system do to correct the problem or meet the requirement? For what level and which tasks will the system be designed? The software engineer, in close cooperation with the user, must determine the boundaries of the expert system.

In the TED model, for instance, the major scope question was which level of maintenance—organizational or DS—would be incorporated into the system. After choosing the level, we had to decide which tasks would be included in the expert system. The DS mechanic uses seven technical manuals to accomplish all his tasks! Of all his many tasks, which ones would the expert system help him to do?

Hardware Selection

In this phase, the system engineer may or may not have control over the delivery platform (the hardware on which the software system will operate). For example, most Army systems operate off Army common hardware, so the platform is fixed. However, if the engineer can select the delivery platform in conjunction with the user, then he must consider possible constraints on his choice, including cost, the user environment, available software, and connectivity.

Software Selection

The key to software selection is choosing packages that meet the user's needs and the engineer's requirements. While all phases in the development model are important to the process, software selection is vital for the obvious reason that the expert system is a software deliverable (in other words, this is what the user will receive).

The engineer will spend the vast majority of his resources in software selection. He will have two choices: commercial off-the-shelf products or inhouse code development. Each course of action has its own costs and benefits (see chart on next page). When selecting software, we also need to remember that one package will not solve all problems. Within the main software program, many sub-software programs may be needed (for example, hypertext, data bases, spreadsheets, data acquisition, data logging, and custom inhouse code).

Rapid Prototyping

A prototype is a limited system normally focused on executing one or two tasks. While shallow in nature, it should accurately define the tasks the finished product will perform. Subject matter experts and programmers do not speak the same language, so a prototype can serve as a common reference point; without a prototype, little feedback can occur.

In the iterative software development method, prototypes are produced at the earliest possible stage. This is known as rapid prototyping, which is defined as getting software code into the hands of the user as soon as possible. It gives the user the earliest possible opportunity to view and comment on his system and allows him to see the transformation of his intangible vision into a tangible product that he can view and touch. This enables the user to respond to potential features as each is developed. It also helps the user clarify exactly what he wants from his expert system. Keep in mind that rapid prototyping also allows the programmer to provide feedback to the user. It shows how well the programmer understands the user's needs. Rapid prototyping doesn't let a programmer waste time with quality control. Without rapid prototyping, the time from concept development to delivery of the final product can be long—and that delay can result in the user receiving an expert system that he doesn't need or can't use.

Obviously, the user has to help the programmer during rapid prototyping. He does this by working closely with the programmer. The user's management must also support the subject matter experts by providing the resources the programmer needs to understand and develop the domain. The user must also be straight with the programmer. The user must not tell the programmer what he wants to hear; instead, he must tell the programmer what he needs to hear. Standing operating procedures within the user's environment shouldn't be bent to meet the needs of the program. The program must meet the user's needs.

Commercial off-the shelf (COTS)	
Benefits	Costs
Cost to develop is reduced because customer base is larger.	Run-time fees are possible, especially if software will be widely distributed.
External support is available from developer.	Software selection is tied to the survivability of developer.
Code is written already, so man-hours are saved.	Code may not be upwardly compatible with subsequent versions.
Technology proliferation offers users many selections.	Software program may not fit the expert system model being developed.
Inhouse development	
Benefits	Costs
Code is tailored to user's specific applications.	It is expensive to generate and may require extensive man-years of effort to develop.
Code can be modified readily.	Programming staff is required.
There are no run-time fees.	No external support is available.

☐ **When selecting software, the engineer must weigh the benefits and costs of commercial off-the-shelf products against inhouse development.**

User Testing

There are two categories of user testing: informal and formal. Informal tests should be done as soon and as often as possible. A rule of thumb is that each module should be tested as it is developed. An iterative model has little chance to succeed unless there is an avenue for immediate user employment and feedback. Unlike rapid prototyping, which often takes place in a structured environment, an informal user test should be conducted in the user's working environment. A user test should not involve the subject matter experts who have been providing input to the program. In developing TED, we conducted an informal test with the Tennessee Army National Guard during its annual training at Fort Stewart, Georgia. By allowing users other than subject matter experts to participate in user testing, you can gain a different perspective that may help you refine the program.

A formal test has a different focus and requires much greater resources than an informal test. The formal test is conducted before the program is handed over to the materiel developer for fielding. All previously tested modules are integrated into one program and operationally tested.

Deliverable Product

Since this development model is an iterative process, it is expected that one or more of the phases will be revisited. But at some point the development process must cease so that the expert system can be delivered to the user. Of course, user feedback from the field and technological advances may require subsequent program updates; these changes should be fielded as subsequent versions of the system.

TED has proven itself to be a viable expert system for the Abrams tank mechanic. But the iterative model used in developing TED is appropriate for other weapon systems. It should be considered as the source to guide other engineers in developing expert systems. ALOG

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Improving the Environment Through HAZMIN

by Major James E. Sisk

Hazardous wastes are often by-products of Army operations. But changes in public attitudes mean that soldiers now must do all they can to reduce pollution. The hazardous waste minimization (HAZMIN) program attacks the problem at its source, by cutting the wastes that cause the pollution.

It comes as no surprise to anyone in the Army that popular attitudes toward the environment have changed. More and more, citizen action groups and public regulatory bodies are pressing the Army to reduce pollution, develop and use environmentally friendly materials, and implement operational practices that protect land, air, water, wildlife, and human health. The Army is constantly faced with the need to comply with hundreds of laws, policies, procedures, audits, and decisions from Federal and state environmental agencies.

While they need to meet the mandatory requirements imposed by environmental protection laws, logisticians also can implement some common-sense, unit-level initiatives that will enhance their environmental performance while saving money. One easy approach is to fully support the Army's hazardous waste minimization (HAZMIN) program as defined in AR 200-1, Environmental Protection and Enhancement.

The overall objective of the Army's HAZMIN program is to minimize the pollution and wastes generated by Army operations through proactive programs. At the installation level, the HAZMIN task is substantial and must be executed by full-time employees. At the unit level, soldiers can support HAZMIN programs by examining some smaller areas of their operations to see where they can avoid creating wastes and costs. By using economically practical methods, both in training and day-to-day operations, logisticians can decrease the waste they generate and realize considerable savings to the Army.

Commitment to Environmental Goals

The most important factor in promoting environmentally sound operations is a firm commitment by commanders and unit leaders to the HAZMIN program. This commitment should be reflected in both policy memoranda and actions. Logistics units should demonstrate that they are socially conscious, environmentally aware organizations that recognize their responsibilities to their neighboring communities. This recognition will promote the Army's credibility and lead civilian communities to view soldiers as good stewards of the environment.

Under Army regulations, HAZMIN goals include both long-range objectives and near-term plans to reduce hazardous and nonhazardous waste throughout the Army. The establishment of environmental objectives demonstrates an installation's or a unit's intent to involve the entire organization in environmental stewardship. An installation or unit puts teeth

in the HAZMIN philosophy through officer and noncommissioned officer enforcement of standards, training plans, policies, and standing operating procedures. Soldiers must be encouraged to submit suggestions and participate in the organization's enviromental quality control program. Periodic training, quality circles, and new soldier orientation programs are a few of the effective methods that can be used to get soldiers involved in environmental protection.

Operating a HAZMIN Program

Where can logisticians go for assistance in maintaining a viable HAZMIN program? One easily recognizable source of help is the installation environmental manager. Specialists in reducing pollution and managing hazardous waste are found on all Army installations. The Defense Logistics Agency's Defense Supply Center, Richmond, Virginia, also has a hazardous technical information service that can provide guidance (call 1-800-848-4847). The Army Materiel Command's (AMC's) Logistics Support Activity (LOGSA), at Redstone Arsenal, Alabama, and logistics assistance offices (LAO's) also are valuable sources of information on specific waste reduction techniques for logistics operations.

There are four overall steps an installation or unit should follow in effectively running a HAZMIN program. First, identify all the organization's functional areas that may impact or influence environmental performance, such as motor pools, warehouses, the materiel management center, outside storage areas, self-service supply centers, and local training areas.

Second, analyze each functional area's processes to determine waste streams. This analysis will include—

- **Identify all unit functional areas that may impact on the environment.**
- **Analyze each functional area's operations to see where waste and pollution may result.**
- **Determine alternatives to current methods of operations to see where waste and pollution can be minimized.**
- **Look for ways to continuously improve procedures and operations so that hazards and waste are minimized.**

☐ Installations and units should follow this four-step process to run an effective HAZMIN program.

- Identifying where hazardous materials are ordered, stored, and used.
- Classifying hazardous and nonhazardous waste products by type and quantity.
- Identifying process flows that generate scrap and waste, such as supply point operations, preventive maintenance checks and services scheduling and operations, and packing and loading operations for deployment.

Third, determine alternatives to present methods. Finally, continuously improve the program through inspections, audits, analyses, and soldier involvement.

Alternative Products and Processes

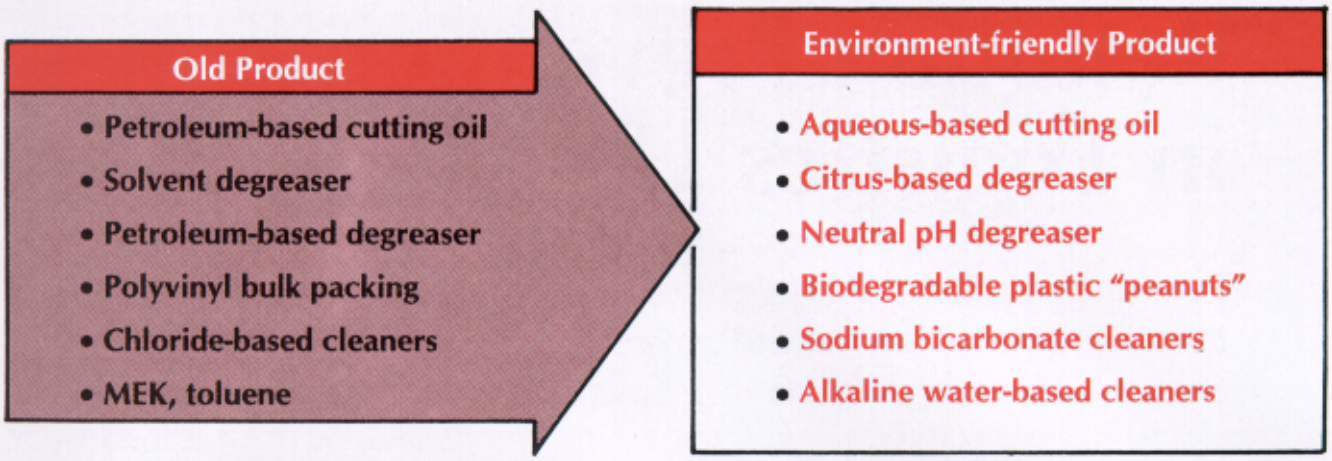
Finding alternatives to current methods of doing business is the heart and soul of a HAZMIN program. Each unit should make a strong effort to reduce waste at the source proactively, by using nonhazardous and nontoxic substitutes. Many products available to logistics units have less effect on human health and the environment than competing products that serve the same purpose. Often, the use of environmentally preferred products will reduce what the Army must pay a certified waste disposal company to remove waste. (Waste disposal normally is performed at the installation level).

Many of these products are quite acceptable for use in machining, cleaning, packing, and equipment maintenance operations. Unless a military specification requires a certain product, environmentally preferred products more than likely will meet performance standards.

The chart on the next page shows some examples of products that support HAZMIN requirements that units can order by national stock number. In addition to these products, units also can use onsite recyclers for such substances as antifreeze, solvents, and wastewater; recyclers can be either stand-alone or vendor-serviced systems. These products and services are just the tip of the iceberg when it comes to the hundreds of alternatives available to logisticians.

Other cost-effective alternatives to consider include those that reduce onhand quantities of hazardous materials. To do this, a unit should conduct a complete analysis of all of its functional areas and processes. The results of such an analysis can lead the unit to—

- Restrict user inventories (onhand quantities) of hazardous materials at individual work areas so that users have just enough of what they need.
- Reduce consumption of waste-generating materials by using minimal amounts of packing.
- Use direct or reduced ordering of hazardous materials under stockless inventory policies. Credit card



☐ Using alternative products can reduce generation of hazardous wastes. Here are some environmentally benign products that units can substitute for commonly used substances.

purchases and just-in-time techniques will help ensure that the smallest amount of supplies needed is on hand and available at just the right time.

• Extend the shelf life of hazardous and toxic materials. Recertification of expiration dates may be possible under performance specification rules or guidance in technical bulletins. Units can check with their AMC LAO or consult LOGSA for possible ways to extend the shelf life of items to the maximum extent possible. Extending shelf life may save valuable time and money.

• Regenerate spent material through inhouse recyclers.

• Analyze packing, crating, and handling of items to find ways to reduce generation of hazardous waste.

• Recover and reuse containers (perhaps by using metal cans rather than cardboard boxes) both within the unit and among direct support and general support suppliers and end-users.

Reducing Waste Disposal Costs

All HAZMIN programs target disposal costs of hazardous and nonhazardous waste to save even more money. Disposal efforts normally focus on recycling, onsite treatment, or use of landfills. Most installations have robust recycling programs that not only yield economic benefits but improve community relations as well. In choosing what to do with hazardous or nonhazardous waste, installations and units may realize cost savings by—

• Forming disposal cooperatives. Units in close proximity can consolidate recyclable or hazardous waste in joint-use locations for single pickup and disposal.

• Donating nonhazardous scrap. An installation or unit can cultivate community goodwill by giving nonhazardous scrap to nonprofit organizations that will haul it away. Logisticians should check with the local Defense reutilization and marketing office for guidance.

• Actively seeking markets for waste. By using off-the-shelf technologies, logistics units and installations may find alternatives to landfill disposal. Bioremediation and composting are only some of the emerging disposal technologies now available.

Obviously, these alternative products and methods are but a few of the ways by which the Army is maintaining and promoting the HAZMIN program. Logisticians must understand that everything they do has a potential impact on the environment. Through sound procedures, policies, training, advice, and analysis, units can create an optimum HAZMIN program. The up-front elimination or reduction of hazardous and nonhazardous waste during logistics planning for any training event, deployment, or operation is key to success.

A proactive HAZMIN program, integrated throughout the installation or unit and focused on achieving the lowest practical cost and least negative impact on the environment, will reduce pollution and waste produced by Army operations and focus more attention on the environmental consequences of Army activities. But it also will lower operating costs, improve the occupational health of soldiers, and increase community recognition of the Army's commitment to environmental stewardship. ALOG

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Pollution Prevention in Logistics Units

by Peter Kushnir

Proactive pollution prevention requires unit leaders to instill in unit personnel an environmental protection ethic that changes their behavior.

The Army has conducted business for decades without consistent regard for how its military operations and facilities affect the environment. That is changing. The Army now realizes that water and air pollution, abuse of land used for training areas, and mismanagment of hazardous wastes at Army installations represent very real costs. These costs include fines paid to state regulatory agencies, hours worked to clean up spills of hazardous substances, loss of training areas, delays in projects, and negative impacts on training readiness. Pollution prevention techniques often cost less, dollar for dollar, than a cleanup. The cost of adverse public reaction to a hazardous materials spill is immeasurable.

Pollution prevention is a requirement, not an option. What does this mean to a unit leader? How does a unit leader implement pollution prevention in his unit? Before we answer these questions, let's define several environmental terms and review briefly the regulatory basis for pollution prevention.

Knowing the Terms

Pollution prevention is one of two major waste minimization techniques (see chart on next page). Pollution prevention is an attempt to eliminate or minimize generation of waste that subsequently requires disposal. The second waste minimization technique, recycling, involves treating or reusing generated waste before disposal.

A *process* may be a procedure as complex as manufacturing a weapon system or as simple as cleaning an individual weapon. A process also may be supplying materials, such as petroleum products, to a user.

Materials used in a process may be hazardous or nonhazardous. A *hazardous material* is one that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial threat to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Waste, according to the Resource Conservation and Recovery Act of 1976, is a material no longer useful in a process. Wastes may be solid, liquid, or gaseous and hazardous or nonhazardous. Pollution results from hazardous substances entering air, water, or land.

Source reduction is defined by the Pollution Prevention Act of 1990 as ". . . any practice which . . . reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment . . . prior to recycling, treatment, or disposal. The term includes equipment or technology modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control."

It's the Law

In addition to the Pollution Prevention Act, two Executive orders (EO's) require Federal agencies to implement pollution prevention techniques in their operations. EO 12856 challenges the Federal Government to lead by example through applying source reduction practices in the management of its facilities and in its acquisition practices. It directs Federal agencies to publicly report toxic wastes and emissions and to reduce toxic releases by at least 50 percent by 1999. EO 12873 instructs Federal agencies to incorporate waste prevention and recycling in their daily operations and to implement cost-effective procurement programs for recycled and environmentally preferable products and services.

Finally, Army Regulation (AR) 200-1, Environmental Protection and Enhancement, requires Army personnel to procure and use materiel ". . . in such a way as to minimize pollution and waste generation." AR 200-1 also provides guidance for establishing a

hazardous materials management program. Two objectives of the program are to limit the use of hazardous materials to the maximum extent possible and to use the least hazardous material that is still effective for its intended purpose.

Making It Work

So what does this mean to a unit leader? And how does he implement pollution prevention in his unit?

Simply stated, pollution prevention means that, if hazardous materials are not used in a process, hazardous wastes will not be produced. Sound operating procedures lessen the amount of hazardous waste generated. Some of the following techniques will help implement pollution prevention practices at unit level.

Ensure the best possible management of hazardous materials. Establish procedures within the unit for identifying and correcting management deficiencies.

Use nonhazardous substitutes as often as possible. Product substitution is an easy way to reduce hazardous waste generation. Review the unit hazardous materials inventory to see which substances can be replaced by nonhazardous or less hazardous substitutes. For example, use citrus-based cleaners instead of solvents for degreasing operations. Substitute plastic beads, which last longer and can be recycled, for sand in sandblasting operations. Use beadblasting instead of solvents for paint stripping. Substitute soap and hot water for a vapor degreaser when cleaning parts whenever possible. Or use a single solvent for several steps in a process instead of using a different solvent for each step.

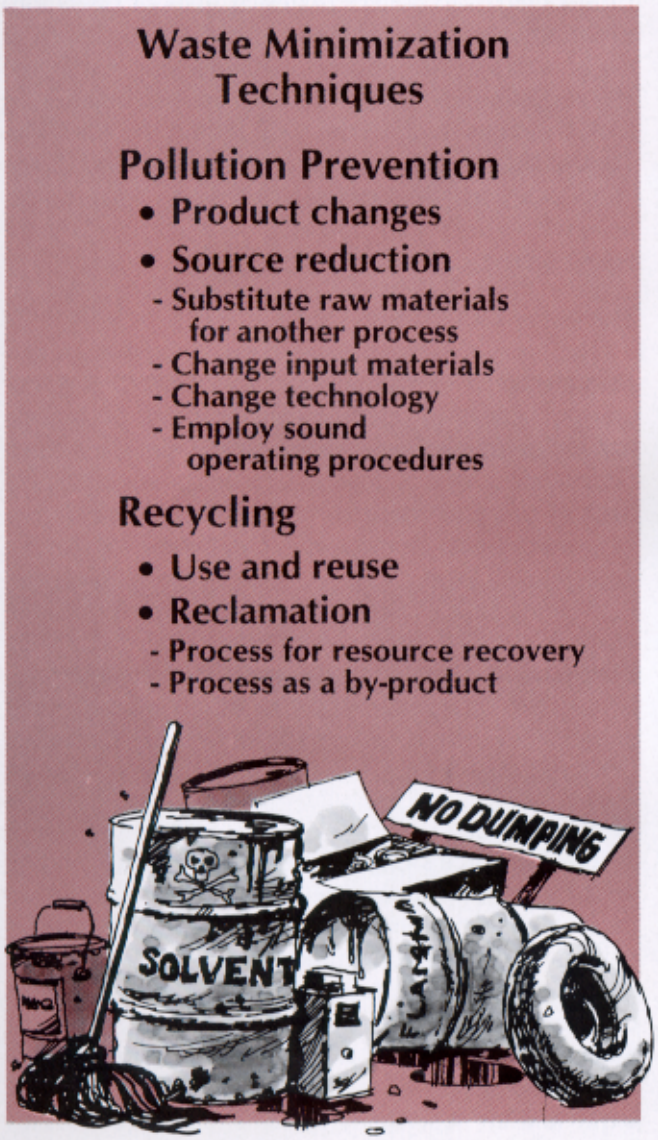
Conserve resources through recovery, recycling, and reuse. Ensure that adequate equipment for spill-prevention and control is on hand wherever hazardous materials are used.

Conduct inventory control. Do not stockpile hazardous materials; order and use only what is required. The Resource Conservation and Recovery Act requires that expired hazardous materials be handled and managed as hazardous waste. It can cost much more to dispose of an item after its shelf life has expired than it did to obtain it.

The hazardous materials pharmacy concept is one method of effective inventory control. A hazardous materials pharmacy is a one-stop location on an installation from which personnel obtain materials containing toxic substances. The hazardous materials pharmacy tracks closely the consumption of hazardous materials in an attempt to minimize their use. It provides a centralized approach for managing and controlling hazardous materials from the time they are received at the facility until their disposal.

Establish a pollution prevention training program and ensure that unit personnel are properly trained. Coordinate training requirements with the chain of command and the installation environmental and safety offices.

Proactive pollution prevention requires instilling in unit personnel an environmental ethic that changes their behavior. Changing unit behavior achieves a cost savings and improved readiness for the Army and helps ensure a cleaner, safer environment for everyone. ALOG



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Multilinear Warfare

by Lieutenant Colonel Christopher R. Paparone

The concept of nonlinear warfare, which is fully embraced in joint doctrine, has met with virtually no argument. Nonlinear warfare proponents envision combat operations without the traditional lines drawn on the map, such as the forward line of own troops. "The conduct of land operations in Operation Just Cause is an excellent example of nonlinear operations," states the 1 February 1995 version of Joint Publication 3-0, Doctrine for Joint Operations.

The narrative description paints a picture of joint attacks occurring simultaneously in 26 locations, giving the reader the impression that these happened in relative isolation from each other. This kind of nonlinearity occurs only in the "beam-me-up-Scotty" dreams of science fiction enthusiasts. I believe there is little, if any, utility in the proposition of nonlinear operations, either for the joint force commander or his logistics planner.

While the idea of nonlinearity is practically meaningless, the study of what I call *multilinearity* provides the commander with a much broader picture of modern warfare. Nonlinearity suggests the commander's vision must be unconstrained from overlays depicting phase lines, boundaries, and arrows. Multilinear warfare, on the other hand, while not ignoring the complexity of line graphics, recognizes the human limitations of the commander to fully comprehend operations if all the lines are portrayed on a map.

I will simplify my argument using "line of operation," the often misunderstood theoretical construct of warfare. A line of operation is an imaginary line between the force's base of operations and the objective. Nonlinear warfare implies that we have somehow revolutionized warfare and that the linear relationship between the base and objective of the force no longer applies. Multilinearity insists that this relationship, although immeasurably more complex in modern warfare, still exists.

A good way of contrasting nonlinear warfare with multilinear warfare is to examine what each branch of the armed services can bring to the joint warfare table in terms of lines of operation. Nonlinear theory inadequately addresses the unique capabilities that services provide to the joint warfighter. Examination of each service's capability in terms of multiple lines of operation is infinitely more useful.

The Army

The Army is the decisive force in any major regional conflict. It must either create forward bases of operation or augment existing forward-presence bases. The Army's line of operation in a forcible entry operation may depend on continental United States (CONUS) bases such as Fort Bragg and Pope Air Force Base, North Carolina, or a prepared intermediate staging base, such as a port facility provided by a host nation.

A relative disadvantage for Army forces is a requirement to have sufficient airlift and sealift. The Army almost always is forced to conduct phased operations to gain a desired line of operation for decisive action. To be successful, Army operations depend on being able to quickly shift lines of operation from CONUS to theater (external lines of operation) to intratheater (internal lines of operation). Even at the pinnacle of Army force readiness achieved by the Reagan administration's buildup of the eighties, it took 7 months to make this shift during the Gulf War. Today, this is an even riskier proposition, given American and allied coalition demands for a quick, decisive victory and our lack of a strong forward Army presence.

The Navy and Marine Corps

The Navy and the Marine Corps, joined as an amphibious force, furnish mobile, sea-based lines of operation. Lines of operation from maritime systems can offer tremendous flexibility to the joint force commander. Naval forces offer uniquely adaptable lines of operation because of their relative advantage in moving great distances and then loitering without a nearby fixed base. The Navy and Marine disadvantages are a lack of decisive combat power projection on land and a relatively short operational reach. The Marine Corps, for example, must rely on Army logistics for extending their line of operation inland past 50 kilometers, as exemplified during Operation Desert Storm.

The Air Force

The Air Force's lines of operation differ depending on the type of weapon systems employed. Certainly a relative advantage over other forces, the line of operation for their intercontinental ballistic missiles or strategic bombers is from CONUS to target, termed by General Merrill A. McPeak, the former Chief of Staff of the Air Force, as equivalent to forward presence. However, lines of operation for Air Force strike and air superiority systems may require bases

in closer proximity due to "shorter legs." Generally, all Air Force bases are fixed, a disadvantage considering the need for multiple lines of operation in oversea locations. Also, operations may be constrained due to restricted overflights and use of host nation facilities.

Interrelationship with Lines of Communications

Another important multilinear concept is found in the study of lines of communications (LOC's). Not to be confused with lines of operation, LOC's are the "pipelines" that move supplies and forces. These pipelines are ground, sea, or air connections between the force and its base of operations. That pipeline may extend all the way back to the industrial base of a nation.

There is a strong interrelationship between lines of communications and lines of operation. LOC's enable lines of operation by serving as a faucet for the materiel that operating bases need to launch forces to the objective. LOC's may stem from lines of operation or from the secured objectives that lines of operation permit. The commander may have to shift LOC's to accommodate a desired line of operation, or he may have to use a line of operation to establish an LOC. Understanding this interrelationship is the essence of military operational art, maneuver warfare, and the development of a national security strategy. Internal lines of communications may support activities that flow from external lines of operation and vice versa.

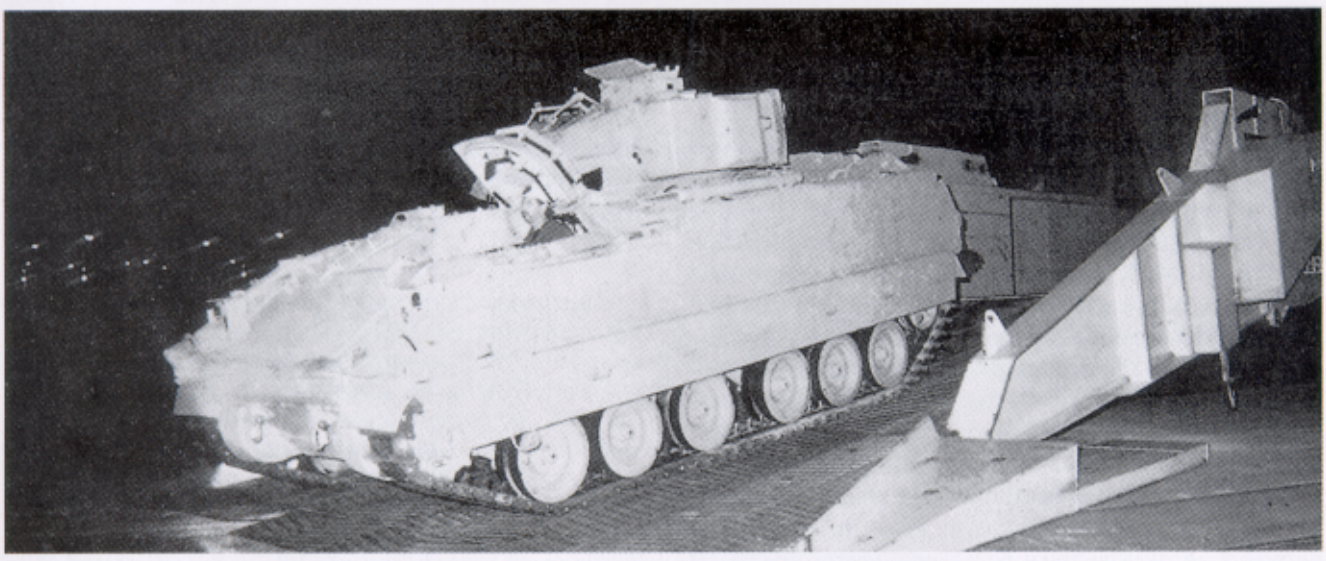
World War II

There are many examples of this remarkable interrelationship from World War II. One is the "bridge too far" Market Garden operation that attempted to use an *air* line of operation (vertical envelopment) in concert with opening *land* lines of operation and communications. All of the China-Burma-India theater campaigns were based on this relationship. The strategic objective was to open a land LOC to the Chinese and U.S. air forces in China, facilitating ground and naval lines of operation aimed at the Japanese. Operation Bolero, the combined U.S.-British campaign to build up invasion forces in Britain, is an example of establishing a secure line of communications before employing a decisive line of operation. General Douglas MacArthur's entire strategy of island hopping in the Pacific was based on this interrelationship.

Operation Just Cause

From the multilinear perspective, the truer picture of Operation Just Cause comes from a study of the interrelationship between lines of operation and communications. Not the *coup de main* suggested by Joint Publication 3-0, Operation Just Cause was a sequel to other planned and executed operations that had begun as early as February 1988. No doubt about it, until combat operations commenced in December 1989, the main effort was to prepare bases of operations. More than 60 percent of the forces required, to include all heavy forces, were based in Panama by then and were secured during Operation Nimrod Dancer. LOC's and lines of operation were identified and exercised during Operations Purple Storm and Sand Flea.

From CONUS, elements of the 75th Ranger Regiment were consolidated in order to better synchronize the rangers' lines of operation with Panama-based forces as well as with Fort Bragg- and Fort Ord-based



☐ The Persian Gulf War demonstrated that the Army depends on sealift and airlift to gain a desired line of operation in a deployment.

☐ **Lines of communications, not to be confused with lines of operation, are the "pipelines" used to move troops and materiel to bases of operations.**

airborne and light infantry forces. Operations began using external (CONUS to Tecumen, Torrijos, and Rio Hato, Panama) and internal lines of operation (Fort Kobbe, Panama, to the objective at Fort Amador, Panama).

What made operations in Panama unique was this mixture of internal and external lines of operation with an immediate shift to internal lines of operation and communications. This transition was feasible because of available inplace forces and because land LOC's were opened within hours of initial combat. Having the inplace, relatively secure bases significantly reduced the risk normally associated with using external lines of operation. Operation Just Cause was not a "nonlinear operation," as claimed by Joint Publication 3-0, but a complicated mixture of internal and external lines of operation and communications. This is an important point that helps to distinguish between an almost pure force projection operation like Desert Shield and a forward presence operation like Just Cause.

Strategic Level of War

Joint force structure issues, such as service roles and missions, strategic mobility, and pre-positioned materiel, also are best examined from a study of lines of operation and communications. The formulation of military strategy can be clearly rooted in the interrelationship between lines of operation and LOC's. For example, in the event of another Korean War, would it be best to reinforce the South Korean peninsula bases or create a "coalition base," allied with Russia in the vicinity of Vladivostok, to enable a line of operation into North Korea from the north?

Operational Level of War

What are the implications of multilinear warfare for the joint force commander? Split-based operations, the essence of our Army's force projection strategy, are more appropriately explained using the multilinear approach to lines of operation and communications. The Army's pre-positioned afloat initiatives are also rooted in the desire to shift quickly from external to internal lines of operation. The problem of transitioning from a forward-based Army to a decisive force-projection Army may best be explained in terms of multilinear warfare. In the recent Haiti operation, the commander in chief of the U.S. Atlantic Command developed a nontraditional line of operation by placing Army forces aboard Navy vessels that served as floating bases.

I conclude that the commander's concepts of operation and support may be better developed if he thinks in terms of multilinear versus nonlinear warfare. The directional relationship between operational bases and the military objective is, and will be in the foreseeable future, linear. The communications between the force and base(s) also are linear. Multilinearity is a pragmatic and evolutionary approach to the study of war, unlike the professed "revolutionary" idea of nonlinearity. I believe that current joint doctrine unfortunately takes the more obtrusive approach and proposes that commanders conduct nonlinear operations. **ALOG**

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Maximizing MEDEVAC

by Lieutenant Colonel Terry Carroll

In combat operations, air medical evacuation (MEDEVAC) can be a great combat multiplier. Air MEDEVAC eases the burden on already-scarce evacuation assets and speeds the flow of critically wounded patients to the rear. However, recent experience at the Combat Maneuver Training Center at Hohenfels, Germany, suggests that better coordination and preparation are needed to improve use of air MEDEVAC. In particular, brigades must improve coordination before a deployment among the forward support medical company (FSMC), its forward support MEDEVAC team (FSMT), and the forward support battalion (FSB) staff.

Aeromedical evacuation assets greatly enhance the evacuation capabilities of the FSMC. However, to achieve maximum results the FSB must provide maintenance, supply, and life support to the FSMT and fully integrate it into logistics operations. And while using helicopters improves MEDEVAC capabilities, it also generates new information, training, and safety requirements for the FSB and FSMC. Let me present some ideas on how brigade leaders and planners can integrate the FSMT into brigade logistics operations and improve the team's effectiveness.

Whether a brigade works independently or as part of a deployed division, the bulk of its combat service support (CSS) will be provided by the FSB. The FSB commander and staff and the brigade combat team's S1 and S4 are well versed in ground logistics but rarely are familiar with aviation logistics. The first step for the brigade in using MEDEVAC is to review basic medical operations doctrine and mission training plans (MTP's) for the support of a brigade, division, and corps. Some basic references include—

- FM 8-10-1, The Medical Company.
- FM 8-10-3, Division Medical Operations Center.
- FM 8-10-6, Medical Evacuation in a Theater of Operations.
- FM 8-55, Planning for Health Service Support.
- FM 63-20, Forward Support Battalion.
- ARTEP 8-058-30-MTP, MTP for Forward Support Medical Company.
- ARTEP 8-44-MTP, MTP for Medical Evacuation Battalion Headquarters.

The next step is ensuring that the FSMC support operations section and the brigade S3 (Air) understand the basic tenets of corps-level ground and air medical evacuation and their specific responsibilities. Brigade planners should request officer and noncommissioned officer (NCO) professional development plans for MEDEVAC operations from the supporting medical evacuation battalion at least 90 days before deployment. In the long term, MEDEVAC use should be part of the FSB's annual professional development program. Officer and NCO professional development should include the mission essential task lists (METL's) for the FSB, evacuation battalion, and air and ground ambulance companies, including current METL assessments.

Exchanging this information will link the training strategies of the FSB and the evacuation battalion and identify areas that should be emphasized. The units then can develop mutually supporting training objectives and incorporate them into priority training events. This basic understanding of organization, functions, capabilities, and the state of unit training will clarify the expectations of all units.

The FSMT should detail all the support it requires from the FSB. Some examples include—

- Supply: Class III (petroleum, oils, and lubricants), including requirements for aviation-quality fuel and gallons per day; class IX (repair parts); common class I (subsistence) and water.
- Maintenance: Support for aviation unit maintenance (AVUM) and aviation intermediate maintenance (AVIM) support, including data on aircraft density and type; automotive maintenance, including vehicle density information; communications and avionics.
- Life support: Billeting; rations.
- Operations: Parachute zone and landing zone organization and operations; weather data access; Army airspace command and control requirements; aircraft security.
- Training: UH-60 Black Hawk helicopter orientation; aviation safety; forward area refueling equipment operations and refueling.
- Health service support planning.

Let's look more closely at some of these areas.

Maintenance

The FSMT normally includes an AVUM capability for conducting preventive maintenance, replacement

of components, and limited repairs. AVIM support requires early coordination among the division materiel management center (DMMC), the aviation support battalion, and corps aviation support units.

In general, the divisional AVIM company or the aviation support battalion can provide maintenance support for the FSMT to augment the medical evacuation battalion's AVIM capability; but these support procedures must be mutually agreed upon before deployment.

Brigade planners should identify all scheduled maintenance and all sets, kits, and outfits needed to perform scheduled maintenance. Scheduled inspections must take place during deployments. Early coordination with the DMMC to throughput aviation repair parts to the FSB will improve repair timeliness.

In short, brigade and unit planners should identify AVIM and aviation class IX procedures early, coordinate with all associated units and activities before deployment, and establish specific planning milestones to implement aviation-specific support.

Communications

The FSMT deploys with no organic ground communications capability. FSB's must consider the FSMT's requirements in planning their operational communications nets and ensure that the FSMT has access to and use of AM and FM radios.

Early decisions on radio nets used for MEDEVAC will lessen confusion at every level. Army doctrine does not specify a particular radio net for MEDEVAC; units can use either the brigade administrative-logistics, the FSMC command, or the ambulance platoon net. The brigade must identify one net, publish and disseminate the frequency, and validate the procedure during all CSS synchronization drills and rehearsals. To help everyone know how to contact MEDEVAC, units can attach the 9-line MEDEVAC request format to radios.

The flight operations specialist from the FSMT should be the FSB's link to the FSMT. He should be located in the support operations section. This arrangement facilitates communications and ensures that the FSMT remains in the information loop.

Army Airspace Command and Control

The brigade S3 (Air) and the FSMT must formalize and rehearse critical Army airspace command and control (A^2C^2) procedures. The support operations section, FSMT flight operations specialist, and brigade S3 staff should work together to ensure that all appropriate flight data arrive at the FSB in a timely manner. Support operations graphics should always include flight hazard and air defense data. The brigade should schedule joint FSMT and FSB flight operations training so FSB personnel become familiar with aviation operations procedures.

Brigade Support Area Defense

The addition of helicopters to the brigade support area (BSA) defense plan creates several challenges. The aircraft have no capability for self-defense and therefore depend on the FSB for security. They also present a significant sight-and-sound signature for an enemy and require an open landing zone near the FSMC in order to transfer patients rapidly. These considerations affect the FSB S3's defense planning and influence how the base cluster is formed. They also complicate decisions about where the FSMC and the FSMT should be located: in the center of the base cluster, as a separate base, or on the BSA perimeter (in accordance with FM 63-20). Air corridors in and out of the BSA also must be planned carefully.

Intelligence

The FSMT needs extensive friendly and threat intelligence data to conduct its operations. The FSB S2/3 should understand the scope and intensity of the FSMT's requirements and should view the FSMT as both a consumer and producer of intelligence data. Aviation-specific intelligence updates, provided on call, should be added to the responsibilities of the S2/3 section. Specific debriefing procedures for MEDEVAC crews also should be developed; flight crews can provide accurate, timely updates to the overall BSA and brigade intelligence-preparation-of-the-battlefield process.

Standing Operating Procedure Exchange

The last step in the initial planning required for a successful deployment is exchange and deconfliction of training and field standing operating procedures (SOP's). The complete integration of the FSMT into SOP's must precede its operational use, and the FSB must know in detail the costs, in resources and time, of an enhanced evacuation capability.

Preparation and Training

Many required predeployment training events are easily incorporated into unit training plans. Helicopter orientation, litter drills, aviation refueling operations, and related individual and collective tasks should be incorporated into company and battalion training programs; this should be done no later than 90 days before deployment.

Specialized training, such as landing zone operations, may require external assistance from the FSMT or the divisional aviation brigade; this support should be requested early. The FSB S3 should maintain oversight of all required predeployment training and

provide the FSB commander with weekly updates.

Units should schedule and conduct inventories no later than 60 days before deployment to determine the serviceability of critical support items. These items include the forward area refueling equipment, fuel tankers (which must be certified), landing zone marking kits, and sling-loading sets. Conducting inventories well before deployment ensures that there will be sufficient time to reorder, service, or repair equipment as necessary. Units must bring all the documentation required to validate the serviceability of all systems. The FSB S4 should be tasked to maintain visibility of these actions.

The FSMC commander, the support operations officer, and the FSMT leader must jointly develop a methodology for health service support (HSS) planning before deployment. Doctrine on this issue appears contradictory because FM 63-20 and FM 8-10-5 name the support operations officer and the FSMC commander, respectively, as the HSS planner. Actually, HSS planning must also include the FSMT leader and the brigade surgeon. HSS planning may take any form the FSB commander wishes, provided that no aspect of treatment or evacuation is omitted.

HSS planners should allocate specific responsibilities to all HSS players. They also should establish a linkup date, time, location, and procedure well before deployment. No later than 7 days before deployment, the brigade should issue the appropriate signal operation instructions to the FSMT and conduct rehearsals of aircraft access and egress into various BSA bases. The FSMT leader and the air defense artillery team leader need to conduct face-to-face coordination to verify identification and operational procedures before deployment. Once deployed, the FSMT becomes a fulltime member of the BSA team.

Operational Use of the FSMT

After planning, preparation, and execution of a deployment, the brigade can improve MEDEVAC effectiveness by adopting the following operational procedures—

- Ensure copies of all orders, annexes, and overlays reach the FSMT. The FSMT should participate fully in HSS planning, including mission, threat, and terrain analysis. Require the FSMT leader to produce an air ambulance support annex to the HSS plan.
- Require an FSMT representative to attend all air mission and orders briefs at FSB and brigade. Backbrief air crews on mission requirements. Include the FSMT in the daily BSA tenants meeting.
- The FSMT leader should attend all brigade CSS rehearsals as a full player and present aviation-specific considerations for the mission plan.
- Develop procedures to maintain current A^2C^2, threat, and weather data in the support operations section and maintain liaison with the brigade aviation liaison officer and S3 (Air).
- Formalize the prelaunch air evacuation checklist to facilitate rapid exchange of critical flight data. Develop and rehearse a hasty displacement plan for FSMT aircraft.
- Like all BSA tenants, the FSMT must attend daily intelligence updates (normally provided during tenant meetings) and remain aware of the tactical situation. The FSB should develop and provide an aviation-specific, short-notice threat briefing update for air crewmen that includes terrain, hazard areas, current activity, and known unit locations.
- Plan for and rehearse contingency operations, such as downed aircraft recovery team operations, search and rescue operations, and reconstitution and reinforcement of medical assets using MEDEVAC aircraft.
- Clarify launch authority for the FSMT. The FSMC commander retains this authority for the brigade area. The FSMC must keep the support operations officer informed of aircraft availability and use.
- Organize and operate the FSMC landing zone with a designated officer and NCO in charge, ground crew, and security element, as required. (See FM 8-10-6, chapter 10, section III.)
- Verify the operability of all air survivability and identification-friend-or-foe equipment before every mission, and conduct a risk assessment.

The use of these operational procedures assumes that the FSMT, FSMC, and FSB are full players in the brigade combat team mission analysis and orders process.

The air ambulance provides the brigade with a capability that can profoundly reduce died-of-wounds rates. But implementing MEDEVAC requires resources, preparation, and cooperation. The brigade must identify and remedy training, material, and procedural shortfalls at home station before deployment. FSMT assets, coupled with proactive planning and operationally sound use, will provide a significant combat multiplier to the brigade. **ALOG**

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Logistics Support in Bosnia

A year ago, come 20 December, U.S. forces began deploying to Bosnia-Herzegovina to participate in the NATO-led effort to separate warring factions under the terms of the Dayton Peace Accord. That anniversary soon will be upon us. This past year, logisticians—soldiers, sailors, marines, airmen, and civilians from all segments of the Department of Defense in both active and reserve components—worked shoulder-to-shoulder to provide combat troops what was needed to sustain Operation Joint Endeavor. Many of those who participated in Operation Joint Endeavor have written about their experiences with various aspects of the support operations. Their stories fill the next 24 pages. While their stories are not all-encompassing, they provide a greater understanding of the roles our troops are playing in NATO's peace Implementation Force.

—Editor

Multinational Deployments in Operation Joint Endeavor

by Lieutenant Colonel Nicholas J. Anderson

Operation Joint Endeavor, the North Atlantic Treaty Organization's (NATO's) mission to establish peace in Bosnia-Herzegovina, is the first operation that required strategic deployment of multinational ground forces. Paramount to the success of this operation was a common understanding of NATO procedures among the countries that provided troops.

Supreme Headquarters Allied Powers Europe is the NATO military headquarters that planned and executed the multinational support of Operation Joint Endeavor. Deployment of troops into Bosnia-Herzegovina began in early December 1995 and continued through February 1996 under centralized management of the Allied Command Europe mobility coordination center (AMCC) in Mons, Belgium. Initially, 32 nations, half of them NATO members, conducted strategic movements to ports of debarkation in Bosnia-Herzegovina. Three more non-NATO countries deployed troops to Bosnia-Herzegovina later.

The deployment phase of Operation Joint Endeavor consisted of managing, coordinating, prioritizing, and controlling the movement of over 2,800 aircraft, 400 trains, and 50 ships that transported over 205,000 tons of cargo and 40,000 personnel into the theater of operations. The magnitude of this deployment required detailed coordination among troop-contributing nations, NATO organizations, and countries along the deployment route.

The first step in planning the multinational deployment was developing force requirements for implementing the concept of operations. Contributing nations created a list of potential participants in the operation by matching the forces of their countries with requirements that had been determined by the Supreme Allied Commander Europe. Then deployment timelines were prepared according to parameters set by the Implementation Force (IFOR) commander to create IFOR disposition lists. Air and seaports of debarkation, desired orders of arrival, required delivery dates, and final destinations were established during this step.

In the second step, each nation added timelines, modes of transport, movement paths, and supply requirements to the IFOR disposition lists to create its own initial detailed deployment plan. During conferences and follow-on discussions, the AMCC provided broad planning guidance to help national movement planners fine-tune their deployment plans.

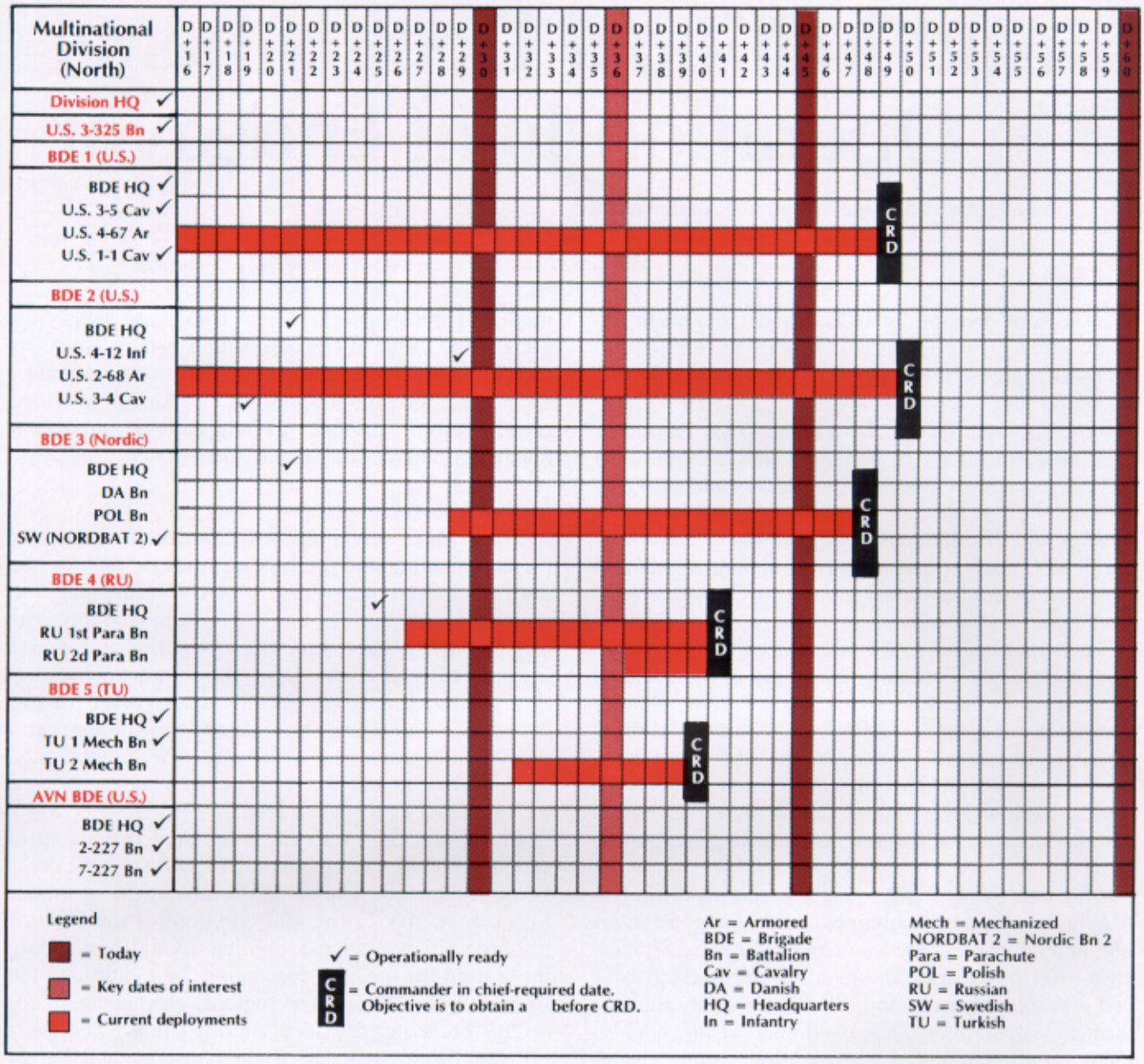
Movement Architecture

The AMCC served as NATO's executive agency for coordinating and prioritizing strategic movements into the theater according to NATO principles and policies. Each participating nation deployed forces as requested by the Supreme Allied Commander Europe. As part of the deployment process, each nation submitted its own detailed deployment plan to the AMCC. Using the allied deployment and movement system (ADAMS), the AMCC integrated the various national deployment plans into a detailed multinational deployment plan.

In coordination with the joint movement control center (JMCC), the commander of Allied Air Forces South established a regional air movement coordination center in Vicenza, Italy, to control the flow of military and contracted civilian aircraft, including those used for medical evacuation, in and around the theater of operations. The regional air movement coordination center provided aircraft landing and take-off slot times, assigned flight corridors and height bands, and coordinated air traffic control with civilian agencies.

As the executive agency for the IFOR commander, the JMCC in Zagreb, Croatia, coordinated force receptions and onward movements. The JMMC also coordinated troop and equipment movements with nongovernmental organizations, the Government of Croatia, and the regional air movement coordination center.

Transportation agencies of the participating countries and the Commander in Chief, Allied Forces Southern Europe, coordinated sealift requirements with those of a concurrent arms embargo in the Adriatic Sea. The flow of personnel and supplies into the theater by ship was the responsibility of individual countries but was coordinated by the AMCC and



Sample deployment status chart.

the JMCC.

From its movement operations center at Kiseljak, Bosnia-Herzegovina, the Allied Command Europe's rapid reaction corps directed troop and equipment movements in their area of operations through division movement control organizations, national support element movement control teams, air terminal movement control teams, and airlift control elements. The forward communications zone movement control center at Split, Croatia, coordinated reception and onward movement of forces and supplies outside Bosnia-Herzegovina. For this they relied on national support element movement control teams, air terminal movement control teams, and airlift control elements that were located at airports, seaports, and holding areas.

Movement Management Tools

Nations deploying troops to Bosnia-Herzegovina used both automated and manual systems to manage and control movements from home stations to areas of operation in the theater. It is significant to note that ADAMS interfaces with the automated deployment management systems of NATO-member countries. NATO nations with automated deployment management capability therefore used ADAMS, and

non-NATO nations used other methods such as charts, diagrams, telephones, and even pencils and paper. Regardless of the method used to manage and control national deployments, the ability to report timely and accurate information was most important.

At the allied level, ADAMS helped analyze and manage deployments. With ADAMS, the movement planners were able to reduce deployment planning time, provide a standard means of exchanging plans and data, resolve differences in multinational deployment plans, and offer a common tool for preparing deployment plans for participating non-NATO countries.

Another management tool used by the AMCC during the deployment phase of Operation Joint Endeavor was the deployment status chart at left. Each country submitted to the AMCC a detailed deployment plan, which included deployment timelines and movement paths. In turn, the AMCC forwarded the detailed deployment plans to the theater JMCC in Zagreb and maintained close coordination with the JMCC to obtain the status of arrivals into the theater. As each element was declared operationally ready to perform missions in the theater, the AMCC placed a check mark in the appropriate block on the deployment status chart. This management tool was used extensively during the deployment phase to brief the Supreme Headquarters Allied Powers Europe command group and national representatives. The chart served as a single source of deployment information for supported and supporting commands.

Challenges

The four biggest challenges during the deployment phase of Operation Joint Endeavor were standardized reports, deployment plan formats, transit clearances, and personnel augmentations. Some of the nations that provided troops and equipment did not receive copies of the standardized reports and instructions for completing them before the deployment began. Still, all of the countries and movement agencies were very responsive to reporting requirements, and the deployment of forces was never threatened. However, in future operations, standardized reports and instructions should be distributed well in advance of deployment as part of the operation plan.

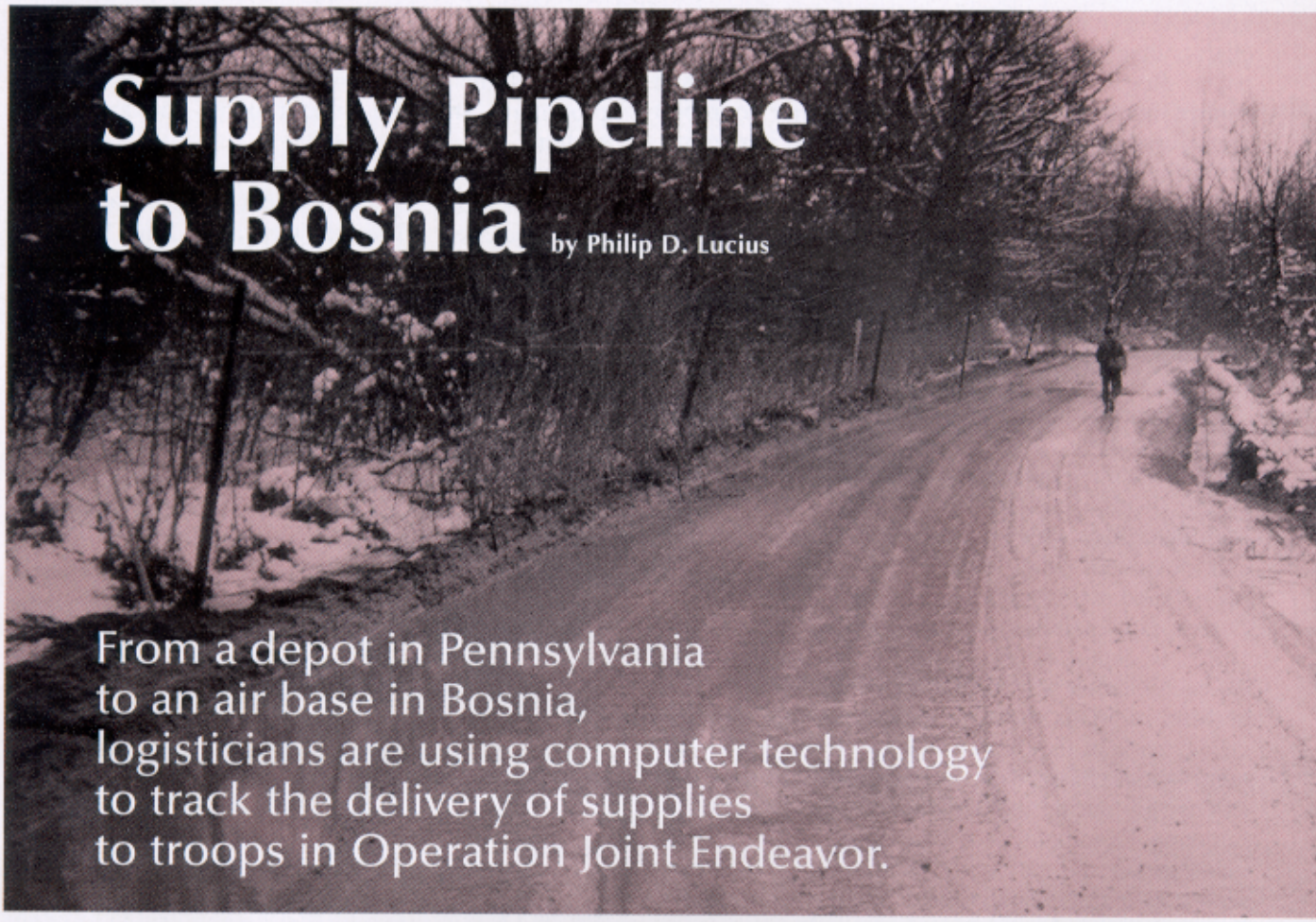
Since non-NATO deployment plans were not prepared in ADAMS format, the AMCC had to convert the information in those plans into a compatible format. Additionally, there were numerous changes in the plans, and some countries were reluctant to release sensitive information. However, the AMCC convinced national representatives and movement planners of the expediency of the ADAMS format for the AMCC's effort to coordinate an international detailed deployment plan. Ultimately, the AMCC obtained the information required to manage deployments into the theater using the automated system.

Ideally, transit clearances should be obtained from countries along the deployment route before forces are dispatched. However, Operation Joint Endeavor deployments began so soon after the signing of the Dayton Peace Agreement that some political issues with several countries along deployment routes still had to be resolved. In fact, some trains were already en route to affected countries even as national and NATO movement planners were attempting to obtain border transit clearances. Because deployments were multinational, and many countries required transit clearances, dedicated legal and diplomatic authorities worked around the clock. As a result of their efforts, deploying forces experienced minimal delays at borders.

The sophisticated movement architecture of Operation Joint Endeavor required movement organizations at all levels to be staffed with personnel who were qualified to perform specific missions. At the national level, movers coordinated shipments through seaports, airports, and railheads. NATO also needed movers to perform similar functions at all levels of command and in provisional organizations such as the JMCC and the AMCC. The challenge was to get enough qualified personnel from a very small movement community to fill positions at all levels to support Operation Joint Endeavor. In the end, national and NATO organizations pulled together and accomplished the mission despite personnel shortages.

Without the willingness of all the participating nations to work together to achieve a common understanding of NATO procedures, the deployment of multinational troops and equipment into Bosnia-Herzegovina and surrounding countries in support of Operation Joint Endeavor would not have been a success. Valuable lessons learned from the deployment phase of the operation will assist with the redeployment of troops from Bosnia-Herzegovina to their respective countries and will help allied forces plan and execute future multinational military operations.

Lieutenant Colonel Nicholas J. Anderson is a Transportation Corps officer assigned as a NATO movements staff officer to Headquarters, Allied Forces Central Europe, movement and transportation branch in Brunssum, the Netherlands. During the deployment of forces to Bosnia-Herzegovina, he served as a plans officer for the AMCC.



Supply Pipeline to Bosnia

by Philip D. Lucius

From a depot in Pennsylvania to an air base in Bosnia, logisticians are using computer technology to track the delivery of supplies to troops in Operation Joint Endeavor.

As soldiers serving in Operation Joint Endeavor move south to base camps in Bosnia, maintaining a viable materiel distribution system has become critical to their success. The flow of materiel must be adjusted to accommodate their movements. Logisticians have to track this materiel flow while maintaining visibility of where the receiving units are located. The supply pipeline supporting the Bosnia mission stretches nearly 4,600 miles back to the small town of New Cumberland, Pennsylvania.

New Cumberland hosts the consolidation and containerization point (CCP) for the air lines of communication supporting the multinational Implementation Force in Bosnia. The CCP is part of Defense Distribution Depot Susquehanna, Pennsylvania (DDSP); the depot is under the command of Defense Distribution Region East (DDRE), which is headquartered at New Cumberland.

CCP: Consolidating Supplies for Bosnia

Since January, the CCP has prepared an average of 26 pallets per day for shipment to Bosnia. That's 182 pallets per week of food, clothing, medicine, and mechanical and electrical parts—everything necessary to conduct a military operation. Much of this materiel is shipped to the CCP from depots in Alabama, Florida, Georgia, North Carolina, Ohio, Pennsylvania, Tennessee, and Virginia, as well as a number of depots in the western United States. The CCP then consolidates the materiel and prepares it for shipment on air pallets.

When a customer in Bosnia—usually a unit—needs a particular item, the supply request is sent to the theater Army materiel management command. The request then is forwarded to an inventory control point (ICP). The Defense Logistics Agency (DLA), headquartered at Fort Belvoir, Virginia, operates ICP's throughout the continental United States. After it receives the request, the ICP issues a materiel release order (MRO) to the depot that stocks the item. To control costs and ensure delivery of materiel to the right customer, most items are shipped from the depots or from commercial vendors to the CCP to be readied for oversea movement.

Instead of sending supplies to a unit in single, separately shipped packages, which would strain unit

The main road at the Tuzla Air Base shows the snow, rain, and mud of the Bosnian winter (left). Air pallets of class II (clothing and individual equipment) and class IX (repair parts) await processing at Lukavac Air Base, Bosnia (above).

reception and distribution capabilities, the CCP places several packages into one container destined for a specific customer. Consolidating packages requires a two-fold effort: containerizing the materiel and tracking its movement through the supply pipeline.

Technology for Tracking Shipments

Most logistics problems at this stage of Operation Joint Endeavor require the involvement of a transporter. Army transporters believe that "nothing happens until something moves." Transporters coordinate how freight gets into Bosnia, they know where the freight is in the pipeline, and they get it to the right unit.

The computer technology that links one site to another along the logistics pipeline helps transporters find those critical parts that are urgently needed in the field. Many transporters were working in the transportation field before today's computer systems were even imaginable, but most would agree that computerized tracking technology is extraordinary. They also would agree that their functional and historical knowledge is needed to point the computer's "eyes" in the right direction.

Mike Wagner, a transporter with DDRE, is the civilian representative for the transportation operation in Bosnia serving with the DLA contingency support team. Under what many would consider difficult weather conditions, Mike works to solve transportation problems; that means he locates freight and gets it to the customer in Bosnia.

For example, a fuel pump was urgently needed by the 1st Armored Division. Using advanced computer technology, Mike was able to work with transporters in New Cumberland to locate the fuel pump and expedite its movement through the pipeline. He had to find answers to such questions as: Where is the fuel pump in the pipeline right now? In what air pallet is it contained? What can be done to get the product to the customer now? When Mike found the item, 1st Armored Division commanders were able to decide how quickly they needed it, and DLA was able to respond to their needs.

Mike works with the distribution management division at DDRE—a group of people who have

worked in many logistics functions during their Federal careers. They track requests 24 hours a day, 7 days a week. Their challenge is to find the freight that is within the pipeline between DDRE and the customer in Bosnia and provide the customer an answer to any query in 2 hours.

"DDRE has tracked thousands of MRO requests from soldiers serving in Bosnia by using a variety of tracking systems to search the pipeline to identify where the materiel is," says Jack Barmore of the distribution management division. A grocery store checkout counter bar-code machine provides managers with a variety of information about their inventory. Likewise, DLA's distribution standard system (DSS) is used to coordinate all phases of a distribution depot's materiel management functions from receipt of order to shipment of stock, including inventory management, item care and preservation, management of stowing materials, and stock selection and packaging. With DSS, transporters can begin their search by "tapping into" the depot's computer system to track their materiel.

More Than Systems Are Needed

However, while the military began consolidating its distribution depots in 1991, not all of those depots currently use DSS. When transporters use other systems, they must request a depot to research the status of the item they are seeking. The variety of available distribution management systems poses an additional challenge for DDRE personnel.

To overcome gaps in automation capabilities, DDRE brought together people with a variety of experience. One of them was Trudy Wilkerson, who has worked as a transporter for 28 years. If asked where her experience was put to the test, she'll tell you it was during Operation Desert Storm, when she worked wherever she was needed.

One of the people with whom Trudy worked in the early stages of Operation Joint Endeavor was Master Sergeant Jerry Packer, who was serving with the peacekeeping forces in Bosnia. Sergeant Packer needed to expedite shipment of ranger body armor from a contractor to waiting troops in Bosnia. Trudy worked with the contractor and tracked the armor through the CCP to Dover Air Force Base, Delaware, and on to Ramstein Air Base, Germany. "Trudy's effort greatly enhanced the force protection posture of the troops down in the Bosnia area," Sergeant Packer noted.

The Tracker's Tools: LIF and GTN

The computer system initially used by transporters like Trudy to research materiel status is the logistics intelligence file (LIF). LIF is an Army data base that provides the data needed to begin researching materiel status, such as the depot from which the materiel was ordered and the quantity and priority of the shipment; LIF can confirm for the user that the materiel was shipped. By supplying a requisition number, transportation control number (TCN), Department of Defense activity address code (the address of the materiel's destination), or project code, a transporter can use LIF to view the status of current and past requisitions managed by the Army.

The next system accessed at DDRE is the global transportation network (GTN), which is managed by the U.S. Transportation Command through TELNET. The GTN system identifies when the materiel was shipped. After the researcher determines when the materiel was flown overseas, he can use LIF to find

A soldier with the Army transportation movement control team uses a handheld interrogator to locate a specific air pallet in the staging area at Tuzla.

its date of receipt by the customer.

Typically, ICP's will fax copies of all MRO's that DDRE needs to track. By comparing the ICP listing and the LIF data, a researcher at DDRE can determine the depot to which the MRO was released. Through a series of screens provided by LIF, he then can determine the location of an item within a depot and if that item has been palletized or is sitting in the packing lane ready to be palletized. If the item already is on a pallet, LIF will furnish the item's pallet number and pallet identification, the container on which it was loaded, the van number, and the bill number. With that information in hand, a transporter can obtain the pallet TCN, which is needed to find the item in the pipeline. Inputting the pallet TCN will result in a list of everything that is loaded on that air pallet.

The transporter needs to use GTN when he knows the item in question has been shipped to the airport and his task is to find the shipment in the pipeline. He is not only responsible for the materiel leaving the depot but also for tracking it until it reaches the customer. Entering the pallet TCN into the GTN system will show where the shipment is.

Gaining Intransit Visibility

Keeping a close eye on materiel in transit involves two forms of technology: optical laser cards (the automated manifest system), which detail pallet contents, and radio frequency (RF) transmitters, which are used to track shipments. Each shipment is documented using laser cards and tracked on its way overseas by means of a satellite-monitored RF tag attached to the shipment. This technology has greatly improved DLA's ability to track and identify individual shipments.

Another tracking device is international transportation information tracking (INTRANSIT). This is a proof-of-concept, satellite-based transportation tracking system that records messages and positions from moving vehicles. INTRANSIT reads the RF tags and stores the information in a data base. This data base shows a list of the pallets that were built at the CCP. By using the INTRANSIT data base, a transporter can identify the date the pallet was built, the date it was shipped, its carton control number, and its contents. RF tags are matched to the pallet ID. INTRANSIT not only tracks misplaced materiel but also the current status of all materiel.

Transporters use interrogators (handheld scanners) to read the RF tags for each air pallet at the point of receiving to obtain bar-coded information affixed to each container. The bar codes contain shipping and content information. Transporters can know exactly when a shipment left and when it reached its destination.

The INTRANSIT machine actually shows where the pallet is in the pipeline—even as the pallet passes through an installation gate. There is no human intervention; INTRANSIT reads data picked up by RF tag readers throughout Bosnia and other points in Europe and feeds them to DDRE. DDSP has a reader, and Dover Air Force Base and Ramstein Air Base have some as well. As soon as a truck goes by a

Pallets are loaded for delivery to various supply support activities in Bosnia.

☐ **A transport is ready for departure from Tuzla Air Base after delivering air pallets.**

reader, the data are fed back to the INTRANSIT machine.

"When a customer calls and says he didn't get his materiel, but all research indicates he has it, the INTRANSIT machine will pinpoint exactly where the pallet is sitting," notes Mike Wagner. "Seems odd that a guy in Pennsylvania can say, 'Run 20 yards down and you will find your pallet.' But it is not odd. The technology is better than the conditions. These soldiers serving in Bosnia have competing concerns. Our job is to reduce their manpower needs to find materiel."

At the End of the Pipeline

Daily reports between DDRE and Bosnia serve as an exchange of information. One such report is the 9EV Air Pallet Report, which allows DLA to see what cargo is in the distribution pipeline from the CCP through Dover to Tuzla, Bosnia, and Taszar, Hungary. Many of the reports generated by DDRE are used at all levels in the theater of operations.

The 21st Theater Army Area Command commander and the lst Armored Division Support Command in Bosnia have been impressed by the information DDRE provides on the pallet reports. The troops working at the air bases and support camps are able to use the reports to determine what type of vehicle assets and equipment are required to move cargo to customers. Once they know how many pallets are coming and for which customer they are destined, the troops can put together a convoy to deliver the items and thus meet customer needs.

"During the early stages of Operation Joint Endeavor, the air base at Tuzla became backlogged with air pallets due to lack of documentation and various other problems related to the weather," observed First Lieutenant John Long, officer in charge of the Army transportation movement control team. "The [team] requested DLA provide assistance to help organize the field. DDRE was able to accomplish a smooth transition by monitoring the movements and making the necessary changes to ensure the units received their materiel."

Operation Joint Endeavor continues to offer DDRE a good opportunity to improve its use of technology to better serve the soldier in the field. As John Yost, a 25-year veteran of transportation management at DDRE, observed, "DDRE continues to refine its tracking and distribution processes so that lessons learned in support of such operations are put to good use." **ALOG**

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Up Front: DLA in Bosnia

by Captain Nicolas Herrera

The Defense Logistics Agency's aggressive forward-support policy has brought new meaning to the term 'logistics support in the field.'

It was the first deployment of this size for the Defense Logistics Agency (DLA). To support the 1st Armored Division in its deployment to Bosnia for Operation Joint Endeavor, DLA implemented an aggressive forward-support policy that has brought new meaning to the term "logistics support in the field." No longer do DLA personnel just sit at their desks and work logistics issues during contingency operations. For Operation Joint Endeavor, DLA is responding to customers' needs more efficiently through a team deployed forward into Bosnia; a main contingent stationed in Hungary; two logistics operations centers, one at DLA-Europe in Wiesbaden, Germany, and another at the 21st Theater Army Area Command in Kaiserslautern, Germany; and two liaison officers stationed at the U.S. European Command Headquarters in Stuttgart, Germany. By strategically placing its assets and personnel, DLA-Europe was able to establish a full service and support package for the forward-deployed team, known as the DLA contingency support team-forward (DCST-F), and respond to all their service and support requests. Even an ocean's distance did not hamper DLA headquarters' ability to provide support to this forward element. The headquarters ran an emergency support operations center that yielded invaluable support to DLA-Europe, DCST-F, and the 1st Armored Division.

I arrived in Tuzla, Bosnia, on the night of January 13, 1996. I spent 4 months working with the DCST-F and 1 month in Kapsovar, Hungary, with the DCST-main contingent. During that time, the DCST-F in Bosnia made a name for itself by providing responsive service and support to its customers.

The DCST-F's operations were set up next to the 1st Armored Division Support Command (DISCOM) at Camp Punxsutawney in Lukavac, Bosnia, about 10 miles northwest of Tuzla, on the site of an old coal and coke factory. This location meant that soot was always in the air and under foot. The weather was extremely cold and harsh, and space was very limited. Our mission was to provide logistics services and support to the 1st Armored Division for all DLA-managed commodities and services, including rations, contracting, fuels, and reutilization of materials.

The DCST-F included a lieutenant colonel who was the officer in charge, a lieutenant colonel and a captain who served concurrently as operations officers and customer liaison officers, a GS-12 civilian counterpart, an Air Force master sergeant who was a subsistence representative from the Defense Personnel Support Center Europe, a GS-12 automation and systems analyst, a team of Defense Contract Management District International specialists, and an automated manifest system (AMS) contractor.

Our first task was to identify the customers' needs. To do this, we met with the DISCOM and other potential customers immediately. We toured the 1st Armored Division Main Support Battalion (MSB), our largest customer, and met with the DISCOM class IX (repair parts and components) managers and personnel in the general supply office. We asked them what we could do to help and let them know what assistance we could provide. As the "new guys on the block," we also met with the onsite Army Materiel Command (AMC) logistics assistance representatives, who were an integral part of the 1st Armored Division and had experience in deploying with the division.

Work was slow in coming as we began to identify our support requirements and establish ourselves as a viable part of the mission. We knew that, with soldiers and equipment on the ground and more due in, there would be a great need for supply support.

Automation's Role

The DCST-F used many automated systems while deployed to Bosnia, including the standard automated materiel management system (SAMMS), logistics information network (LINK), logistics intelligence file (LIF), Internet, intransit visibility, global transportation network (GTN), and AMS.

SAMMS is a wholesale depot system that provides asset visibility and stock posture information to users.

LINK is a tool developed by DLA to provide worldwide access to logistics data bases for all services; PC-LINK is a version developed by DLA-Europe that allows users to generate LINK queries from their personal computers (PC's). With either SAMMS or PC-LINK, users can create large batch files of requisitions that can be uploaded easily to the LINK system.

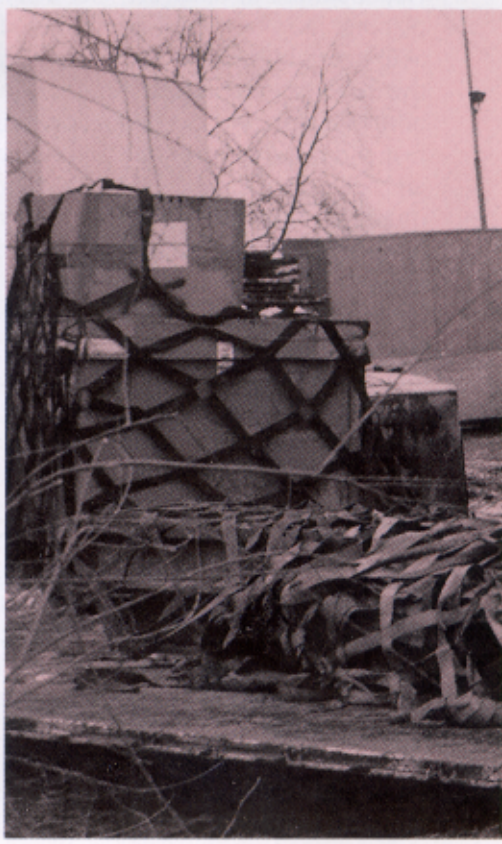
LIF is a centralized, computer-oriented data base operated by the AMC Logistics Support Activity, Redstone Arsenal, Alabama, that contains supply and transportation data on Army-sponsored requisitions submitted to the wholesale supply system. It provides visibility on individual requisitions and shipments as they are processed throughout the logistics pipeline.

The Army home page on the Internet (accessed through web browsers like MOSAIC and NETSCAPE) gives users intransit visibility of supplies in the logistics pipeline. Information is fed into the home page by the LIF and the data base at the Volpe National Transportation Systems Center in Cambridge, Massachusetts. Users can query the system in numerous ways, such as using radio frequency (RF) tag information, transportation control number, national stock number (NSN), or document number.

RF tags and technology are used extensively for intransit visibility of parts in the pipeline. The RF tags are polled by RF interrogators set up at specific choke points; the interrogators relay tag information to a data collection center, from which users can obtain up-to-date, near real-time information on the location of supplies in the pipeline.

GTN is a command and control system that provides the U.S. Transportation Command with integrated, automated support to manage common-user airlift, surface lift, and terminal services that deploy and sustain Department of Defense (DOD) forces on a global basis during both peacetime and war. GTN receives data from existing Government and commercial transportation computer systems and integrates the data into a single data base. Users can extract data by searching for the transportation control number, DOD activity address code, document number, or other identifying information. The GTN provided intransit visibility for DLA-managed parts that had been shipped into Bosnia.

The Bosnia mission was the first time AMS was deployed with the 1st Armored Division in an operation. AMS is a shipping and manifest data base system that uses PC's, optical memory cards, readers and writers, bar-code readers, RF tags, and printers to facilitate the receipt process. AMS operates in a variety of supply organizations, from the depot to the



A DLA contingency support team member (above) checks a shipment of repair parts on its arrival in Lukavac, Bosnia. Before tons of rock were hauled in to cover supply yards in Lukavac, trucks sank axle deep in snow, rain, and mud (right).

direct support unit (DSU). Our main interface was at the DSU, where AMS performed receipt and issue functions. When shipments were received, global or multipack optical memory cards were read, and the information was downloaded to the AMS data base. Data on incoming Department of Defense (DD) Forms 1348-1A were scanned and downloaded to the AMS data base. AMS then generated a report of discrepancy as the data were reconciled, and the receipt data were transferred to the standard Army retail supply system (SARSS). As items were issued, additional authorized stockage list (ASL) line-item data were added to the AMS data base and packing lists were generated for our customer units.

When the AMS representative arrived onsite, he immediately began fine-tuning the operations of the MSB so they could be better supported by automation. After meeting with the DISCOM class IX managers to discuss their needs, we learned that the chain of command held meetings called maintenance readiness reviews (MRR's) to discuss the status of deadlined equipment and parts on order. The document used by the DISCOM commander and the assistant division commander for support (ADCS) to track the requisitions through the supply pipeline and conduct MRR's was the 026 (the standard Army maintenance system [SAMS]-II automated version of the DA Form 2406, Materiel Condition Status Report). All deadlined equipment and parts ordered for that equipment appeared on the 026.

Readiness Reporting

Initially, the DISCOM commander held daily MRR's by brigade; reviews of requisitions that were over 30 days old were held once a week. The ADCS and DISCOM and brigade commanders held MRR's at brigade camps every 2 weeks to discuss readiness. The ADCS also held special MRR's every 48 hours in the deployment phase of the operation to review the readiness of his core combat systems. For this he used slides depicting the readiness of systems needing special attention. The DCST-F tracked requisitions and expedited the delivery of critically needed assets when necessary. We kept the managers informed of the results of our efforts, and they, in turn, reported the status at the MRR's. The DCST-F attended the MRR's to provide additional backup information and assistance if needed.

Overcoming Obstacles

The 1st Armored Division faced a number of challenges. The division used national item identification numbers (NIIN's) for tracking requisitions through the system, while DLA automated systems

used NSN's. Although only a portion of the division's ASL had arrived in Bosnia, the division still had maintenance requirements to meet. Transportation assets were limited, and driving on the old coal yard was difficult until tons of rock were spread on its surface. There was no central receiving point and no RF tag choke points, which made intransit visibility difficult. There was a large backlog of pallets at the MSB's throughput points at Tuzla; Lukavac; Camp Harmon, Croatia; and Ramstein, Germany, due in part to changing priorities, limited transportation assets, and difficulty in crossing the Sava River separating Croatia and Bosnia. Also, the harsh environment made it difficult to maintain consistent communications links.

As the theater matured, so did our role and the needs of the 1st Armored Division. News of the DCST-F's consistent and thorough support of the DISCOM spread, and units began requesting our assistance in obtaining DLA-managed commodities. Through training, education, and positive results, DLA's successes multiplied, and our work load increased. Critical to our success was our early deployment with the 1st Armored Division, our close interaction with our customers, and our ability to provide feedback using a common medium—the 026 report.

Not content with just these successes, the DCST-F looked to the team's systems analyst and the AMS contractor to raise the level of automation to keep up with the ever-growing work load while staying within our resource limits. Many customers expressed an interest in gaining access to LINK and SAMMS, so we added training to our mission. This proved to be a great benefit because it empowered the customer with greater and more accurate information which, in turn, meant fewer and more informed requests for assistance. We used batched queries on Federal logistics (FEDLOG) compact disk, SAMMS, and AMS to sort through large backlogs of pallets and multipacks to identify critical parts in the air lines of communication (ALOC's) and establish priorities for the work load. We developed a relational data base that interfaced with the 1st Armored Division's SAMS-II-generated 026's and the AMS data base. The result was a report that contained all matches between AMS-received parts and the 1st Armored Division's 026 open requisitions. This report gave both the DCST-F and the 1st Armored Division visibility of critical parts backlogged. It also allowed the division to establish priorities for processing the ALOC pallets that contained the largest number of critical parts.

Lessons Learned

Many of the lessons learned in the first few months of Operation Joint Endeavor will help ensure the success of future DCST missions. The first lesson we learned was that coordination with the class IX managers is integral to efficient and timely customer support.

In the beginning, the class IX managers provided the DCST-F with a copy of the 026 (segregated by brigade) every week and highlighted the DLA parts that were critical. The DCST analyzed and researched the parts by verifying the DLA stock posture (for example, items due in and on-hand) and status of open documents. The DCST then notified the 1st Armored Division DISCOM class IX managers of the findings before the daily brief by annotating the 026 with the information. If the estimated shipping date of an item exceeded 30 days, the DCST-F contacted the various DLA inventory control points' emergency supply operations centers and requested that they expedite shipment.

The DCST-F soon learned that, to solicit requests for assistance, it was prudent to use a medium that was easily understood throughout the 1st Armored Division and among DLA customers. In this case, it was the 026. For bulk requests for assistance, the team used the batch processing modes in FEDLOG and SAMMS to obtain status and DLA stock posture.

A second important lesson learned involved expediting the 1st Armored Division's supply requests. In coordination with the DISCOM and its supporting units, the DCST-F developed a comprehensive system for expediting requests. First, a unit accessed the integrated logistics analysis program, LIF, or any similar system to obtain the status of the open request. Then these data were provided to the next higher supply management level, such as the DISCOM class IX managers, with a request to expedite processing. The required item had to be a deadlining request or have a similar urgency. Next, the managers identified the request to the DCST-F, who validated the request, its status, and the DLA stock posture to determine if it was necessary to contact the DLA emergency supply operations centers and item managers or expediters. The DCST continued to track the request in spreadsheet form until it was shipped. These data were then annotated and given to the DLA-Europe logistics operations center in Wiesbaden for tracking purposes.

To speed up the process, the DCST-F took an aggressive role in researching and tracking all parts requested by the customer units. We reacted more quickly to the customer's needs and, by personally working these issues, the team was better equipped to answer questions at MRR's.

The DCST-F also validated the currency of all requests from customers because we often had access to

information that was more up-to-date than that provided to and by the customer. In addition, we researched and tracked requests identified by the customer as a problem or needing particular attention. As a part of this process, we collected the full NSN, source of supply, unit point of contact and phone number, and DLA depot point of contact for each problem request. In addition, we noted the date and time the request was received, when the inquiry was made, and all feedback provided to the customer.

A third lesson learned concerns tracking and reporting of supply requests handled by the DCST-F. Our daily volume of supply requests ranged from a low of 20 a day to an all-time high of 1,600. To expedite tracking of open customer supply requests, we created a Microsoft Excel spreadsheet that would allow us to update, sort, and access critical data elements for our customers. Rather than sort through a stack of papers, we could enter information such as the NSN, document number, or weapons system code of any item and obtain status information almost immediately. If the DCST-F needed additional assistance with any items, the items were listed in the daily situation report to the logistics operations center in Wiesbaden.

Later in the operation, the spreadsheet grew too cumbersome for the DCST-F to keep current, so additional logistics support personnel joined the team to help with the work load. Ultimately, we evolved to transferring the spreadsheet by electronic mail to the class IX main customers, which helped reduce the number of customer support requests. Our proactive stance and flexible attitude were key to our remaining effective.

One option being explored for future contingencies is the deployment of a mobile training team before or during the early stages of a unit's deployment to train the unit in asset visibility within DLA. This would be an ideal time to give a unit access to LINK and SAMMS and to show it how to better track documents in the pipeline.

The DCST-F conducted a lot of document research during the first 60 days of the operation because of the tremendous initial backlog of supplies at Dover Air Force Base, Delaware; Ramstein; Rhein Main, Germany; Camp Harmon; Taszar, Hungary; Tuzla; and the 1st Armored Division MSB. In response to the backlog, the DCST-F developed a way to reduce research efforts significantly. The AMS representative received daily downloads of all AMS cards read from the backlog waiting to be processed. He maintained these data in a data base that was used by the team to query the system about documents in question. If the part being sought appeared in our 026 data base, the team provided that information to the customer. If it did not appear, we continued to research through SAMMS and LIF until we were able to provide information to the customer.

During the first 60 days of the operation, the team found that approximately 10 to 15 percent of the parts tracked were located at Lukavac. Because of the large backlog of ALOC-delivered items in the MSB, documents on many of these parts had been received by the class IX main but not receipted into SARSS or had been receipted into SARSS and the part already issued to the customer. This was largely due to the high operating tempo sustained by the 1st Armored Division. DCST-F often was able to obtain parts when others had failed. In one case, we located 30 of more than 100 critical parts needed to fix deadlined systems and provided status information for core combat systems briefings given to various command levels.

Our new 026 data base continued to evolve into a relational data base that compared all parts received in the AMS data base against the 1st Armored Division's 026 reports and printed comparisons into separate spreadsheets for the DCST-F and its customers. The program gave the DISCOM supply managers visibility of incoming ASL lines, which helped to reduce ASL zero balances. It also gave the 1st Armored Division MSB the ability to establish priorities so that ALOC's handling the largest number of critical parts were given precedence. With the program, the DISCOM materiel managers and commanders had intransit visibility of deadlining parts that may have arrived but had not been processed. Last, but certainly not least to the DCST-F, our research time was reduced a whopping 60 percent!

DLA played a key role in improving unit readiness, expediting unit requests, and improving order and shipping time in support of Operation Joint Endeavor. Because of its flexibility, the DCST-F concept was able to change while continuing to support the mission. Although military operations differ in many ways, DLA's ability to support the customer in any theater, under any circumstances, is now a proven success. **ALOG**

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Task Organization for Bosni

Deploying the 29th Support Group to support U.S. required the unit to meet the challenges of split-ba

Operation Joint Endeavor—the current U.S. peacekeeping mission in Bosnia—challenged the soldiers of the 29th Support Group beyond the normal requirements and stresses of supporting a deployed force. This time, the group itself was going to deploy into a theater of operations. For Operation Joint Endeavor, the 29th Support Group would have the opportunity to move into the Bosnian theater and perform its mission under the Army's concept of split-based operations.

I serve as the supply and maintenance officer of the 29th Support Group. Although the group always has been deployable, we believed that we would not deploy as a unit to conduct our traditional mission of reception, staging, onward movement, and integration (RSOI). We felt that, in a contingency, we would execute our mission at our base in Germany, and we had rehearsed to do so during numerous Reforger and Atlantic Resolve exercises. While we recently had sent units to Rwanda and Turkey to support humanitarian operations, we had never deployed the entire group. It was only within the last 2 years that we had been told that the 29th Support Group should consider itself deployable.

Planning Support for the Bosnian Theater

Once our commander, Colonel John J. Deyermond, was notified that the 29th Support Group would deploy into the Bosnian theater of operations, we realized that we faced several challenges. We would have to overcome them if we were to successfully support the move of the 1st Armored Division from Germany into Bosnia.

During all of the planning sessions at Grafenwoehr, Germany, we were told that we would have to leave a large portion of the group in Germany; as a consequence, we would have to leverage our personnel to perform our mission in the theater.

Our most critical task was figuring out how to integrate a deployed task force containing just under half of the group's total military strength with a large, predominantly civilian rear detachment and make the resulting split organization support the assigned mission. As the planning and execution of the deployment began, we quickly recognized that the 29th Support Group was well organized to execute the plans laid out in Grafenwoehr.

Deploying to Hungary

The initial challenge was to push ourselves out of Germany and into Hungary, the location selected for the intermediate staging base. This was no easy task for a headquarters unit that had not deployed since its reactivation in 1980. As the "sustainer force" (those in the group who would conduct the RSOI mission in theater) readied themselves for deployment to Hungary, the rest of the 29th Support Group focused on supporting their preparations.

The Kaiserslautern Industrial Center (part of the 29th Support Group) and the 200th Theater Army Materiel Management Center (TAMMC) were instrumental in filling our equipment shortages. This was especially critical for the 29th Support Group Headquarters Company. The Kaiserslautern Industrial Center and the Equipment Support Center-Mannheim (part of the 51st Maintenance Battalion) helped to ensure that all of our equipment was ready to deploy.

In early December 1995, the 29th Support Group finally received the word to deploy to Hungary and set up for the RSOI mission. Our successful deployment was a tribute to the hard work of numerous soldiers and civilians who did not deploy but supported the 29th team.

The RSOI Mission

Once on the ground in Hungary, we faced a new set of challenges. At first, we lacked visibility of the stocks coming into the theater. So we talked with our rear detachment on a daily basis to find out what had been shipped; the Kaiserslautern Industrial Center again proved invaluable. We were able to change shipment priorities as needed and reroute cargo destined for different locations. This newfound visibility aided us in setting up a distribution system for the intermediate staging base in Hungary and ensuring that we had enough physical space to manage all stocks—two factors critical for ensuring a successful

a by Captain Steven A. Shapiro

forces moving into Bosnia ısed operations.

deployment.

Another challenge was managing the large volume of containers arriving daily as part of our RSOI mission. The policy developed at the Grafenwoehr planning conference called for all cargo, whether sustainment cargo or unit equipment, to be shipped in 20-foot containers. However, we lacked the transportation personnel needed to handle all the containers arriving in theater. This was a result of Army doctrine. An area support group is expected to deploy to a mature theater that has a transportation command (TRANSCOM) to perform transportation functions, so the 29th Support Group has no transportation section in its logistics operations cell. This deficiency was corrected when the 37th TRANSCOM augmented our staff with personnel to manage transportation.

The transportation cell from the 37th TRANSCOM and the 191st Ordnance Battalion (part of the 29th Support Group), with its personnel skilled in managing ammunition containers, were instrumental in providing the expertise, container-handling equipment, and muscle we needed to ensure that containers stayed with "deployer units" (those units deploying further into Bosnia) as they transited the intermediate staging base. By March, over 1,700 unit equipment containers had been processed through the intermediate staging base.

Supporting the Deployed Force

Once we completed the RSOI mission, our labors turned to sustaining the force deployed in Bosnia. Although we were supporting both "deployers" and "sustainers" during RSOI, we decided that we should see if we could do more. The area on which we first focused our efforts was expanding the 51st Maintenance Battalion's traditional role of direct support (DS) supply and maintenance to include general support (GS) supply and maintenance. Our civilian partners in the rear detachment—Kaiserslautern Industrial Center for GS supply and maintenance and Equipment Support Center-Mannheim for GS maintenance—conducted much of the research we needed to expand the 51st Maintenance Battalion's role.

Our detachment in Hungary compiled demand data based on operational tempo. The rear detachment in Germany then checked existing programs, coordinated with the Army Materiel Command's Logistics Support Activity in Alabama and the 200th TAMMC for availability data, and added stocks to our supply support activities as deemed necessary. We also used their analysis to begin the process of updating our GS maintenance program.

The next area of sustaining the force that required fine tuning was forwarding freight arriving at the intermediate staging base to Bosnia. We used the model of the hub and spoke distribution system in Kaiserslautern, Germany, to design our system. We were able to get the Kaiserslautern hub to pack dedicated pallets and containers. We then created a freight forwarding area to do what the Kaiserslautern hub does but on a much smaller basis. We shipped no cargo smaller than a multipack. Our system of placing smaller boxes within a large box has withstood the test of over 100 convoys and 600 flights. This system, combined with emerging radio frequency technology, made the logistics battlefield visible to anyone with a computer and a modem.

Upon reflection, many units might have executed our Bosnia support mission, but not many are as well prepared for such a mission as the 29th Support Group. The group has a robust staff of local nationals and Army civilians who have years of experience and can resolve complex logistics problems with theater-wide implications. This staff, combined with our soldiers—both those who deployed to Hungary and those in the rear detachment in Germany—were our keys to success.

The task organization of a support group like the 29th is unique in the Army force structure and can be leveraged easily when a commander is willing to improvise and delegate. Split-based operations for the 29th Support Group were further enhanced by a robust command and control structure in the rear detachment that worked in synergy with our deployed forces. **ALOG**

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Food for Operation Jo

Logistics support of more than 20,000 soldiers and airmen deployed to Hungary, Croatia, and Bosnia in support of Operation Joint Endeavor has provided plenty of challenges for logisticians. One challenge was providing food and other subsistence items during the deployment and sustainment phases of the operation.

Developing the Plan

In late October 1995, officers from Defense Logistics Agency (DLA)-Europe, Defense Distribution Depot Europe (DDDE), and Defense Personnel Support Center Europe (DPSCE) met with representatives of the 21st Theater Army Area Command (TAACOM) in Grafenwoehr, Germany, to develop a class I (subsistence) plan for troops participating in Operation Joint Endeavor.

The TAACOM representatives presented the DLA officers with their requirements and the operational limitations known at the time. They anticipated that the majority of the deploying soldiers and airmen would be sent initially to an intermediate staging base (ISB) in Hungary, while selected units would deploy directly to the Sava River crossing point in Croatia. (The Sava River divides Croatia and Bosnia.) A small number of troops would be deployed by air directly into Bosnia.

The 21st TAACOM planners wanted to provide all deployed forces with a T-M-T ration cycle. This meant that tray-packed rations (T rations) would be served for breakfast and dinner, and meals, ready-to-eat (MRE's), would be served for lunch. In addition, fresh fruits and vegetables would supplement the T-ration meals. The planners also knew there would be a severe shortage of materials-handling equipment (MHE) and ration-handling personnel at the deployment sites.

Twenty-four hours after coming together, the DLA and TAACOM group produced a subsistence support plan. According to the plan, deploying units would be furnished with 20-foot containers of rations. The rations would be arranged in each container so the units could withdraw them for meals without having to rummage through the container. In this way, soldiers could "eat through" the containers from front to back. The containers also would be packed so no menu would be served more than once every 10 days. Until a bridge could be constructed over the Sava River, subsistence for those forces deploying directly into Bosnia would be provided by air.

The subsistence plan called for three separate container configurations—one each for breakfast and dinner T rations, and one for refrigerated fruits and vegetables. Each container would be configured with 10 pallets of T rations, each pallet containing a separate menu. Additional pallets of supplemental items such as ultra-high-temperature milk, fruit juice, cereal, and condiments would be included in the containers also. Each T-ration container would hold 20 to 22 pallets, which would be enough to feed 400 soldiers either breakfast or dinner for 10 days. A

A commercial sideloader is used to load 20-foot ratio

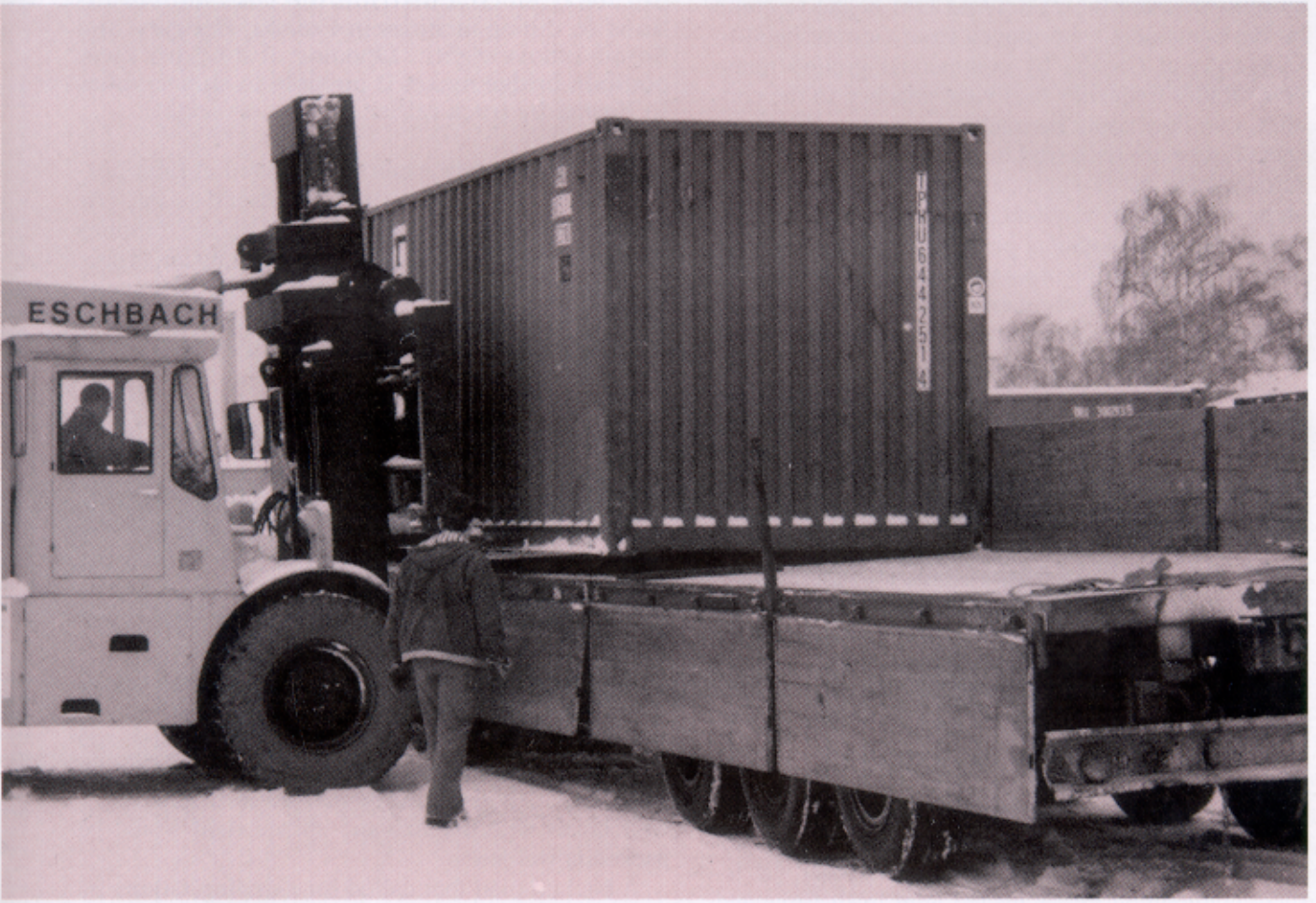
int Endeavor

by Lieutenant Colonel Anthony H. Kral and Captain Drefus Lane

dining facility that could feed 400 soldiers would be issued one breakfast container and one dinner container every 10 days. An 800-soldier dining facility would receive two of each type of container every 10 days. Issuing the containers directly to the dining facilities would greatly simplify handling at the theater, corps, and division materiel management centers. Instead of managing over 30 types of semiperishable subsistence, class I managers would have to manage only two "standard" types of T-ration containers.

U.S. Army, Europe's 20-foot, chassis-mounted, refrigerated containers would be adapted to hold enough fresh fruits and vegetables for 400 soldiers for 20 days (or 800 soldiers for 10 days). Only hardy fruits and vegetables with a shelf life of 20 days or more would be chosen for these containers. Like the T-ration containers, the containers of fresh fruits and vegetables would be issued directly to the dining facilities.

DDDE's perishable food distribution facility in Kaiserslautern was experienced in providing subsistence support by air, because it routinely provided air shipments to commissaries and troop issue support activities in the Middle East and the Azores. In addition, the Kaiserslautern facility recently had provided perishable subsistence support by air to the 3d U.S. Army, the 24th Corps Support Group, and the 1st



›n containers onto a commercial flatbed truck.

Brigade, 24th Infantry Division (Mechanized), for exercise Bright Star '95 in Egypt. Therefore, it was decided that the Kaiserslautern distribution site would configure rations on Air Force 463L pallets and move them to either Ramstein or Rhein-Main Air Base for subsequent movement to Bosnia. The number of soldiers stationed in Bosnia fluctuated, so the quantity of rations airlifted would vary according to the actual headcount.

The DDDE distribution sites held successful rehearsals of the subsistence support plan. In November 1995, the 21st TAACOM approved the concept for implementation.

Deployment Ration Support

In anticipation of the December 1995 order from President Clinton to deploy U.S. troops in support of Operation Joint Endeavor, DDDE's Germersheim, Germany, distribution facility began to configure standard 20-foot containers of breakfast and dinner T rations. MRE's, water, and health and comfort packs were also configured in 20-foot containers. As requirements from the 21st TAACOM began to come in, the containers were moved from Germersheim to Hungary and Croatia by commercial ground transport. Radio frequency tags were attached to the containers so they could be tracked en route. When the containers were delivered to the sites, they were positioned near the dining facilities so rations and supplements could be removed as needed.

During the deployment phase, the concept plan had to be modified to incorporate a different method of providing fruits and vegetables to the troops. Due to limited onsite storage facilities for perishable items, the 21st TAACOM deployed the majority of U.S. Army, Europe's 20-foot refrigerated containers directly into Hungary, Croatia, and later to Bosnia and used them to store perishables. As the number of available refrigerated containers dwindled, DDDE explored the possibility of leasing additional containers for shipping fresh fruits and vegetables. Unfortunately, they found that leasing commercial containers could cost up to $12 million. So, instead, DDDE opted for leasing commercial refrigerated trucks to ship fruits and vegetables and other perishable subsistence items. It was important to lease trucks with 20-foot refrigerated trailers so the meals could be packed according to the standard configurations already developed.

Only four of the commercial carriers contacted had trucks with 20-foot refrigerated trailers available. Nevertheless, soon after the deployment order was issued, commercial trucks loaded with fresh fruits and vegetables were moving toward Hungary and Croatia. Because there were so few trucks, they were off-

Wooden ramps (above) make loading containers with a forklift easier. Commercial trucks dispatched from DLA distribution sites deliver rations to dining facilities in Croatia, Hungary, and Bosnia (above right). Opening of the Sava River pontoon bridge makes it possible to ship supplies to Bosnia by truck rather than by air (right).

loaded immediately when they arrived at their destinations to allow quick turnaround and reuse. As planned, initial "push packages" of class I supplies for forces deployed to Bosnia were sent by air. These air shipments continued until the Sava River pontoon bridge was completed. After the ground route over the bridge was established, supplies were shipped by air only in emergencies.

Ration Support for Holiday Meals

Even before the deployment order was issued, the DDDE distribution sites were formulating plans to support the Christmas and New Year's meals. For all the Operation Joint Endeavor sites—Hungary, Croatia, and Bosnia—Christmas dinner would be the first A-ration (fresh) meal since the deployment began.

The perishable holiday food, which included several frozen and chilled items, would be moved on commercial refrigerated trucks to Hungary and Croatia, except that support to Bosnia would be by air. Frozen food would be packed in insulated triwall boxes with dry ice, and chilled food would be packed in wet ice.

A backup plan that called for shipping rations by air to Taszar airfield in Hungary was developed in case headcounts and troop densities fluctuated

greatly. The plan was put into use on 22 December 1995, when an emergency request for rations for 1,200 soldiers in the ISB in Hungary came in. The shipment of A rations arrived in Hungary on 23 December, just in time for Christmas.

Sustainment Ration Support

Except for holiday meals, deployed forces subsisted on the T-M-T ration cycle. However, as Operation Joint Endeavor transitioned from the deployment phase to the sustainment phase, so did the rations transition from T rations to A rations. Originally, the A-ration transition plan called for a private contractor or the logistics civil augmentation program (LOGCAP) contractor to distribute food directly to the individual dining facilities. The contractor would establish a local warehouse to receive and store food provided by the DDDE distribution sites in Germany and issue it to each dining facility based on an established delivery schedule. However, the commanders involved wanted to switch to A rations as soon as possible, and they decided to begin serving A rations before the contracting agencies could award the distribution contracts.

In early February, the ISB in Hungary began serving A-ration breakfasts 7 days a week and A-ration dinners 2 days a week in each of eight separate dining facilities. Without a contract for food storage and delivery in place, the DDDE distribution sites in Kaiserslautern and Germersheim were tasked to distribute the rations to the individual dining facilities. Using 40-foot dry cargo and refrigerated trailers, the Kaiserslautern and Germersheim sites distributed breakfast and dinner A rations directly to the eight dining facilities. This distribution of food from the wholesale level directly to the "foxhole" was a first for DDDE.

In late February, commanders of the units in Croatia and Bosnia decided to convert to A-ration menus also. With no contract established, the responsibility for distribution again rested with the DDDE activities in Germany. They shipped the first A rations to Bosnia in late February and scheduled subsequent deliveries for each Monday, Wednesday, and Friday. Initially, the Kaiserslautern and Germersheim sites distributed rations to six different base camps in Bosnia. However, because the division and corps support units had no means of breaking down the bulk rations, the depot shipped A rations to over 28 separate sites.

As of 1 March, the Germersheim and Kaiserslautern facilities had shipped over one million cases of semiperishable subsistence and 65,000 cases of

perishable subsistence to the deployed troops.

Observations and Lessons Learned

Providing class I support from the depot directly to the "foxhole" by the DDDE activities in Germany was not without its unique challenges and special requirements. There were also some key lessons learned.

Overall, the concept of breakfast and dinner T-ration containers worked extremely well. However, since 20-foot containers are not handled routinely at the DDDE distribution sites, it took a while to figure out the best way to load and unload them. Containers initially were positioned on flatbed trucks by a leased commercial crane, which was a slow and arduous task. Later, a commercial sideloader was leased to move the containers. Handling the containers with the sideloader was faster, and the cost of leasing it was less than the cost of leasing the commercial crane.

Personnel at the Germersheim distribution site built special ramps so pallets of rations could be loaded into the containers with a forklift. However, the wooden ramps did not hold up to continued use. After reinforcing metal plates were added, the ramps were strong enough to handle the work load without breaking down.

Based on customer feedback, additional information, such as ration type, meal type, and number of pallets, was entered on the radio frequency tags. Also, the tags were taped to the containers to prevent them from being detached prematurely.

Shipping A rations directly from the depot to individual dining facilities generated a lot of paperwork. On average, Operation Joint Endeavor documentation requirements were five to ten times greater than those associated with "normal" depot shipments. Dining facility requirements constantly changed, often up to the time delivery trucks were loaded. The DDDE distribution sites became adept at adjusting rapidly to changing requirements with minimum disruption to normal depot operations.

Ground transportation time ranged from 2 to 5 days between depot and dining facilities, so the shipments had to be highly accurate and timely. Signs indicating that the cargo was class I supplies, the truck's destination, and the required delivery date were posted in the cabs of the delivery trucks. Load diagrams were given to both the truck driver and the receiving unit. These diagrams listed the total number of pallets, customer identification information, and type of supplies on the pallets. Special placards that were clearly visible to personnel unloading the containers were placed on each pallet. Strip maps, points of contact, and a special instruction letter were given to vehicle drivers to help them pass through all the en route checkpoints or call back to the depot if necessary. Drivers were also required to notify the depot when they reached the convoy marshaling area before crossing the Sava River.

To help offload the pallets at the dining facility, commercial carriers were requested to provide a pallet jack on each of the 40-foot trailers. With the pallet jack, pallets loaded at the front of the truck could be pulled to the rear. The pallet jack fit under the last pallet loaded so it took up no extra space on the truck.

Quality control was significantly increased for Operation Joint Endeavor shipments. At Kaiserslautern, for example, each perishable shipment received a 100-percent inspection to make sure all requested items were loaded and the pallets were properly labeled before the truck pulled out.

Class I supply support for Operation Joint Endeavor has shown that the DLA community, in concert with supported services, plays a vital role in sustaining U.S. forces deployed in contingency operations. The close coordination among DLA activities, the 21st TAACOM, and customer units led to the successful support of Operation Joint Endeavor forces during the deployment phase. Continued dialogue and communication allowed for the smooth transition from operational rations to fresh A-ration meals during the sustainment phase. In the end, it is the deployed soldier who benefits from this cooperative effort. **ALOG**

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Captain Drefus Lane is the transportation officer for Defense Distribution Depot Europe in Kaiserslautern, Germany. He is a graduate of the Combined Arms and Services Staff School, the Transportation Officer Advanced Course, and the Infantry Officer Basic Course. He was previously commander of B Company, 724th Main Support Battalion, 3d Infantry Division (Mechanized), Fort Stewart, Georgia.

Ghostbusters—Then and Now by Douglas N. Watters

It was the fall of 1984, and the 1st Armored Division had just completed its level two gunnery for the year. As I drove home to Niederndorf for Christmas break, I could not help reflecting on the many long days and nights I had spent on the ranges of Grafenwoehr diagnosing problems with turret and fire control functions. My partner, Jack Calloway, an old Air Force electronics instructor and my co-worker from Rock Island Arsenal, Illinois, snored while I pondered the events of recent weeks.

I had been in Germany for about a year and a half by then, and I was painfully aware of many of the challenges the armor community was facing. Only 2 years before, I had headed one of two teams sent to Europe to train turret mechanics and crews on the then-sophisticated M60A3 main battle tank.

Jack and I had become more than co-workers: we lived only a block apart, and during the Christmas break we had many opportunities to talk about the gunnery cycle and the problems we had encountered. It was during one of these talks that we developed a program that our soldier counterparts would name "Ghostbusters." The term came from their perception that our program provided the means of getting all of the "ghosts" out of their turrets before gunnery.

Our program was very similar to the assembly line process that had dominated our past experience. The Ghostbuster line had "stations," and each station had a number of checks and adjustments, extracted from technical manuals and performed in an orderly fashion. Each station had a simple checklist with questions designed to make the tank mechanic answer with a simple "yes" or "no." Each question was accompanied by a corresponding "special instruction" to help the mechanic understand the need to make the check and the detail required for the check. The original program consisted of six stations, the final one being a quality assurance station.

We drew from many sources in developing the program. But the factor that made it an overwhelming success was that it pulled together all levels of maintenance. A certain amount of time would be set aside, normally 8 to 10 days per battalion, for executing the Ghostbusters program before gunnery. We would have the direct support (DS) van parked in the same motor pool in which we were "ghostbusting," which would expedite the repair and maintenance of those items repaired above the organizational level. Mechanics were required to answer all questions with a "yes" for each tank before it moved to another station. The end product was a fully operational tank, with the crew, organizational mechanic, and DS supporters confident that the system was as good as it could be.

As the years passed and the program grew in popularity and quality, we began applying the same logic to all systems managed by the Army Armament, Munitions, and Chemical Command. We next developed programs for the M109 howitzer system and the M1 Abrams tank—the latter just in time for the Canadian Army Trophy '87 competition. The Abrams program was used to track each of the tanks used by the 4th Battalion, 8th Cavalry, 3d Armored Division, which went on to become the first U.S. Army unit to win the trophy. In that competition, several Abrams tanks performed so well that they were able to cut a Coke can in half at 1,200 meters with their main guns. Victory was never sweeter.

The original Ghostbusters program has undergone some changes since then, including its name. It is now called the integrated maintenance program, prep for gunnery, or IMP/PFG. This program was the cornerstone for recovery from Operations Desert Shield and Desert Storm and was used to prepare units before their deployment in the Southwest Asia region.

The old cut-and-paste versions of the booklets we used have grown into official Army technical bulletins (TB's). For example, the TB for the M1A1 tank is TB 9-2350-264-50-1 and can be obtained from your local logistics assistance representative (LAR). Your LAR can help you set up your own maintenance program using the Ghostbusters method. Following this program will enable your unit to interact with all available resources dedicated to logistics support of our Army. So if you are looking for a game plan for maintaining your fleet of combat systems, whether they be tanks or helicopters, contact your LAR or call the Army Tank-automotive and Armaments Command Field Service Office at DSN 793-5312/6440 or commercial (309) 782-5312/6440. **ALOG**

Douglas N. Watters is a senior staff and technical representative for the Army Tank-automotive and Armaments Command and the Armament and Chemical Acquisition and Logistics Activity, Rock Island Arsenal, Illinois.

Bridging the Data Gap in Bosnia

by Lieutenant Colonel Carl J. Cartwright
and Major Jeffrey K. McGee

In anticipation of deployment to Bosnia for Operation Joint Endeavor, the 1st Armored Division conducted an extended series of exercises at Grafenwoehr, Germany, in October and early November 1995. The exercises preceded the actual dispatch of the augmented force, known as Task Force Eagle. Throughout the exercises, a recurrent theme was the need for electronic connectivity to transmit data.

In Germany, the 1st Armored Division had made great inroads in the use of the objective supply capability (OSC). On a more limited basis, the division had employed the exportable logistics system (ELS) in support of Task Force Able Sentry in Macedonia using commercial and Defense switched network (DSN) lines. The challenge in Bosnia would be accessing OSC and using ELS with standard field tactical communications to relay logistics information.

OSC is well known in the logistics community and enables the user to obtain a part from the nearest source of supply within the theater of operations. If the part is in the continental United States, OSC almost instantaneously establishes a requisition at the wholesale level.

ELS is a menu-driven software developed by the 5th Signal Command that allows the user to upload maintenance or requisition data and download status information through a concentrator. In effect, ELS is simply the software that allows units to upload and download electronic data to a mailbox for routing and temporary storage. ELS was successfully used for operations in Macedonia, Rwanda, and Somalia and is now being used by units throughout Germany. Clearly, both systems are useful for any type of Army field or garrison operation.

In a short-fused effort that was unusually cooperative, elements of U.S. Army, Europe's logistics automation development (LAD) directorate, the 5th Signal Command, the 1st Armored Division automation officer (G6), and the division support command (DISCOM) combat service support automation management officer conducted a series of experiments during the predeployment training at Grafenwoehr. During these experiments, the Army's standard Army maintenance information systems (STAMIS), which include the unit level logistics system-ground (ULLS-G), standard Army maintenance system (SAMS), standard Army retail supply system-interim (SARSS-I), and direct support unit standard supply system (DS4), were connected to mobile subscriber equipment. We used hardwiring, modems, and tactical terminal adapters (TTA's) to connect STAMIS to the mobile subscriber equipment. In this way, logistics data were successfully transmitted within the theater and to the wholesale system. The tests proved that we could move logistics data with existing technology and available tactical communications systems.

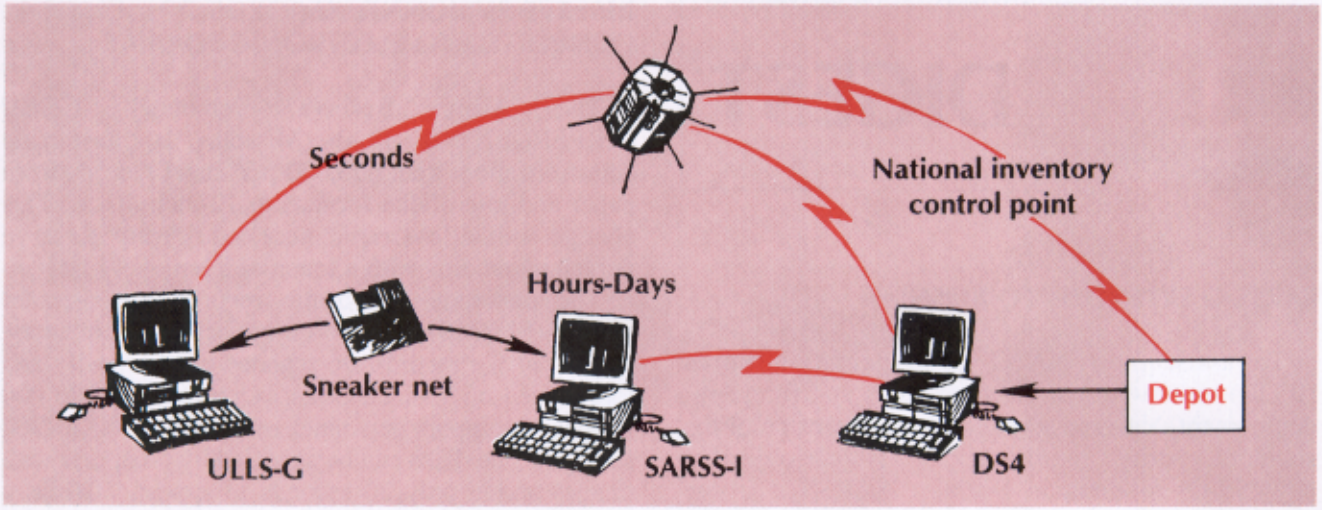
Once deployed to Bosnia, we would be able to prepare the battlefield logistically, but we anticipated difficulties with force protection and communications because of the terrain and the number of troop locations. We knew that we had to find better ways to move data than by using voice mobile subscriber equipment or by hand-carrying floppy disks, a method also known as the "sneaker net." The dusty environment of Bosnia made it difficult to maintain the integrity of data on floppy disks. In addition, road travel was often perilous because of the threat of ambush, minefields, and other hazards.

With available technology, we hoped to lower order and shipping time and increase the operational readiness of Task Force Eagle, as well as lighten the class IX (repair parts and components) load. In short, we wanted to apply velocity management and the principles of battlefield distribution in Bosnia. However, there were several major hurdles to cross.

First, we had to find a modem that would operate with all STAMIS systems. We chose a Codex model 2345 modem because of its universal applicability.

Next, we had to figure out how to encrypt logistics data for passage through the secure communications systems. We used a commercially available piece of equipment called a network encryption system to pass unclassified data through the classified networks, which provide the best environment for data transfer.

Finally, we found that the absolute maximum distance at which there was a reasonable chance of maintaining a signal strong enough to transmit data from the STAMIS to the mobile subscriber equipment small extension node (SEN) was 1,500 feet. The assets available, the distance of the STAMIS computers from the SEN, and the terrain determined whether we used hardwiring, modem, or TTA to link the STAMIS sites to the SEN.



Leveraging logistics data transmission shortens the logistics pipeline.

The real challenge was expanding logistics connectivity to all elements of the task force. Our priorities were to hook up all DS4 and SARSS-I sites, followed by SAMS and then ULLS-G computers. Of the ULLS-G sites, we would wire the combat brigades first, then the units already in the Tuzla valley of Bosnia (task force-main, task force-rear, and task force-troops).

After several unsuccessful attempts, we discovered that achieving connectivity was possible only through the cooperative and integrated efforts of the combat service support automation management officer, the division automation officer, and the brigade signal officer. Together, we formed strike teams that descended by helicopter into base camps and literally wired ULLS-G boxes from the operator's station to the SEN; from the SEN data moved through the point of presence router into the network encryption system. Data then would be transmitted from the network encryption system to satellites overhead and on to Germany. There the data would be unencrypted and patched into the DSN phone lines and on to the OSC gateway or ELS server. The strike team concept provided operators on-the-spot refresher training on how to verify passwords and script files; maintain hardware, software, and wire connections; and actually log on to OSC and ELS before leaving the site.

In a special test, the 1-1 Cavalry Air Troop at Hampton Base in northern Bosnia used their mobile subscriber radio telephone to send logistics data to OSC and ELS. Their location was so remote that they did not have SEN coverage. Fortunately, the mobile subscriber radio telephone worked, but the success rate was much lower than the air troop would have liked.

In Bosnia, Task Force Eagle proved many of the principles of cutting-edge logistics operations on the Force XXI digital battlefield. Electronic logistics connectivity works; however, it still has problems, many of them caused by mixing old and new technologies. However, tremendous technological strides have been made, and a generation of soldiers now knows a different type of logistics. The Army must continue to upgrade its total asset visibility systems—both hardware and software—to better serve its customer units in the field through improved battlefield distribution and velocity management. With an investment in technology, such as the latest version of ULLS-G, we can eliminate the "sneaker net" on the battlefield. ALOG

Lieutenant Colonel Carl J. Cartwright is the division materiel management officer for the 1st Armored Division in Bosnia. He has a bachelor's degree in biology from State University of New York at Albany and a master's degree in logistics management from the Florida Institute of Technology at Melbourne. He is a graduate of the Ordnance Officer Basic and Advanced Courses, the Army Command and General Staff College, and the Army Logistics Management College's Logistics Executive Development Course.

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ALOG LOG NOTES

Army Logistician Is in a New Home

After residing at 12301 A Avenue on Fort Lee, Virginia, for almost 10 years, *Army Logistician* has moved to new quarters. We're now in Bunker Hall, the headquarters and principal academic building of the Army Logistics Management College. Along with the new editorial offices came new phone numbers, fax number, and e-mail and regular mail addresses. We want to be sure that you—our readers, contributors, and correspondents—can keep in touch with us, so please note the changes that follow (or just copy this page for your personal address book). The mailing address is—EDITOR ARMY LOGISTICIAN, ALMC SUITE C300, 2401 QUARTERS ROAD, FT LEE VA 23801-1705. Our new number is **804-765+extension** or **DSN 539+extension.** Thus, our FAX number is **804-765-4463** or **DSN 539-4463.** Phone extensions and e-mail addresses for each of us on the staff are—

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We always look forward to hearing from you, so call, fax, e-mail, or write us.

–Editor

Is Hercules Aptly Named?

The name "Hercules" evokes visions of strength. Having read your article, "Hercules Unchained: The Improved Recovery Vehicle" [November-December 1995 issue], and Sergeant Bridgman's response in your May-June "Log Notes," I wonder if "Hercules" is an appropriate name. Once again the powers that be, without getting input from the users, field a recovery vehicle that will lag behind the equipment it's designed to support. I spent 11 years as a 63H tracked vehicle repairman and have some experience in operating and supporting this vehicle.

One morning during an alert, while deployed in the Persian Gulf, we watched the Bradleys and the Abrams moving out in front while the M88's and AVLB's [armored-vehicle launched bridges] brought up the rear. The two dinosaurs chugged along, sending black plumes of smoke skyward. It was humorous at that moment, but it made a point. Our "warfighters" will be racing to engage the enemy while their recovery vehicles drudgingly will try to catch up.

From my mechanic's background, if I'm to tow something, I want a tow vehicle with the same or more power than the vehicle I'm towing. Doctrine now states that when an M1 or the heavier M1A1 is towed, two M88's will be used—one to tow, the other to brake.

We've modernized the armor folks by giving them the best tank in the world; modernized the infantry by giving them the best battlefield taxi in the world; modernized the artillery by giving them a new ammunition carrier and soon, coming to a battery near you, is a new howitzer. The armor folks also have a new bridge launcher based on the M1 chassis in the works. Yet, we leave our recovery folks in the dark ages with only a slightly better dinosaur.

With Hercules, armor units and their direct support units have to stock repair parts for two systems and PLL [prescribed load list] clerks have to track parts for two systems. Wouldn't it make more sense for armor units to stock only one kind of track pads, road wheels, and other repair parts? Soldier maintenance training would be simpler, too, by having to learn only one system. One would think common sense would dictate basing a recovery vehicle on the same chassis as the vehicle it is designed to support.

Christopher L. Cullen
Fort Drum, NY

Single Stock Fund

The "Single Stock Fund Decision Made" story in the July-August Digest column of *Army Logistician* caused some of us in the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), U.S. Army, Pacific, to question the validity of some of the statements.

First, it must be understood that the single stock fund (SSF) initiative is highly controversial because of major differences in the two primary alternatives. The first alternative, proposed by the Logistics Integration Agency and the Army Materiel Command (AMC), would extend wholesale financial ownership and item management down to the corps' and theater army area commands' materiel management centers and installation-level directorates of logistics. The second alternative, proposed by the U.S. Forces Command, would handle financial ownership as described in the first alternative, but item management would be retained by retail activities using the standard Army retail supply system-objective (SARSS-O). In other words, it is a question of "centralized" versus "decentralized" item management.

The original concept described in your May-June 1991 article, "Primer on the Single Stock Fund," and restated in your current story, embraced the concept of centralized asset management. After getting the results of a proof-of-principle conducted at Fort Hood, Texas, General Wilson, who was then the Army DCSLOG, requested that the SSF initiative be "relooked" to determine if it should be continued and, if so, in what form. A council of colonels (COC) was formed, headed by the DCSLOG's

chief of the secondary items division of the Resource Management Directorate, to conduct the review. Last February, the COC met, discussed the alternatives, and overwhelmingly voted the FORSCOM alternative as their preference. The DCSLOG later approved the second alternative for continued development and assigned AMC as the Army's executive agent.

The statement in your story, "The SSF, also called centralized asset management. . ." was true before the latest decision approved the decentralized asset management concept. Your story also failed to state that AMC has been assigned to develop and implement SSF, based on the FORSCOM alternative. Program management will operate through a corporate board structure, comprised of members in grades O6 and GS-15, representing major commands, AMC, and Department of the Army. The overall picture your story should have told is that wholesale and retail management of Army items will be centralized at AMC, but item management will remain decentralized.

George Lampros, Jr.
Fort Shafter, HI

Gee, Mr. Lampros, we kinda thought that was what our story said, but maybe we weren't as explicit in our explanation as we should have been. Let us offer a very minor defense: our story was reviewed and approved by subject matter specialists before it was published. Sorry if we misled anyone or confused the issue. –Ed.

Detect Contamination?

I'm writing in reference to the article, "Mortuary Affairs in the Theater," by Major James Bates that was in your July-August issue. Major Bates wrote, "If chemical and biological agent monitors indicate contamination, the search and recovery tags and personal effects bags must be annotated with the letters CHEM or BIO."

The fact is there is nothing in the Army inventory that can monitor any object for biological contamination. Only the biological integrated detection system can monitor for biological agents, and it detects only a biological cloud.

Can you correct this in the next issue of *Army Logistician*? Some commanders may waste precious time trying to find a biological agent monitor for their search and recovery team.

SGT Randall S. Pike
Fort McClellan, AL

Because of our printing schedule we couldn't print your letter in our "next (September-October) issue," Sergeant Pike; but here is the clarification you asked for. Major Bates is on an oversea assignment, so we asked Tom Bourlier, the Army's recognized subject matter expert in this area and the director of the Mortuary Affairs Center, Fort Lee, Virginia, to comment. Here is his response. –Ed.

Sergeant Pike is correct. There are no biological detectors at the present time. The technology for such a detector is, even now, being worked on.

Detection of biological agents, as mentioned in the *Joint Tactics, Techniques, and Procedures* publication, was not intended to mean that we are using detectors. Detection of biological agents takes place in medical channels. Since personnel do not immediately die of biological contamination, they will be in medical channels when they succumb. When remains are transferred to the mortuary affairs collection point, medical personnel will state what the contamination is. I hope this will help Sergeant Pike.

Tom Bourlier
Fort Lee, VA

Common Tool Control Problem

Staff Sergeant Kenneth Abrahamson's letter in your July-August Log Notes hit home. Guard units are not the only ones who struggle through unnecessary, bureaucratic, time-consuming, non-value-added exercises in tool control. It is a common problem that should have been fixed years ago.

I suspect some log person somewhere in the bowels of the Department of Defense created this monster so organizations that have been reduced in strength by more than 55 percent will have still more things to do.

Hello, out there in logistics-land! Is anyone listening to people in the field? Sergeant Abrahamson's four-point tool replacement process should be adopted without discussion because he makes sense of a system that is totally out of control.

If you want to operate a business, which is what everyone from the President down to people at the lowest level of Government say they want, then this would be a very good first step.

My hat is off to the "green suit" side of the force, both active and guard people. They are doing one heck of a job in the face of formidable odds. Job well done!

Curt Robinson
Holloman Air Force Base, NM

Log Notes is your column—a way for you to share your thoughts and ideas on a variety of logistics subjects. You may want to comment on articles we have published, take issue with something we've published or with something happening in the logistics arena, or just share a creative, innovative idea on a better way to do things. Your "note to the editor" is welcomed and offers valuable feedback. Your log note will be edited only to meet style and space constraints. All log notes must be signed and include a return address; but if you request, your name will not be published. Mail log notes to EDITOR ARMY LOGISTICIAN, ALMC SUITE C300, 2401 QUARTERS ROAD, FT LEE VA 23801-1705; send them by FAX to 804-765-4463 or DSN 539-4463; or e-mail them to speightt@lee-dns1.army.mil.