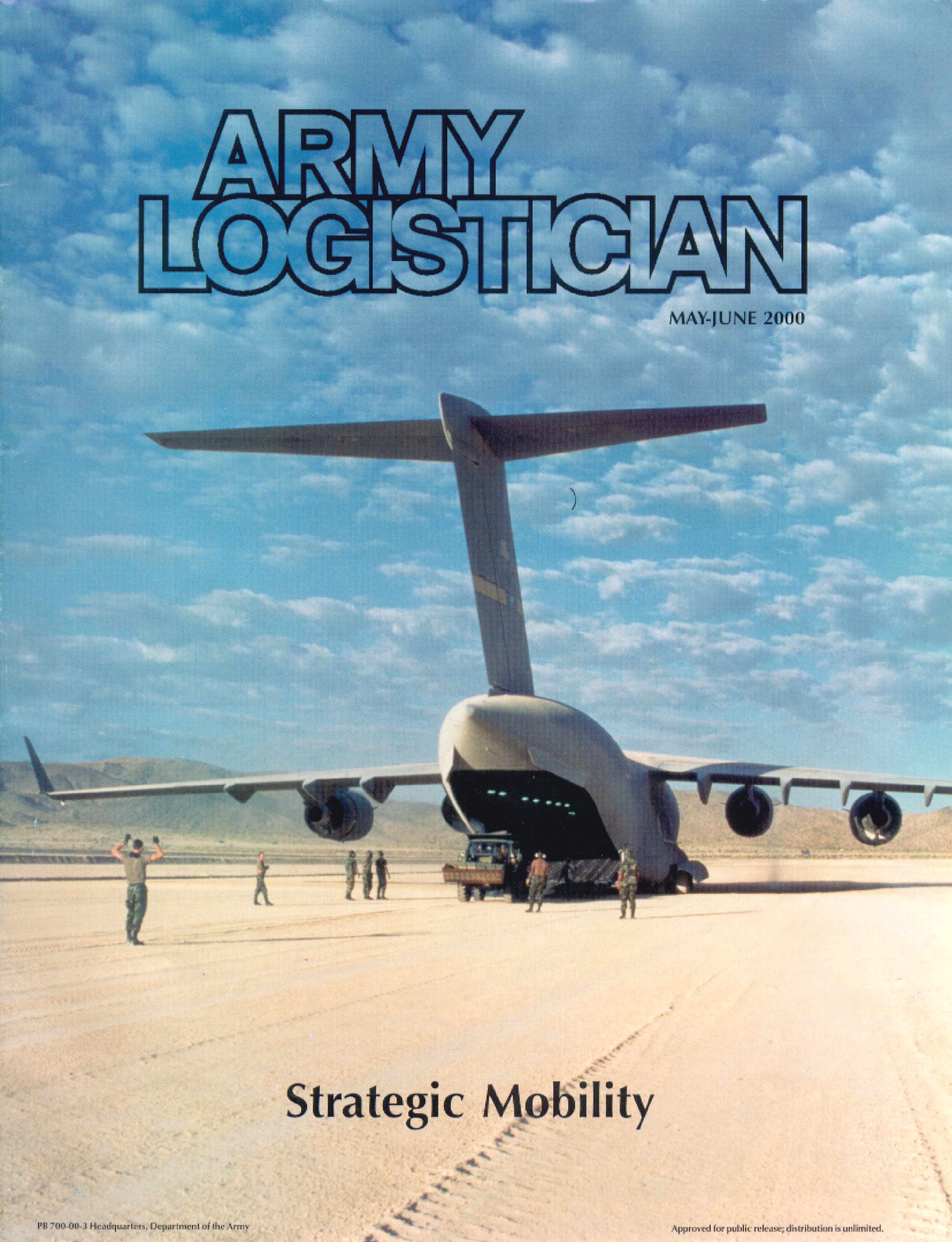
ARMY LOGISTICIAN

MAY-JUNE 2000



Strategic Mobility

PB 700-00-3 Headquarters, Department of the Army

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ARTICLES

DEPARTMENTS

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

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COVER

The C–17 Globemaster III will be the Army's choice for strategic airlift in the future. The article beginning on page 7 explains how alternative tankrack designs not only would boost the strategic mobility of the tankracks themselves but also would enhance the strategic mobility of the C–17 aircraft, combat pre-positioning ships, and strategic sealift ships.

Coming in Future Issues—

- Alternatives to the Soldier Canteen
- The Quest for Deployment
- Multifunctional Communication on the Future Battlefield
- Developing a Joint Medical Asset Repository
- Logistics, Saratoga, and 'Gentleman Johnny'
- Planning for a Successful Theater Support Command
- Supporting the National Training Center
- The 'Life of Type' Model
- Army Pre-positioned Stocks Afloat
- AOAP–Powerful Maintenance and Environmental Tool
- Logistics Rail Locks in Airdrop
- Most Decorated Ammunition Company in Vietnam
- Combined Rear Area Operations in the Korean Theater

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ALOG NEWS

BUDGET REQUEST FUNDS ARMY VISION

Funding to achieve the Army Vision highlights the Army budget proposed for fiscal year (FY) 2001. The budget "begins the process of transforming the Army into a force that is strategically responsive and dominant at every point on the spectrum of operations," which is the objective of the Army Vision announced by Chief of Staff General Eric K. Shinseki last October. By realizing the Army Vision, the Army will become an "objective force," in which distinctions between heavy and light units are minimal and all divisions are "full spectrum capable." The objective force will be "responsive, deployable, agile, versatile, lethal, survivable, and sustainable." The transformed Army will be able to deploy a combat-ready brigade in 96 hours, a division in 120 hours, and five divisions in 30 days.

The budget begins the transformation process by providing funds for—

- Stand-up of the first two brigade combat teams at Fort Lewis, Washington. (See article on page 52.)
- Initial fielding of the interim armored vehicle (IAV). The IAV will be a "common baseline" system of the brigade combat teams. It is expected to be a modification of one or more medium-based platforms (between heavy and light) in use or under development.
- Accelerated research and development of the Future Combat System (FCS). The FCS "is envisioned to be an ensemble of manned and potentially unmanned combat systems" designed to provide the technological capabilities needed by the objective force.

In all, the Army's budget requests $70.765 billion in total obligation authority for FY 2001, an increase of $3.4 billion over last year's request and $755 million over what Congress appropriated. The $70.765 billion figure does not include an additional $2.7 billion the Army is seeking to defray the costs of contingency operations such as Bosnia and Kosovo.

Total spending for military personnel will be $28.380 billion; operation and maintenance, $23.827 billion; procurement, $9.421 billion; research, development, test, and evaluation, $5.260 billion; military construction, $1.039 billion; family housing, $1.140 billion; environmental restoration, $390 million; chemical demilitarization, $1.004 billion; and base realignment and closure activities, $303 million.

The budget will maintain the Army's current personnel strength of 480,000 soldiers in the Active Army, 350,000 in the Army National Guard, and 205,000 in the Army Reserve. However, the Army wants to reduce its civilian personnel by 2,000, to 216,000 (down 1.2 percent). By the end of FY 2001, the Army will have reduced its personnel strength, compared to FY 1989, by 38 percent in the Active Army, 23 percent in the Army National Guard, 36 percent in the Army Reserve, and 47 percent in the civilian work force.

The operation and maintenance budget will support an operating tempo of 800 home-station training miles per year for M1 Abrams tank crews and 14.5 flying hours per month for active-duty aircrews (9.2 hours for National Guard and 9 hours for Army Reserve crews). It also will support 10 brigade rotations for both the National Training Center at Fort Irwin, California, and the Joint Readiness Training Center at Fort Polk, Louisiana (9 active component brigades each), and training through the Battle Command Training Program for 5 division command and staff groups and 2 corps Warfighter exercises.

Progress will continue toward completing the Army Afloat Pre-positioned Ships Program in FY 2002. The Army's goal for this program is 15 ships, 8 of which will be large, medium-speed, roll-on-roll-off vessels.

The budget also will permit the Army to improve the Abrams tank through three initiatives: an engine improvement program that will reduce Abrams fuel consumption by approximately 30 percent; a total vehicle refurbishment program that should reduce operating and support costs by 18 percent; and a program to reduce parts obsolescence by replacing old analog parts with a new digital system.

The Army will continue to upgrade the CH–47 Chinook heavy-lift helicopter to the "F" variant and the UH–60 Black Hawk utility helicopter to the "L+" variant, which should extend the useful life of both systems by 20 years.

The budget seeks procurement of 1,002 high-mobility, multipurpose, wheeled vehicles (HMMWV's); 2,577 trucks in the family of medium tactical vehicles; and

(News continued on page 48)

NEWS

(News continued from page 1)

404 trucks in the family of heavy tactical vehicles. A program to give each heavy, expanded-mobility, tactical truck (HEMTT) an improved engine, antilock brakes, and a load-handling system will reduce operating and support costs and improve fleet readiness.

New logistics initiatives in the budget will support the Army's transition to the Single Stock Fund and testing and fielding of the Global Combat Support System-Army (GCSS-Army).

The budget projects that Army forces will purchase $6.7 billion in fuel, repair parts, consumable supplies, depot maintenance services, ammunition, and information services from Army Working Capital Fund (AWCF) activities. Of the four AWCF activity groups, the budget forecasts that customer rates, compared to last year, will decline 4.2 percent for supply management; increase 7.1 percent for depot maintenance; increase 3.6 percent for ordnance; and decrease 26.5 percent for information services.

LOGISTICIANS EXPLORE WAYS TO REDUCE CSS 'TAIL'

Inspired by Army Chief of Staff General Eric K. Shinseki's call for transformation of the Army issued last October with the new Army Vision, Army logisticians continue to seek ways to reduce the combat support and combat service support (CSS) "tail" that supports its fighting forces' "teeth."

According to Lieutenant Colonel Ray Mason, special assistant to the Deputy Chief of Staff for Logistics and action officer for the logistics component of the Army transformation, logistics transformation is a critical enabler of the Army Vision, and the logistics community will continue to adjust its capabilities and efforts as its mission evolves. "For example, we want to maximize on the battlefield the number of logistics vehicles that have their own organic upload and download capability, reducing the need for forklift, cranes, etc. The system that meets that need is the palletized loading system . . . originally designed for ammunition units. In the past few years, we expanded its use beyond ammo units and we expect an even further expansion under transformation."

One means of accomplishing this is commonality among units. "If you have common-designed units, then you know exactly what you're deploying," observed Mason. "You can pre-build and stage strategic and combat-configured loads—like food, ammunition, [and] barrier material—before they're needed and pre-position them at the right places in the world."

The Army already depends heavily on commercial firms to meet its requirements. For example, the initial brigades being formed this year will use off-the-shelf vehicles that are already available. The aim is to increase speed and ease of deployment and resupply and decrease the assets, both in personnel and equipment, that it takes to do the job effectively.

The concept of split-based operations supports the goal of having only the required number of people and equipment forward. Logistics units can deploy fewer soldiers and less equipment and still effectively complete their mission by relying on satellite communications and air and sea lines of communication.

Army logisticians also are working with industry to adapt shipping containers to meet both parties' needs. While the initial force in a contingency will move by air, 90 percent will follow by sea, according to Mason. The 40-foot container is the standard for the shipping industry. However, it is big and heavy and requires significant materials-handling equipment to move. To overcome this logistics challenge, two 20-foot containers can be linked to meet the shipping standard and unlinked once they are in theater. Then they can be moved around separately by the palletized loading system.

Another example is fielding weapon systems with embedded prognostics and diagnostics that identify potential faults before the systems break and indicate exactly what is wrong when they do break. The result would be smaller repair part stocks and fewer mechanics.

Army logisticians also are making improvements to the Time-Phased Force Deployment Data System. Better descriptions of exactly what assets a unit possesses, both in personnel and equipment, help commanders build the task organization that will deploy. A program called ORG–ID identifies units below the battalion or company level. "This will allow rapid and accurate deployment team-building," Mason said.

According to Mason, "The intermediate staging base of past deployments may become the intermediate support base [ISB] in the future, where applicable." It will be an area somewhere in the theater of operations but out of direct-fire range where stocks can be built up without having to be moved constantly as the battle campaign progresses and where theater or general support medical, maintenance, supply, and administrative functions can be performed. "We're already working with the joint staff and the CINC's [commanders in chief] to identify ISB's throughout the world," he said. The goal is to be able to bring an ISB up to operating capability quickly in case of a contingency or major theater war.

Another goal for the future is a web-based system where users drop requisitions onto a web page and the provider pulls down requests and processes them, all in real time. "The capability is already out there in the Internet world, it's just a matter of adapting it to our needs and our deployment requirements and, of course, our unique security requirements, but all that's doable," Mason said.

DSCR EXPANDS CUSTOMER SERVICE OPTIONS

One of the newest services offered to units in the field by Defense Supply Center Richmond (DSCR), Virginia, is the Web-based Customer Account Tracking System (WebCATS). WebCATS is an automated logistics tool that offers current supply information such as requisition status, shipping data, stocks on hand, latest contract shipments, and weapon systems data.

WebCATS can be accessed on the World Wide Web via the DSCR home page at http:// www.dscr.dla.mil. It is listed as a frequently visited site on the main page and also as an option under "Customer Information." A password is required to use the system, and instructions for obtaining one are included on the WebCATS home page.

Data in the system can be viewed by weapon system, national stock number, or requisition number. Information from DSCR, DSC Philadelphia, DSC Columbus, and the Naval Inventory Control Point is consolidated into single point-and-click queries, so users no longer need to access individual systems to obtain the latest information.

Questions or comments about WebCATS should be sent by e-mail to tfisher@dscr.dla.mil.

FORCE PROVIDER UNITS DESIGNATED

The Army has designated five Quartermaster companies as special Force Provider units. These units will be charged with erecting and operating the improved version of the Army's containerized, deployable tent city known as the Force Provider.

A pre-positioned tent city was erected at the Joint Readiness Training Center at Fort Polk, Louisiana, last November and will be used as a test bed for examining and evaluating life support system technology.

The 488th Quartermaster Company (Force Provider), formerly of Fort Bragg, North Carolina, operates the Fort Polk module. The 488th is the only Active Army unit designated to run the modular tent cities. The other four Quartermaster Companies (Force Provider) are in the Army Reserve and are scheduled to train at Fort Polk later this year. They are the 216th in Mankato, Minnesota; the 542d in Erie, Pennsylvania; the 691st in Los Alamitos, California; and the 802d in Columbus, Georgia. At full strength, each Force Provider company will be able to organize into up to six platoons, each of which can operate one Force Provider module.

"The idea is for the 488th to become the experts and train other units when they come here," said Captain Mark Evans, the company's commander. Until then, DynCorp contractors have been hired to help train the Quartermaster companies and to provide site management for the Fort Polk Force Provider.

The Fort Polk module has several upgrades over the other 22 Force Provider packages pre-positioned afloat and in warehouses, according to Jack Hardwick, the DynCorp site manager. The Force Provider tents are air-conditioned in the summer and heated in the winter. The deployable tent city offers laundry, chapel, and recreation tents and gleaming, modern kitchens, showers, and latrines. The recreation tent has a 52-inch television with VCR, a satellite dish, ping pong tables, and a weight room. The Product Manager for Force Provider has been tasked to build and assemble a total of 36 such modules by 2003.

In the past, Force Provider modules have been used to house troops in Haiti, Macedonia, Bosnia, Hungary, and Grand Turk Island. They also were used at the Guantanamo Bay Naval Base in Cuba for refugee operations.

TOOLS FOR MATERIEL RELEASE TRACKING AND TOTAL PACKAGE FIELDING ON LINE

The Army Materiel Command (AMC) and the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), Department of the Army, are developing two web-based tools that will provide visibility of the materiel release (MR) process and the requirements for total package fielding (TPF).

The Materiel Release Tracking System (MRTS), scheduled to be operational on 1 April, provides each gaining command real-time status of weapon systems to be fielded, the type of release (full, conditional, urgent, training, or temporary hand receipt), any conditions that prevent a full release, and interim solutions for each condition. The MRTS gives the gaining command a greater role in the MR process and increases communication with the fielding and materiel support commands. As a result, the gaining command will have time to plan for the arrival of systems and to prepare for and approve interim solutions to conditions that could prevent a full release.

The MRTS is available on the World Wide Web at http://aeps.ria.army.mil. Data entry into the MRTS will begin after assignment of developmental line item numbers. With the MRTS, AMC and ODCSLOG will have oversight of all MR activity and will be able to track the progress of conditional releases until full release is granted.

The TPF website, also to be located at http://aeps.ria.army.mil, is targeted to be fully operational by the first quarter of fiscal year 2001. It will supplement the efforts of the fielding and gaining commands to develop and provide cost-effective, efficient, and thorough TPF information. The website will contain materiel fielding plans, mission support plans, memoranda of notification, and other fielding documents. It will provide gaining commands greater visibility of system fielding schedules and associated documentation and allow greater lead times for planning and budgeting purposes. Data contained in the TPF website will be linked to the MRTS, and data entry into the TPF website will be a prerequisite for MR approval.

For more information on MR, call (703) 617–3171 or DSN 767–3171, or send an e-mail to sgeorge@hqda.army.mil. To reach the TPF point of contact, call (703) 617–9299 or DSN 767–9299, or send an e-mail to jscott@hqamc.army.mil. The ODCSLOG POC can be contacted at (703) 614–7053 or DSN 224–7053 or by e-mail at larry.hill@ hqda.army.mil.

SMART CARD WILL REPLACE TRADITIONAL ID CARDS

Deputy Secretary of Defense John J. Hamre has authorized the use of smart card technology in identification (ID) cards for all active-duty military, Selected Reserve, Department of Defense civilian, and eligible contractor personnel. The new ID card will be known as the common access card (CAC).

The CAC will have an electronic chip, a magnetic strip, and a bar code. It will hold personal information on the bearer such as inoculations, medical and dental records, and financial allotments and will be the principal card used to provide physical access to secure buildings, controlled areas, and computer systems.

Using the CAC will shorten processing time for soldiers and reduce the time they spend waiting in line for everything from dining facility headcounts to deployment readiness processing. The card will be programmed by the services to meet their specific needs.

The Navy has been designated as the lead agency for the $145-million program. Implementation will begin in 2000 with development of software and purchase of equipment. Installation of the hardware and software at 875 ID card sites will begin in 2001. The program should be in place by 2005.

C–17'S MODIFIED TO MEET ARMY AIRDROP REQUIREMENTS

The Air Force Air Mobility Command's (AMC's) C–17 Globemaster transporters soon will be able to meet the Army's goal of airdropping a brigade's worth of troops and equipment within 30 minutes. The requirement, called strategic brigade airdrop (SBA), currently is met by a mixed fleet of C–141 Starlifters and C–17's. The C–141 is retiring from service soon, so the C–17 must be able to meet all of the Army's SBA requirement.

An Army brigade, which contains about 3,250 soldiers and 3,450 tons of equipment, is airdropped and airlanded in two phases. During the first phase, aircraft must be able to drop roughly 2,500 troops and 1,350 tons of equipment within a limited amount of time. During the second phase of the operation, the remaining 750 personnel and 2,100 tons of equipment are delivered to a landing zone. Without the initiatives currently underway, it would take a C–17 SBA formation about 25 minutes longer than the Army's requirement for the airdrop.

Several initiatives are underway to equip the C–17's to meet the SBA requirement: reducing spacing between aircraft in flight during personnel airdrops, installing dual-row airdrop capability aboard C–17's, and incorporating equipment that will enable the aircraft to fly in tighter formations during inclement weather.

Only 12,000 feet were required between lead aircraft when airdropping personnel with the C–141. However, because of the vortices created by the C–17, a space of 40,000 feet between aircraft currently is required to ensure jumper safety. Using computer models, AMC began testing with 15,000 feet of spacing between aircraft and gradually increased the spacing to 32,000 feet. Before progressing to using real paratroopers, AMC dropped 712 mannequins with aircraft spaced 32,000 feet apart to ensure that interval was safe. Then 60 test jumpers, followed by 302 paratroopers from the Army's 82d Airborne Division at Fort Bragg, North Carolina, were airdropped to complete the testing. All test events were completed successfully and safely. "We feel that the risk hasn't increased by moving the aircraft from 40,000 feet apart to 32,000 feet apart, and it meets the Army's pass time requirements," said Air Force Major David Kasberg, chief of C–17 tactics.

More time is shaved off the airdrop time by installing dual logistics rails that allow two rows of equipment to be airdropped from the C–17, doubling its capacity and cutting in half the number of C–17's required to airdrop the heavy equipment portion of the SBA. "Right now, the airplanes rolling off the assembly line have dual-row capability, and we will have enough dual-row air-

planes by July to meet the Army's SBA requirement," Kasberg said.

Currently, station-keeping equipment (SKE) uses radio wave frequencies (channels) to enable aircraft to fly in formation during inclement weather. A new version of this equipment called SKE follow-on will permit C–17's to fly in poor weather while reducing the amount of space needed between aircraft. The SKE follow-on is expected to be installed in C–17's by the fourth quarter of fiscal year 2004.

CONTRACT SAVES MONEY AND THE ENVIRONMENT

A new long-term, tailored contract to supply the military and Federal agencies with ethyl ether not only will save money but also will protect the environment. The "win-win" contract is a customer support initiative between the Defense Supply Center Columbus (DSCC), Ohio, and Quick Start Products of Rochelle, Illinois.

Ethyl ether is used to quick-start diesel-powered vehicles in cold weather. Containers of ethyl ether (national stock number 2910–00–646–9727) are used by the military and Federal agencies to quick-start everything from diesel-powered tanks and combat vehicles to trucks and bulldozers. In the past, an 18-ounce canister of ethyl ether could cost as much as $8.11 (depending on locality). Since ethyl ether is a flammable and hazardous material, disposal costs ranged anywhere from $106 to $242 for each empty canister.

Under the new contract, the cost of an 18-ounce canister of ethyl ether is reduced to as low as $6.25. Instead of merely providing the product, the contractor now is required to dispose of empty canisters in accordance with applicable regulations. The only cost incurred by the customer is in shipping the empty cylinders back to the supplier. Cost savings are estimated to be $1.28 million annually.

"We decided it was up to DSCC to alleviate our customer of this excess cost as a customer support initiative," said John J. Jones, of the Hazardous Material Minimization Program of the Standardization Management Team in DSCC's Operations Support Group. "So we formed a team with members from the Land-Based Weapon Systems Group, Procurement; and the Defense Logistics Agency Office of Counsel, Columbus Region, to work the problem."

The result of the team effort was a long-term contract written with a tailored support agreement, the first of its kind at DSCC. "This was all due to DSCC's partnering efforts with the military customer and the manufacturer," added Jones.

DOD MAY ADD DIGITAL DOG TAGS

Department of Defense (DOD) officials are considering requiring service members to wear plastic memory cards that contain digitized medical information. Called personal information carriers, or PIC's, the cards would be worn in addition to the traditional metal identification tags. They would serve as electronic theater medical records in settings where computer network connectivity is unavailable. Using laptop computers, theater healthcare providers could scan the PIC's to obtain accurate clinical information immediately and update service members' permanent records in the field.

DOD recently awarded a contract to Informatech, Inc., of Frederick, Maryland, to produce a small quantity of the digital tags. The tags will be demonstrated in simulated operational environments in the next few months. The contract includes options for a total of approximately 2 million tags over the next 5 years.

DOD has not yet decided to employ the high-capacity PIC, however. Officials are studying the digital smart cards already developed to carry various types of personal information in secure electronic form to see if they also can accommodate medical information. The traditional metal tags would continue to serve as the primary means of identification on the battlefield.

If DOD does decide to field the PIC, the early versions will hold only text-based data. Eventually, as data capacity increases and costs per device decrease, they also may hold X-ray, electrocardiogram, and magnetic resonance imaging results and other multimedia data.

While the PIC project is part of the mission of the Composite Health Care System II (CHCS II) Program Office, the actual PIC device will be part of the Theater Medical Information Program (TMIP), a computerized system designed to track healthcare services delivered to service members while they are deployed during a military operation. Along with some other automated information systems, CHCS II and TMIP are a result of lessons learned following the Gulf War. Defense officials found that medical services performed in the field were not always recorded in service members' permanent medical records. A 1998 Presidential report on Gulf War illness directed DOD to develop a force health protection program and maintain consistent, continuous records.

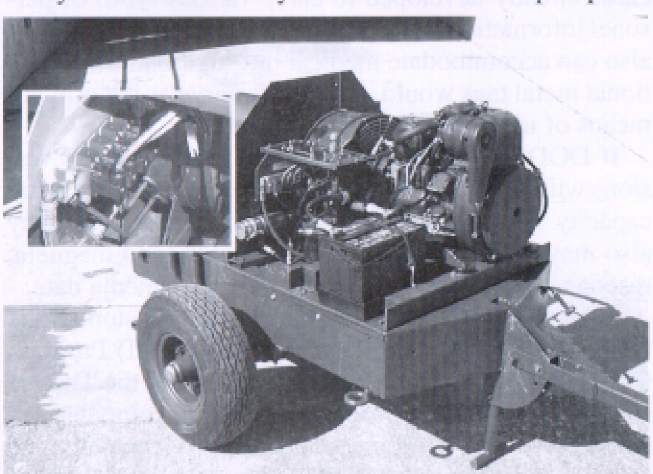
HEATER RETROFIT KIT SAVES MONEY AND MAKES HEATERS SAFER

The Defense Logistics Agency now has a new retrofit kit (national stock number 2910–01–464–9880, part number 401230) that can improve the performance of the 400,000-BTU H–1 heater. In winter, the Army and Air Force rely heavily on heating equipment such as the H–1 portable, diesel-fueled, general-purpose heater to warm facilities such as mobile hospitals and maintenance shops and to heat aircraft while they are being repaired.

"We were beginning to receive reports of heaters down, shortages of spare parts, and escalating prices," said Walt Myers of the Defense Supply Center Columbus, Ohio. One of the major problems was that the heater's three fuel regulator valves—an old design used on refrigeration units—had become obsolete.

The remedy is a new retrofit kit that replaces all three of the heaters' fuel system valves with one state-of-the-art, completely electronic valve. With the retrofit kits installed, the H–1 heaters are more reliable, start quicker, and warm up and cool down gradually. The $1,599 kit replaces three valves that cost $700 each, so retrofit also results in a substantial cost savings.

The retrofit kit adds a new safety device—a flame failure protection sensor—that determines when there is a heat loss or no flame, so the heater can shut down the system automatically and turn off the fuel pump.



☐ DLA's new retrofit kit replaces all three of the H–1 general purpose heater's fuel system valves with one state-of-the-art, completely electronic fuel system valve (inset).

For more information about the heater retrofit kits, call (614) 692–4243 or DSN 850–4243 or send an e-mail to Walter_Myers@dscc.dla.mil.

FIRST BRIGADE COMBAT TEAMS TAKING SHAPE

The Army continues to refine the composition of its new brigade combat teams (BCT's)—the lighter, more mobile units that will be capable of deploying anywhere in the world within 96 hours.

The 3d Brigade, 2d Infantry Division, and the 1st Brigade, 25th Infantry Division (Light), both I Corps units based at Fort Lewis, Washington, were designated last November as the first two brigades to make the transition to BCT.

Each BCT will be staffed with approximately 3,700 soldiers—700 fewer than currently are serving in each brigade—most of whom will serve in three mechanized infantry battalions and a reconnaissance intelligence, surveillance, and target acquisition squadron. These units will contain 75 percent of the BCT's personnel. Although the new units will have fewer soldiers and a different look, Army leaders feel they still will be capable of participating in major theater wars and quickly providing regional stability to hot spots throughout the world, including those in urban terrain.

Plans call for M2/3 Bradley fighting vehicles and M1A1 Abrams main battle tanks to be traded for a lighter, more mobile gun system, known as the Future Combat System, that can be loaded on a C–130 Hercules transport. Soldiers at Fort Knox, Kentucky, are in the process of testing vehicles that may serve as the "interim armored vehicle" for the brigades. Computers installed in these vehicles will allow real-time communication of information, such as the location of minefields, enemy positions, or other obstacles. For example, soldiers will be able to take a picture of a damaged road and upload the image into the brigade's intranet. In minutes, other units in the brigade can begin to determine alternative routes while engineers plan road reconstruction.

ALMC OFFERS INTERNET VERSION OF BASIC REUTILIZATION COURSE

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

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

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

NEW WEBSITE HELPS FAMILIES ON THE MOVE

The Department of Defense (DOD) has a financial planning tool to help active-duty service members prepare for their next move, whether they are moving across town, around the world, or back to civilian life. Military Acclimate, on the Internet at http://www.militaryacclimate.com, projects moving expenses and forecasts the cost of living at a new station.

The website offers information on 225 military bases in the continental United States and 75 overseas locations. Military Acclimate helps estimate the cost of a move based on personal requirements and military allowances. It also compares a service member's current financial standard of living to that of communities in and around the new duty station. The website then provides a "best-fit analysis" that lists important neighborhood demographics, along with a ranking of the communities around a selected military installation.

Military Acclimate also provides links to other DOD websites, such as the Standard Installation Topic Exchange Service (SITES) (http://www.dmdc.osd.mil/sites), that feature specific information on the military community at a selected site. Together, these two sites provide a wealth of information on military housing, child care, and other base facilities and services.

LOGISTICS CONFERENCE SET

The International Society of Logistics (SOLE) will hold its 35th Annual International Logistics Conference and Exhibition (SOLE 2000) 8 to 10 August at the Sheraton New Orleans, Louisiana. The theme for this year's conference is "Logistics: Cornerstone for the Future." Additional information and on-line registration are available through the SOLE home page, http://www.sole.org. Telephone inquiries should be directed to (301) 459–8446.

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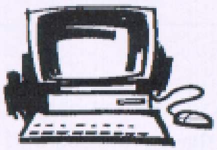


SYSTEMS

The information presented in Army Logistician's Systems *is compiled, coordinated, and produced by the Army Combined Arms Support Command (CASCOM) Information Systems Directorate (ISD). Readers may direct questions, comments, or information requests to Lieutenant Colonel Thet-Shay Nyunt by e-mail at nyuntt@lee.army.mil or phone (804) 734–1207 or DSN 687–1207.*

SMARTER VEHICLES: EMBEDDED DIAGNOSTICS LEAD THE WAY

Logistics systems combat developers sometimes are accused of being concerned only with the movement of electrons and not with "hands-on" logistics. This is not true; we know that information systems are only enablers and not ends in themselves.

Logistics, enabled by information and precision transportation, focuses combat power ("teeth") on the battlefield, reducing the need to dispense assets to protect the logistics "tail." Logistics information and mobility give us the ability to reduce our footprint and trade the supply stockpile for the supply pipeline. Mobility, of course, is linked directly to the operational status of a particular vehicular platform. Therefore, mobility cannot be separated from maintenance, and maintenance cannot be separated from logistics information.

The combat readiness of mobility assets is affected by such factors as the quality of operator and mechanic training, the performance of scheduled services, preventive maintenance checks and services, and the availability of repair parts. Initiatives that impact how we maintain our fleets of combat and tactical vehicles are in place in each of these areas.

The key to maintenance information is gathering source data from a vehicle or weapons platform without human intervention. These source data, freed from possible data entry error, seamlessly enter the maintenance and supply information systems for processing. This initiative begins with the embedding of sensor diagnostic devices to capture data directly from vehicles. If maintenance information-gathering and -processing become automatic, maintenance operations will be changed fundamentally. We are taking a cue from industry, which already embeds diagnostics and data transmitters on high-end automobiles. Various commercial trucking firms already employ telemetry technologies that not only monitor engine status but track cargoes and operator behaviors. We envision these kinds of capabilities in the Army in the not-too-distant future.

Spearheading this initiative is the Army Program Manager for Test, Measurement, and Diagnostic Equipment (PM TMDE). Under the aegis of the Army's Diagnostic Improvement Program (ADIP), PM TMDE will integrate the efforts of numerous materiel developers, logistics agencies, and logistics information systems to provide prognostic maintenance capabilities.

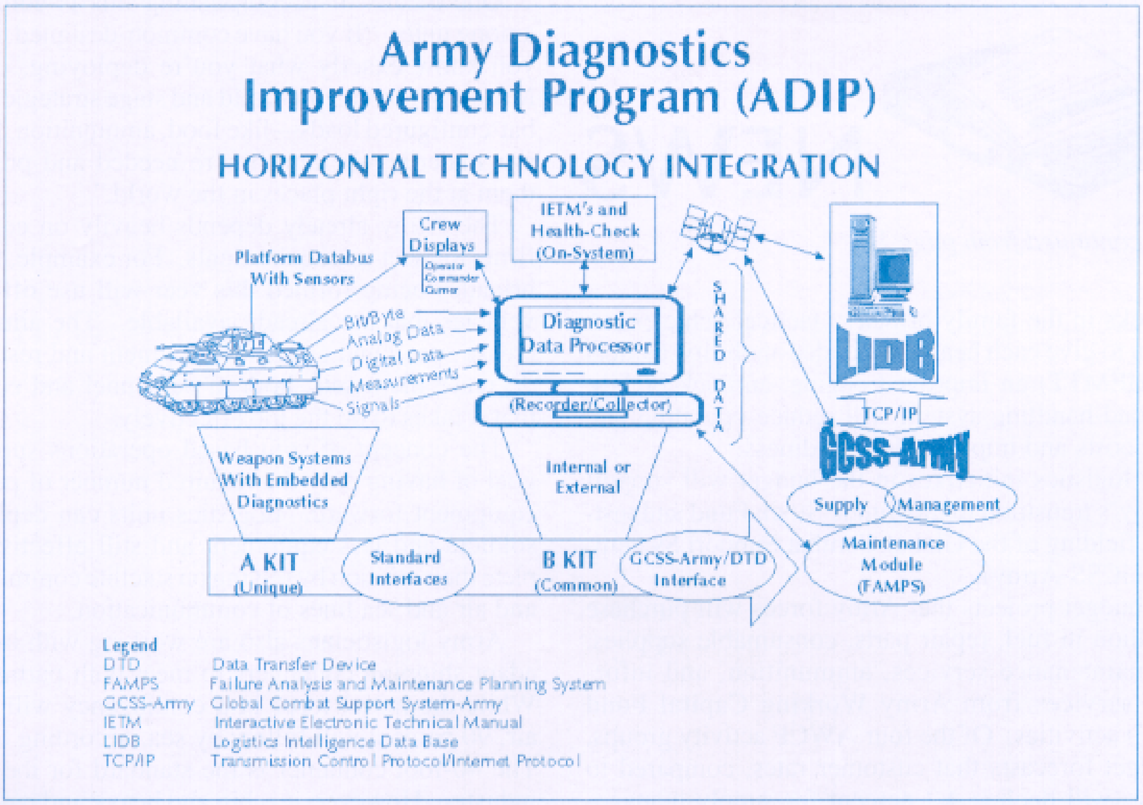
The overall strategy is a shift away from reactive maintenance, which fixes equipment after failure, to anticipatory maintenance, which identifies a fault and repairs it before the equipment actually fails. Prognostic thinking concerns not just how to maintain equipment on the battlefield, but also how to design it and then reengineer our maintenance practices to suit the design. This is an integrated approach that involves everyone—from organizations concerned with the initial design of the vehicle down to the soldiers who operate and support it.

The chart at right describes an end state in which sensor-equipped vehicles will tell mechanics and managers which components will fail and when. It also will alert other systems to requisition spare parts and recommend actions needed to repair components before actual operational failure. Maintainers then can be dispatched to repair vehicles, confident that repair parts are on hand or en route.

Getting to this end state will be an evolutionary process. Some of the necessary technologies are available today, and others are being developed. Vehicles not equipped with sensors can be retrofitted with current technologies to improve diagnostics. As embedded diagnostics are refined, they will be incorporated into the ADIP program.

ADIP hopes to demonstrate operational and support cost savings as technology insertions for embedded diagnostics continue. In addition, these programs can serve as continuous improvement processes and real-time test beds feeding the developmental program. Future weapon systems and legacy systems will benefit from these efforts as upgrades or modifications extend life cycles and improve performance.

Existing technology, which relies heavily on commercial



products, will meet the near-term goals of the ADIP. These technologies will improve current Army diagnostics and will be implemented by various weapon system managers on a case-by-case basis. Embedded diagnostic devices already have been developed for the palletized load system and the M2/3 Bradley fighting vehicle, which should save money immediately and improve diagnostics. These devices also should provide diagnostic data used in future development of technology and help to achieve the end state objective of the ADIP.

PM TMDE has established a test bed at the 3d Brigade, 1st Armored Division at Fort Riley, Kansas, to gauge the effectiveness and impact of these systems in garrison. A second test bed has been set up at the National Training Center (NTC) at Fort Irwin, California, to test the concept in a tactical environment. Testing in these environments should establish a baseline for component failure and test the effectiveness of the failure-prediction algorithms.

The mid-term goal for the ADIP is to develop a system that can provide predictive maintenance based on data collected from individual vehicles and fleets. This system would provide quantitative model data to predict component failure. It then could provide sufficient probability of failure to request repair parts, thereby tying vehicle-based embedded diagnostics directly to the supply system without human intervention. The number of components now equipped with sensors is limited, but it is expected to grow with technological innovation. The fusing of embedded diagnostics with the supply chain then would provide the Army a true anticipatory logistics system.

The end-state goal of the ADIP is to ensure that all future Army vehicles and equipment are outfitted with embedded diagnostics and use standardized interfaces and communications links to communicate with logistics systems.

Operationally, this bolstering of maintenance information capability will impact the commander's decision to commit all available combat power, pull some for anticipatory repair, or cause him to reorganize his assets before combat. Information of this caliber could shape future battles. Improved maintenance information also allows for a reduction of the logistics footprint and a subsequent reduction of combat service support vulnerability on the nonlinear battlefield.

More information on ADIP can be found on PM TMDE's home page on the World Wide Web at http://armyhti.redstone.army.mil. Discussion of experiments in anticipatory logistics can be found on the CASCOM home page at http://www.cascom.army.mil.

Joint Total Asset Visibility: Foundation of Focused Logistics

by Major William L. Taylor, USMC

Joint Total Asset Visibility (JTAV) is here! It currently is deployed to the U.S. Joint Forces Command, the U.S. Pacific Command, the U.S. European Command, the U.S. Central Command, and U.S. Forces Korea. Vast amounts of asset data, such as inventory information, are "pushed" or "pulled" at varying intervals from "authoritative sources" to servers located at these unified commands. The information then can be accessed through the World Wide Web and used by planners at the headquarters level or by operators in the field. A migration now is underway from the existing "as is" system architecture to a new "objective" system architecture, where data are accessed directly at the authoritative source to provide on-line and near-real-time information.

Origins of JTAV

In every major deployment of the 20th century, our forces have been plagued by one constant difficulty: an inability to see assets as they flowed through the logistics pipeline and into the theater. Loss of visibility made logistics management difficult and hindered the ability of logisticians to provide "focused logistics" (one of the goals of Joint Vision 2010). All of this caused customers to lose confidence in the logistics system, leading them to submit numerous requisitions for the same item and often to abuse the priority system in the process. As a result, superfluous materiel choked the transportation system, and the cycle of impaired visibility continued.

An example of this "asset blindness" occurred in Operations Desert Shield and Desert Storm. Over 40,000 containers were shipped to the Middle East, and more than 20,000 of them had to be opened, inventoried, resealed, and reinserted into the transportation system because personnel in the theater did not know the contents or final consignees. When the war finally ended, more than 8,000 containers remained to be opened. The contents of another 250,000 Air Force pallets could not be identified readily.

The results of the logistics effort ensured that U.S. and coalition forces were victorious, but such "brute force" logistics, while perhaps effective, is neither efficient nor desirable. Clearly, there was a need to establish and maintain visibility of assets throughout the logistics pipeline. With such visibility in place, materiel will not be lost in the pipeline, customers will gain renewed confidence in the logistics system and refrain from submitting duplicate requisitions, and the transportation system will not be strangled by excess property. In such a scenario, focused logistics becomes a possibility. JTAV creates the basis for realizing that scenario.

What Is JTAV?

Joint Total Asset Visibility is the ability to provide users with timely and accurate information on the location, movement, status, and identity of units, personnel, equipment, and supplies. JTAV also makes it possible to use that information to improve the overall performance of the Department of Defense's (DOD's) logistics practices. Asset visibility is a fundamental first step toward accomplishing all of the goals of focused logistics. One example of leveraging asset visibility to achieve focused logistics is an initiative to provide interservice visibility of consumable and reparable assets within primary and secondary inventory control activities. This interservice visibility allows for both lateral redistribution and procurement offsets of assets, as well as associated cost savings.

As another example, at the operational level, consider the following scenario. You are cruising the Indian Ocean or training at Fort Hood or Langley Air Force

Base, when the National Command Authority decides you must head back to the Persian Gulf because Saddam Hussein is "rattling his saber" again. As you are ramping up, you discover the filters to your unit's gas masks are being recalled because they are part of a bad lot number. Would it not be advantageous to enter the national stock number (NSN) of the filter into your personal computer and in only seconds find out who close by or back in the continental United States has some replacements? In the past, that could prove difficult or impossible to do. Today, the answer is literally at your fingertips.

Admittedly, the JTAV capability, as it currently exists, is neither 100-percent joint nor total. It is, however, quite robust and useful and represents a quantum leap forward from days past. Additional data bases constantly are being added to JTAV, as are significant enhancements, particularly in the area of in-transit visibility. In the U.S. European Command, where JTAV has been supporting operations in Bosnia and Kosovo, JTAV has become the tool of choice for maintaining asset visibility. Likewise, the JTAV capability is on every unified commander in chief's integrated priority list.

Supporting Documentation

The emphasis on developing and implementing a JTAV capability is contained in numerous documents. Joint Vision 2010, the Defense Planning Guidance, the Quadrennial Defense Review, and the DOD Logistics Strategic Plan all address the goal of obtaining total asset visibility. The Under Secretary of Defense for Acquisition and Technology has produced a report on product support for the 21st century that is actually an implementation strategy. (It builds on the report, *Actions to Accelerate the Movement to the New Workforce Vision*, which was submitted to Congress by Secretary of Defense William S. Cohen.) JTAV is among the topics addressed in the report. JTAV also is a perfect example of the Clinton Administration's National Performance Review objectives of putting customers first, cutting red tape, empowering employees, and getting back to basics. JTAV puts customers (service members) first by providing answers to their questions about assets in the logistics pipeline, and it empowers employees (also service members) by providing the information they need to push decision-making down to the individual best qualified to make the decision.

While all of these documents are significant, it is Joint Vision 2010 that highlights the necessity of JTAV. Joint Vision 2010 is the conceptual template for how our Armed Forces will channel the vitality and innovation of our people and leverage technological opportunities to achieve new levels in joint warfighting. It develops four operational concepts: dominant maneuver, precision engagement, full-dimensional protection, and focused logistics. The JTAV capability clearly is embedded in the operational concept of focused logistics, which is defined as the fusion of information, logistics, and transportation technologies to provide rapid crisis response; to track and shift assets even while en route; and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical levels of operations.

Asset Categories

Before discussing the system architecture, we need to look at one of the enduring JTAV concepts: asset categories. These categories are assets "in storage," "in transit," and "in process." You will notice the link between these asset categories and that portion of the JTAV definition that addresses the location, movement, status, and identity of units, personnel, equipment, and supplies. These asset categories comprise the logistics pipeline. You also will notice the similarity between the logistics pipeline and the "supply chain" inherent in supply chain management.

In-storage assets are those assets stored at retail supply, wholesale storage (both ashore and afloat), and disposal activities. They also include inventories held by maintenance activities to support repair operations and vendor-managed inventories that are part of vendor-DOD partnerships. This category of assets encompasses all classes of supply.

In-transit assets are assets moving from origin to destination and thus are the objects of in-transit visibility. DOD must be able to identify the contents of a shipment and monitor its movement throughout the logistics pipeline. DOD also needs the ability to track item, unit, and personnel movements and to reconstitute and divert shipments.

In-process assets are assets that are being procured or repaired. They include those assets that are on order from DOD vendors but have not been shipped yet, as well as some vendor-managed assets. They also include assets in repair at Government or commercial depot and intermediate-level repair facilities.

System Architectures

The essence of JTAV is an integrated data environment. Specifically, JTAV must access the data bases that contain information on the three asset categories, collect that information, fuse it together, and present it to the user in a useable form. This is a fairly straightforward concept. However, it represents a significant technical challenge because there are hundreds of logistics automated information systems that cross both functional and service boundaries. While each of these existing systems serves some purpose for an individual service or agency, they represent only "islands of visibility" within DOD. The system architecture of JTAV is designed to create the single point of entry into the TAV world called for in Joint Vision 2010.

The JTAV system architecture is the foundation of the JTAV capability. It is a description, including graphics, of systems and interconnections that support functional requirements. It also includes system overlay diagrams and node descriptions. To fully understand the evolution of JTAV and the direction in which it is headed, one must contrast the existing "as is" system architecture with the planned objective architecture.

"As Is" System Architecture

The "as is" system architecture represents what is deployed currently to the unified commands; it is referred to as JTAV-In-Theater, or JTAV–IT. It has evolved from a client-server technology, with all the associated limitations, to more versatile web-based technology. Using web-based technology gives the JTAV the ability to support the implementing strategy of the Global Combat Support System (GCSS) and the broader Global Command and Control System (GCCS), as well as an application known as the Common Operating Picture (COP). In essence, the COP is a visual display of the battlefield, including supporting infrastructure. The GCSS is essentially the logistics input for the command and control activities within the GCCS and requires the JTAV capability to be accessible by any user, from any computer and any location.

The "as is" architecture operates as follows. A server located at a central location receives data feeds from any number of authoritative sources. The data feeds to the server arrive at various intervals by means of the standard file transfer protocol (FTP) process. In some cases, the data are pushed from the authoritative source to the server; in other cases, the data are pulled from the authoritative source to the server. Examples of authoritative sources are the Supported Activity Supply System for Marine Corps retail inventory data, the Standard Automated Materiel Management System for Defense Logistics Agency (DLA) wholesale stocks, and the Global Transportation Network (GTN) for in-transit visibility data.

A user, by means of a user identification standard and password, simply accesses the server via the web and launches a query (asks a question); the answer appears on the user's screen. For example, if a user wanted to know who had a particular NSN item, he would simply enter the NSN as the "entry level argument," launch the query, and in a matter of seconds the location and quantity of that NSN item within the Army, Navy, Air Force, Marine Corps, and DLA inventories would appear on the screen. If he only wanted to see who in the Air Force had the item, the user simply would deselect the other services. Obviously, the data are only as accurate as what is put into the authoritative source and as timely as the most recent update. The whole process is web-based, windows-driven, and quite intuitive.

Objective System Architecture

The objective system architecture currently is being developed. This architecture takes advantage of middleware technology. Through this technology, a piece of middleware, in response to a query submitted by a user, goes directly to the authoritative source and fuses, or consolidates, data within the middleware before presenting those data back on the user's screen in a manner that answers the query. Unlike the "as is" system architecture, where data are obtained through a data push-or-pull FTP process, the objective system architecture obtains data through the following process—

- A data dictionary defines all potential data in the environment.
- A directory identifies where the data reside (in which of hundreds of authoritative sources) and explains how to translate the data in the view defined by the dictionary.
- The dictionary and directory are installed in the middleware.
- The middleware uses the directory to submit requests to the data source and presents the data to the user.

By accessing the data at the authoritative source, the user has on-line, real-time information. Like the "as is" system architecture, unclassified communications use the Nonsecure Internet Protocol Router Network (NIPRNET) and classified communications use the Secret Internet Protocol Router Network (SIPRNET). (It should be noted, however, that even on the unclassified NIPRNET there are many layers of security, such as secure socket layers). In addition to accessing real-time data from numerous sources and making the data available on a single platform, the JTAV capability consolidates data into useful information (whether the user represents the operational viewpoint of the warfighter or the management viewpoint of the inventory control point or item manager).

Given time and performance issues, one may ask when it is appropriate to use a middleware solution to access data. The answer is, "It depends." The appropriate solution is scenario driven. As a general rule, access to data using middleware technology is appropriate when dealing with perishable or dynamic data, such as in-transit visibility data provided by GTN, or in those cases when near-real-time information is essential for mission success. For more static data, such as catalog data or routine inventory queries, the more sensible solution is to continue to receive data via the FTP process and store them forward in the server. So the development and eventual fielding of an objective architecture that uses middleware technology does not replace but enhances the JTAV–IT architecture.

The Role of the Services in JTAV

The roles of the armed services and DLA in the development of JTAV obviously are critical. (In fact, DLA is the executive agent for JTAV.) Far from being a tool to replace the service and agency legacy systems, JTAV relies on those legacy systems! If the individual service or DLA chooses to modify or totally change its systems, JTAV is not affected. JTAV only needs to have data access to whatever system ultimately is chosen by the service or agency.

Access to the data contained in legacy systems is obtained through a disciplined process governed by a memorandum of agreement (MOA) between the service or agency owning the system and the JTAV Program Office. While not all services or DLA agencies have completed the MOA process fully, all have been providing some level of access to whatever systems they have identified as the authoritative sources for sought-after data.

The MOA's are required, however, because they document data access arrangements and because they specify the essential elements of information (EEI's) that have been identified jointly by the JTAV Program Office and the service or agency as necessary for achieving total asset visibility. It is important to note that, while the need to access certain EEI's is driven by requirements, it is the individual service or agency, not the JTAV Program Office, that determines what the authoritative source for those EEI's will be. The documentation process is completed by data-sharing requests and data-sharing specifications, which detail the operational agreements between the service or agency and the JTAV Program Office on design, implementation, and management of pertinent data.

Joint Vision 2010 is the template for how our armed forces will dominate the battlefield of the 21st century. This dominance will be accomplished through information superiority and technological innovation and the resulting new operational concepts of dominant maneuver, precision engagement, full-dimensional protection, and focused logistics. Failure to achieve focused logistics, however, means failure for the other three concepts as well. Focused logistics requires the fusion of logistics information, which in turn requires the sharing of logistics data across functional and service boundaries—and that means JTAV. It follows, then, that JTAV is essential to the success of all the operational concepts set forth in Joint Vision 2010.

The armed services and DLA agencies, though historically protective of their data, are recognizing the reality of the joint environment in which we operate as well as the utility of a shared data environment. So they continue to cooperate by providing access to their respective legacy systems. It should be noted that visibility of assets does not necessarily mean access to those assets. It does, however, mean potential access. Obviously, business rules and agreements must be negotiated. But by leveraging the visibility JTAV provides across service and functional boundaries, the possibilities for a more efficient and effective total logistics enterprise are many.

Briefings, demonstrations, training, and access to JTAV have been provided to numerous units throughout the world. Likewise, in an effort to institutionalize the JTAV capability, similar initiatives have been undertaken through such activities as the Army-managed Joint Course on Logistics at Fort Lee, Virginia. The Marine Corps, in particular, has been quite successful in getting the JTAV capability into the hands of its logisticians as well as embedded in the training offered at many of its formal schools.

For more information about the JTAV capability or JTAV access, call the JTAV Program Office Director, Ms. Nancy Johnson, at (703) 428–1081 (extension 100) or DSN 328–1081 or see the JTAV web site at www.acq.osd.mil/log/jtav. **ALOG**

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Alternative Designs for the Fuel Tankrack

by Major Garry W. McClendon

Improvements to the fuel tankrack would enhance its mobility on future strategic airlift and sealift assets and combat pre-positioning ships.

To distribute and store fuel on the 21st century battlefield, the Army's Force XXI combat and materiel developers have proposed using the fuel tankrack as an integrated component of the palletized load system (PLS) and the heavy, expanded-mobility, tactical truck with load-handling system (HEMTT–LHS). This would make the tankrack a key enabler at the operational and tactical levels of war. The time saved in loading and unloading operations alone would increase the length of time transportation assets can spend on the road in a distribution-based logistics system. However, ensuring that fuel tankracks remain responsive to the warfighter and to the National Military Strategy is still a challenge.

Dominant Maneuver

According to Army Vision 2010, dominant maneuver is "the multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish assigned operational tasks." In the future, the speed at which the Army strategically projects enough fuel distribution assets to support this concept will influence the outcome of the war.

To keep pace with the 21st century warfighter, fuel distribution equipment must be strategically mobile. Today's logisticians must develop equipment that can keep pace with tomorrow's power-projection Army on an increasingly complex and lethal battlefield. Michael O'Hanlon, an analyst with the Brookings Institution, noted that ". . . top military leaders have identified potential shortfalls in [strategic] lift as the most likely handicap to a successful waging of two simultaneous regional wars."

One way to keep pace with tomorrow's Force XXI power-projection Army on the battlefield is to buy more strategic sealift assets, combat pre-positioning ships, and strategic airlift assets. Another, more cost-effective way is to develop alternative designs for the fuel tankrack that will enhance its strategic mobility.

Fuel Tankrack System

The fuel tankrack is a hard-walled, metal fuel tank mounted on an ISO (International Organization for Standards)-compatible platform. It is the same length and width as the PLS demountable cargo bed but has the added advantage of maintaining its height even when empty. The fuel tankrack usually is transported by the PLS or the HEMTT–LHS. It can carry up to 3,000 gallons of fuel when used with the PLS or 6,000 gallons when used with the PLS and a trailer.

The PLS can deliver any class of supply or any item of equipment weighing up to 16.5 tons nearly anywhere on the battlefield. It also can pull a trailer that increases the system's load capacity another 16.5 tons, making the entire system capable of moving 33 tons in one lift. It has an integral load-handling system that allows the driver to load and unload the vehicle without leaving his cab, thus reducing the length of time he spends distributing fuel. It is capable of transporting demountable cargo beds, 20-foot ISO containers, and, now, a fuel tankrack.

When used with the HEMTT–LHS, the fuel tankrack can transport up to 2,500 gallons of fuel. The HEMTT–LHS is a converted HEMTT chassis designed to standardize load handling between the PLS and the HEMTT at the tactical level of war. The only limitation to standardizing the transfer of supplies between these two pieces of equipment is their respective cargo capacities. The PLS can move 16.5 tons, while the HEMTT–LHS can transport only 11 tons. Standardizing the equipment cargo beds of these two pieces of equipment to facilitate the easy transfer of flatracks from one to the other would make the fuel flatrack a key logistics enabler.

The Army has considered adopting an alternative tankrack design that could enhance its operational and tactical role on the battlefield even more. This design is a "stripped down" version of the PLS that can carry 22.5 tons instead of the usual 16.5 tons and would increase the cargo capacity of a fuel tankrack to about 5,000 gallons. However, the proposed design would not necessarily enhance its strategic mobility. If the fuel tankrack is to be used by the Army for fuel distribution on the 21st century battlefield, it should be redesigned so it will be smaller but have increased storage capacity. Such a design would enhance its strategic mobility significantly.

The Strategic Mobility Triad

The three components of strategic mobility are strategic sealift, combat pre-positioning ships, and strategic airlift. In 1994, the Mobility Requirements Study Bottom-Up Review Update defined the strategic lift requirements necessary to deploy to two, nearly simultaneous, major regional conflicts: 10 million square feet of strategic sealift capacity, 2 million square feet of combat pre-positioning ship capacity, and 52 million ton-miles of airlift capacity per day.

Strategic sealift. During wartime, the Navy's fast sealift ships and the new large, medium-speed, roll-on-roll-off (LMSR) ships move more than 95 percent of the fuel; ammunition; trucks, tanks, and other rolling stock; and the hundreds of thousands of tons of other supplies and equipment needed to sustain U.S. forces overseas.

There are eight fast sealift ships in the Navy's inventory. These ships are maintained in a reduced operating status and can be ready to assume a mission in 4 days. With a cargo capacity of more than 50,000 long tons, the fast sealift ship has a major role in strategic deployment. [A long ton is 2,240 pounds.] The LMSR ship is the newest sealift ship in the Navy's inventory. It has a cargo capacity of up to 62,700 long tons and more than 390,000 square feet of space for stowing equipment.

The primary advantage of using strategic sealift as a means of force projection is its ability to transport all of the Army's equipment. Both the fast sealift ship and the LMSR ship can accommodate the Army's largest helicopters and other equipment. They have lift-on-lift-off capabilities and can transport most equipment in an operational condition, which facilitates quick loading and offloading. These ships also have a lift-on-lift-off capability that provides added flexibility when transporting equipment that cannot roll on or roll off in an operational configuration.

The only disadvantage of using strategic sealift is the time it will take to deploy enough equipment to resolve a regional conflict. If time is critical to a military operation, a better method of force projection is combat pre-positioning ships.

Combat pre-positioning ships. Combat pre-positioning ships are the second fastest way to project a force's equipment strategically into a regional conflict. These ships, stationed for the Army in the Indian and Pacific Oceans, provide materiel for an armor brigade and selected combat support and combat service support units. They reduce both the time required to deploy forces and the number of airlift sorties needed to move them.

Combat pre-positioning ships can deploy to a theater of operations faster than strategic sealift ships can. A surge sealift operation that could take over 20 days can be completed in about 5 to 7 days using pre-positioning ships, depending on the distance to the theater. If good intelligence exists about enemy operations, combat pre-positioning ships can be in place as quickly as strategic airlift. The time saved by using pre-positioning ships gives the projected force quick access to put combat units on the ground during the initial stages of a regional conflict.

A combat pre-positioning ship can hold enough ammunition, food, water, fuel, equipment, and other supplies to sustain elements of two Army heavy divisions—up to 34,000 personnel—for as long as 30 days. It is suitable for storing heavy and outsized cargos that usually are not good candidates for strategic airlift operations but are needed in the initial stages of a regional conflict.

A disadvantage of using pre-positioning ships is that equipment and supplies are loaded on the ships in advance, so the ships may contain the wrong equipment needed for the current military operation. It is necessary to have a variety of equipment on board that initial combat forces can use for different missions and different purposes. For this reason, equipment must be stored in the smallest configuration possible.

When considering an alternative design for storage aboard combat pre-positioning ships, the total fuel storage capacity of the fuel tankrack should meet or exceed the fuel requirements of the equipment already loaded onboard the ship. Currently, fuel distribution equipment aboard combat pre-positioning ships has a storage capacity that totals approximately 900,000 gallons.

Because there is a limited number of combat pre-positioning ships, there are limits to the type and quantity of fuel distribution equipment that the Army can store aboard them. Other types of assets also must be accommodated on these ships, and, unlike strategic sealift ships, which can make multiple trips, combat pre-positioning ships complete only one lift in support of an assigned mission.

Strategic airlift. Strategic airlift is the fastest way to project a combat force into an area of operations. It also has the most restrictive equipment transportability criteria. In the initial stages of a deployment, strategic airlift will carry command and control equipment, aviation assets, and standoff weapons such as the Patriot missile and the multiple launch rocket system for area protection of the initial force. Strategic airlift will contribute to the movement of both troops and materiel to deliver forces

☐ The C–17 Globemaster III will be the Army's choice for strategic airlift in the 21st century.

needed in the critical early days of combat operations.

The C–17 Globemaster III will be the Army's choice for strategic airlift in the 21st century. This huge aircraft can carry larger payloads and land on shorter runways than any military aircraft in the world. Its contribution to force projection will help ensure that the initial phase of dominant maneuver is a success.

The transportability criterion for the C–17 is the biggest discriminator in using it to transport equipment strategically. Any equipment transported on the C–17 must be no more than 65 feet long, 17 feet wide, or 13 feet high. Its maximum payload capacity is 170,900 pounds, or approximately 85 short tons. [A short ton is 2,000 pounds.]

During the initial stages of force projection, the C–17 could carry the initial supplies, equipment, and personnel needed to halt enemy offensive operations in a regional conflict. However, because of its transportability criteria, not all Army equipment can be flown on strategic airlift. Even though the C–17 has a larger cargo bay, a larger payload capacity, and is faster than most military cargo planes, its use remains somewhat limited.

Proposed Tankrack Redesign

Two improvements to the basic fuel tankrack design could enhance its strategic mobility on any carrier. A collapsible tankrack design would allow the tankracks to be stacked economically in a smaller configuration while in transport. The higher fuel tankracks can be stacked, the more the mobile storage capacity in the theater of operations. This improvement would not only boost the strategic mobility of a fuel tankrack but also would greatly enhance its operational and tactical mobility.

As an alternative, the Army could develop a collapsible internal fuel storage tank for the fuel tankrack. Replacing the hard-walled fuel storage tank with a collapsible tank would reduce the weight of the individual platform, thus providing more fuel storage.

The outside wall of the fuel tankrack design must provide support for the internal storage tank. (A partially full tank could sway during transport and cause the prime mover to tip over.) Placing collapsible bags inside lightweight, aluminum, semihard-walled fuel tankracks that could be collapsed when empty would reduce the overall height and weight of the tankracks, making it possible to stack them higher for transport.

At the operational and tactical levels of war, the Army needs a redesigned fuel tankrack with an increased storage capacity. The tankrack also should be collapsible and stackable. Incorporating these features into the design of fuel distribution equipment will improve the strategic mobility of C–17 aircraft, combat pre-positioning ships, and strategic sealift ships. **ALOG**

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Hydrogen As an Alternative Fuel

by Peter Kushnir

Hydrogen is the ideal alternative fuel for Army After Next (AAN) platforms. However, while hydrogen offers many benefits, there are two drawbacks to using it as a fuel with current technology. Liquid hydrogen, the preferred form of hydrogen, requires four times the storage space of conventional petroleum-based fuels. The other problem is that hydrogen production depends on the availability of a nonrenewable resource, petroleum. Currently, hydrogen is produced from raw petroleum for industrial use, but petroleum supplies may become limited in the near future.

Liquid hydrogen is the best alternative fuel for AAN platforms; however, further research is needed to move the hydrogen fuel technologies from prototypes to usable military hardware and to optimize power outputs from internal combustion engines (ICE's), gas turbine engines, and fuel cells.

Petroleum production is expected to decrease significantly by 2025, the year that AAN concepts and force structures are scheduled to be operational. Current oil production is 25 billion barrels of oil per year; by 2025, annual oil production most likely will be between 18 and 19 billion barrels—less than the annual production during the oil shortages of the 1970's. The predicted decrease, as well as possible interruption of imported oil due to political instability in the Middle East, will result in increased petroleum prices.

On the other hand, high speed and high mobility will characterize the AAN battle force, and speed and mobility mean high fuel consumption. The 1998 AAN Annual Report states, "An absolute imperative exists to develop alternative fuels (nonfossil) . . . for AAN-era forces." The report goes on to say that there are numerous alternatives to fossil fuels but does not specify what those fuels are. In the January-February 1999 issue of *Army Logistician,* Lieutenant Colonel Allen Forte recommends " . . . new systems [ought] to examine alternatives to fossil fuels as their first option for a power source." Other writers have recommended that AAN planners develop hydrogen as the fuel for AAN platforms; one unequivocally states, "The development of hydrogen-based vehicles is a national imperative."

The Attributes of Hydrogen

Hydrogen is considered an alternative fuel for two reasons: It is renewable, and it is the most abundant element on the earth. Hydrogen comprises more than 75 percent of the environment; so if it became a primary fuel, dependence on foreign sources of fuel would be eliminated. However, hydrogen in nature exists primarily in combination with other elements. For hydrogen to be useful as a fuel, it must exist as free hydrogen (H_2). One common source of hydrogen is water, which is 11.2 percent hydrogen by weight. Hydrogen also can be produced from biomass. Biomass is essentially plant matter, so the vast agricultural resources of the United States could be used to "grow" the fuel required by AAN platforms.

Hydrogen's Characteristics

Hydrogen's physical and chemical properties make it a good candidate for a fuel. At normal atmospheric conditions, hydrogen is a colorless and odorless gas. It is stable and coexists harmlessly with free oxygen until an input of energy drives the exothermic (heat releasing) reaction that forms water. Fuel cells also may use hydrogen as a fuel. A fuel cell is an electrochemical engine that converts the chemical energy contained in the hydrogen molecule into electrical energy. Hydrogen can react with oxygen to produce electricity in a fuel cell.

Hydrogen is the lightest element occurring in nature and contains a large amount of energy in its chemical bond. Because of its low density, liquid hydrogen weighs less than petroleum-based fuels. The density of gaseous hydrogen is 0.0899 grams per liter (g/l). (Air is 1.4 times as dense.) Liquid hydrogen boils at –252.77 degrees Celsius, and it has a density of 70.99 g/l. With these properties, hydrogen has the highest energy-to-weight ratio of all fuels: 1 kilogram (kg) of hydrogen has the same amount of energy as 2.1 kg of natural gas or 2.8 kg of gasoline. Hydrogen burns in air at concentrations in the range of 4 to 75 percent by volume (methane burns at 5.3 to 15 percent concentrations by volume). The highest burning temperature of hydrogen is 2,318 degrees Celsius and is reached at 29-percent concentration by volume in air.

These data give hydrogen both advantages and disadvantages. The major advantage is that hydrogen stores approximately 2.8 times the energy per unit mass as gasoline. The disadvantage is that it needs four times the volume for a given amount of energy. For example, a 15-gallon tank of gasoline contains 90 pounds of gasoline; a 60-gallon tank of gaseous hydrogen would weigh only 34 pounds. Hydrogen has the potential to reduce the amount of fuel consumed by AAN platforms, but the size of the storage container would increase.

Extraction and Use of Hydrogen Energy

There are two ways to extract the energy contained in hydrogen: by simple combustion in ICE's or turbine engines or by converting it to electricity in a fuel cell.

Daimler-Benz AG (now DaimlerChrysler), BMW, and Mazda have developed and tested ICE's fueled with hydrogen and have concluded that hydrogen can be used successfully as a vehicle fuel. Hydrogen also can be used to power aircraft gas turbines. In 1988, a triple-jet-powered, modified Tupolev–154 airliner was flown in the former Soviet Union using liquid hydrogen as a fuel. Daimler-Benz Aerospace Airbus (DASA), in cooperation with Russia, is developing a liquid-hydrogen-powered aircraft. The only drawback is that adjustments in manufactured parts and components will be necessary to handle the cryogenic liquid hydrogen. The cryogenic temperature range is from –150 degrees Celsius (–238 degrees Fahrenheit) to –273 degrees Celsius (–460 degrees Fahrenheit).

Fuel cell drive concepts with highly efficient electric drive systems can provide fuel-efficient solutions for vehicle propulsion that are two to three times as efficient as ICE's with mechanical transmission systems. Fuel cells convert chemical energy directly to electricity, so they lose less energy to waste heat than ICE's. The electrical output of fuel cells can power an electric motor, and vehicles with fuel cells are being developed and tested.

Several types of fuel cells are being developed. The proton-exchange membrane (PEM) fuel cell generally is considered the most promising fuel cell for automotive use, such as light trucks. The PEM fuel cell has a low operating temperature, which enables quick starts, and the amount of power it generates for its weight and size (power density) is high enough for light-duty trucks. Several experiments are being conducted in Germany using PEM-fuel-cell-powered buses. The fuel cells, coupled with electric drive motors, are able to move 18-metric-ton buses efficiently and reliably.

Production

Unlike fossil fuels that can be mined or extracted, hydrogen must be produced. Hydrogen can be produced from a variety of feedstocks, including oil, coal, natural gas, biomass, and water.

The main feedstock for hydrogen is natural gas, because the efficiency is high and the production cost is relatively low. Other feedstocks that are used to produce hydrogen are coal and residual oil from the treatment of crude oil. However, any process producing hydrogen from petrochemical-based feedstock does not reduce dependence on foreign oil.

Hydrogen production from biomass, though promising, is still in the early research and development phase. Basically, biomass includes all organic substances, such as plants, wood chips, bales of straw, liquid manure, and organic wastes. Currently, there is no commercially available process for producing hydrogen from biomass, but the method is to use a high-temperature process to convert biomass into hydrogen and carbon dioxide.

Electrolysis can be used to separate water into its basic constituents, hydrogen and oxygen. In electrolysis, a current is passed through water. Although any power source can be used to produce the electric current, hydroelectric resources offer the lowest price for hydrogen production.

Storage

Hydrogen may be stored on platforms using a variety of technologies. At room temperature, hydrogen is a gas that can be stored in compressed gas cylinders similar to those used on natural-gas-powered vehicles. Gaseous fuels contain comparatively little energy per unit volume, so platforms using gaseous hydrogen may have a somewhat reduced range compared to platforms using liquid fuels such as gasoline or diesel. Hydrogen also may be stored in liquid form, but it becomes a liquid only at very low temperatures, so special fuel tanks are necessary to keep the hydrogen cold and prevent losses.

Compressed-gas cylinders made of stainless steel are being used for storing fuel aboard natural-gas-powered automobiles. These cylinders have a pressure level of 20 megapascals (MPa), or 2,900 pounds per square inch (psi). The pressure levels desired for on-board storage range from 20 to 30 MPa, or 4,350 psi. Under development are high-pressure cylinders made of plastic composite structural materials with steel or aluminum liners, to be used for liquid hydrogen.

Liquid hydrogen storage is preferred to compressed gas storage since more hydrogen can be stored in the liquid state than in the gaseous state. Tanks for cars and buses are available as individually manufactured items. Small vacuum tanks with a 100-liter capacity are available with a super insulation consisting of some 30 aluminum foil layers separated by plastic foil. Larger tanks consist of three elliptical cross-section tanks, each with a 190-liter capacity. The tanks are constructed with 200 to 300 layers of insulating foil. Evaporation rates (evaporation of liquid hydrogen into gaseous hydrogen) for both tanks are on the order of 1 percent per day.

Transport

Both compressed gaseous hydrogen and liquid hydrogen can be transported by trucks or rail. Liquid hydrogen can be transported in pressurized tanks by truck, rail, barge, or ship. Insulation of the storage tanks is of utmost importance. Due to the very low boiling point of hydrogen, losses resulting from boil-off can be considerable.

Pressurized hydrogen gas can be transported via pipelines. In Germany, there are two large hydrogen distribution networks that have more than 50 kilometers of pipeline with pressures of 2 MPa, or 290 psi. There have been no accidents in more than 50 years.

Safety

The safety of any energy source is always a concern. AAN platforms must be engineered properly to minimize risks to their crews. Although hydrogen has different characteristics from petroleum-based fuels, it is as safe as gasoline, diesel, or kerosene.

Hydrogen's explosive range is a 13- to 79-percent concentration in air. It is colorless and odorless and burns with a nearly invisible flame. Hydrogen's wide explosive range, coupled with its very low ignition energy, give it a potential disadvantage since an accumulation of hydrogen in a poorly ventilated vehicle interior may explode easily.

The minimum ignition energy required to ignite a hydrogen mixture is 0.02 millijoules, which is equal to the energy of a static electric discharge from the arcing of a spark. However, the vapors of petroleum-based fuels ignite just as easily.

The diffusion coefficient for hydrogen is 0.61 cubic centimeters per second (cm^3/sec), which means that hydrogen mixes with air faster than does gasoline vapor. Hydrogen's low vapor density and high diffusion coefficient cause it to rise quickly, so that in the open, hydrogen mixes with air and disperses rapidly with no pooling on the ground—unlike petroleum-based fuels.

Since there is a possibility that hydrogen might leak into the crew compartment, hydrogen detectors must be used aboard platforms to detect explosive concentrations of hydrogen. A ventilation system could be used to exhaust the explosive mixture to the atmosphere. Also, since hydrogen's ignition energy is extremely low, a sparkless environment must be provided. The sparkless environment should include an extremely well-insulated electrical system and some form of grounding for the crew so they do not build up a static charge during platform operation.

Environmental Considerations

Hydrogen is the cleanest fuel available. Hydrogen-fueled ICE's and gas turbine engines have negligible emissions of air pollutants. Hydrogen-powered-fuel-cell vehicles have zero emissions. On the other hand, platforms powered by petroleum-based fuels emit significant amounts of air pollutants (hydrocarbons, carbon monoxide, nitrogen oxides, sulfur oxides, and particulate matter), air toxics (either confirmed or suspected human carcinogens, including benzene, formaldehyde, 1,3-butadiene, and acetaldehyde), and carbon dioxide. The health effects of these pollutants range from headaches to serious respiratory damage such as lung cancer.

Burning hydrogen with air under appropriate conditions in ICE's or gas turbines results in very low emissions. Trace hydrocarbon and carbon monoxide emissions, if generated at all, can result only from the combustion of motor oil in the combustion chamber of ICE's. Nitrogen oxides (NO_x) emissions increase exponentially with the combustion temperature. Therefore, these can be influenced through appropriate process control. Particulate and sulfur emissions are limited to small quantities of lubricant remnants. Aircraft gas turbine engines fueled with hydrogen produce no carbon dioxide emissions and cut nitrogen emissions up to 80 percent.

Using hydrogen in fuel cell propulsion systems with low temperature fuel cells completely eliminates all polluting emissions. The only byproduct resulting from the generation of electricity from hydrogen and atmospheric oxygen is water.

Hydrogen has a higher energy density than petroleum-based fuels. It supplies more energy per unit volume than gasoline, diesel, or kerosene. Hydrogen is extremely abundant, thus eliminating U.S. dependence on foreign sources of supply. Research and development projects have demonstrated that using compressed hydrogen or liquid hydrogen as a fuel for ICE's, gas turbine engines, or fuel cells is feasible today. Further research is needed to increase the power outputs from the ICE's and gas turbine engines. Despite a few remaining limitations, liquid hydrogen shows much promise for the future. **ALOG**

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Theater Support Command: Multicomponent Logistics

by Colonel George William Wells, Jr., USAR

In the first of three articles, the author introduces the Army's new echelons-above-corps logistics organization and discusses some of the issues facing it.

One way in which the Army is changing its structure to meet future mission requirements is by examining the use of multicomponent units. The Army has been looking at augmenting active-duty commands with reserve component organizations. The Deputy Chief of Staff for Operations and Plans has established a policy to combine active and reserve component units under one command in an attempt to retain scarce resources. To accomplish this, the Army is using modification tables of organization and equipment (MTOE's) as the basis for structuring single, integrated units. One of the organizations initially selected for this change is the evolving theater support command (TSC) structure.

The Army is transitioning its old echelons-above-corps (EAC) support structure—the theater army area command (TAACOM)—into the TSC. The doctrinal basis for the TSC is found in Joint Publication 4–0, Doctrine for Logistic Support of Joint Operations, which states that, for a given area and a given mission, a single command authority should be responsible for logistics. The provisional TSC organizations now being created are the 19th TSC (reserve element), at Des Moines, Iowa, with its active duty headquarters in Taegu, South Korea; the 377th TSC (reserve element), at New Orleans, Louisiana, with a contingent in Kuwait City, Kuwait; the 21st TSC (reserve element), at Indianapolis, Indiana, with its active duty headquarters in Kaiserslautern, Germany; and the 310th TSC (reserve element), at Fort Belvoir, Virginia, which combines with the active-duty 9th TSC in Japan.

TSC Structure

So what exactly is this new organization called a TSC? It is still the EAC senior logistics command used by the Army service component commander (ASCC) or Army forces (ARFOR) commander in the field. The TSC is a flexible and adaptable structure containing an early entry module (EEM), a command and control structure, and a functional support capability for force projection in a major theater war or theater of operations. Its modular design permits phased insertion of the TSC (thus minimizing strategic lift requirements), instead of requiring insertion of a fixed structure that may not be the right size for a specific mission.

Internally, the TSC structure has added a theater-level distribution management center (DMC), which synchronizes both materiel and movement management. The additional flexibility provided by the DMC enhances command and control of theater-level deployment and redeployment support; sustainment; reception, staging, onward movement, and integration; and force reconstitution.

Another organizational change has been an attempt to align combat service support (CSS) functions—which include combat health support, personnel support, supply, maintenance, transportation, and field services—under a single commander. This change is based on the principle of unity of command for CSS and some combat support functions. The purpose of these modular linkages is to realign key support elements and functions in the structure to meet customer requests, achieve pipeline distribution and on-time delivery, and ensure customer satisfaction. These functional plug-ins, or alignments, are established by the ASCC or task force commander when he determines the initial logistics support requirements of his force.

The reserve component piece of the TSC organization is integrated totally into the authorized level of organization (ALO) of the TSC MTOE under which the TSC headquarters is fielded. No longer is the reserve augmentation a separate table of distribution and allowances (TDA) unit that merely fills gaps between operational requirements and the ALO, as was the case under the old alignment.

TSC Benefits

The new TSC framework has many advantages over the old structure. In Field Manual (FM) 63–4, Theater Support Command, the TSC centralizes the control of EAC functions under a single support commander. This reflects the single logistics concept of responsibility for the theater while providing clearer lines of communication among organizational structures. The deployed EEM of the TSC establishes the initial logistics framework in the area of operations. The TSC will prevent enlargement of the logistics footprint beyond what is needed to manage the flow of supplies into the theater from external sources. This will avoid the past pitfalls of calling forward EAC logistics units when only a slice of the unit is needed. As FM 100–7, Decisive Force: The Army in Theater Operations, details, this structure allows the ASCC to align the theater support structure as his circumstances require.

As the single logistics operator, the TSC will be able to leverage real-time information. This capability will enhance the fusion of theater operational and logistics data. The TSC provides a framework for developing a joint or multinational logistics infrastructure. Some proposals envision the TSC falling in under the joint task force commander (JTFC) in a multiservice or multinational contingency. This would create a direct reporting relationship with the JTFC for logistics support in the area of operations. It would align the TSC in an equal relationship with other command authorities.

Regulatory Changes

Several issues must be resolved before the new TSC structure can reach its full potential. For example, there currently are no regulations that recognize the unique status and requirements of multicomponent units. Existing regulations and policies concerning the flow of funds, personnel actions, and training requirements must be modified for multicomponent organizations. Each TSC headquarters is addressing these concerns through its appropriate component chain of command, with task forces working to achieve positive concurrences. The results will be detailed through memorandums of agreement and understanding, which will implement the Army's multicomponent unit policies by ensuring that the achievement of stated procedures are agreed to by all parties. At some time in the future, appropriate regulatory guidelines may be modified to accommodate the distinctive organizational structures of the TSC.

Funding

Another critical issue is the funding process. The TSC, as a multicomponent command, will use multiple appropriations. The senior commander in the multicomponent unit is designated as the funding manager and will be responsible for the budget execution process. Even though the TSC has a single MTOE, funds, by regulation, will still flow through separate component (active and reserve) channels. However, when funds flow through a series of headquarters, delays may occur in disbursing them, identified funds may be lost, and earmarked funds may be diverted—all of which can require time-sensitive, exhaustive efforts to retrieve the funds. The flow of funds will be crucial when mission execution is imminent. Current efforts are underway to channel funds from the senior fund manager's headquarters to each separate component in the TSC.

Automation Needs

Command, control, communications, computers, and intelligence (C4I) architecture is another key concern. The working structure of the command must be able to communicate and process work using the latest systems, whether at home station or in forward split-base operations. Attempting to operate with outdated systems, or without C4I systems, is a prescription for failure. Customer logistics needs either will not be met or will fall short of the TSC's goals. An integrated automation network must be present to provide the data needed to achieve anticipatory logistics support. Fly-away packages need to be identified that allow unit logisticians to function on laptop computers at headquarters and when deployed in the area of operations. Regardless of the component, each soldier must possess the same capability to communicate within the established infrastructure. Past scenarios of system noncompatibility no longer can be tolerated. Without this capability, the multicomponent structure will fail to achieve mission success.

Likewise, all soldiers must be trained on the latest Standard Army Management Information Systems (STAMIS). In-house or contracted training must occur throughout the year. Soldiers must have the right Internet software capability at their home stations to refresh their skills. With multicomponent staffs separated by long distances, it is imperative that soldiers in TSC's are proficient in their logistics skills and work abilities so they can support the battlefield.

Training

Synchronized training of the active and reserve component staffs of the TSC must be orchestrated carefully. There will be a mixing of regulatory requirements between components. Each member of these multicomponent units must strive to stay current, have a workable plan, be involved in all coordination, and be innovative, even though many times he may be separated from his associates by thousands of miles. Without effective multicomponent staffs, good business practices, and administrative attention to detail, meshing the tactical, technical, and logistics skills of active and reserve component soldiers during such activities as force protection operations, EEM mobilizations, and fast-paced, high-stress operations will be less than totally successful.

Continuity of Roles and Missions

Even though a TSC has a single MTOE, responsibilities and roles will remain much the same under the new alignment. Among its assigned tasks, the reserve component element will be involved in training downtrace Army National Guard and Army Reserve area support groups (ASG's) and other support elements, such as corps support command and corps support group (CSG) staff elements and their soldiers. As AR 11–30, Army Wartrace Program, describes, wartime planning alignments and missions provide a rational basis on which to establish mission-essential task lists (METL's), develop effective unit training programs, and participate in such collective training activities as overseas deployment training and regularly scheduled exercises. The TSC as a whole will be charged with meeting readiness requirements and staff-section proficiency in military occupational specialty qualification self-sustained training. The TSC reserve components will continue to play a key role in developing, leading, and staff training by conducting exercises for subordinate reserve component ASG's and CSG's that complement METL training.

Support Under Challenging Conditions

The development of the TSC multicomponent structure is going to remain challenging and difficult. Training time will have to be managed even more carefully than at present. The learning and training environment of the TSC must emphasize the importance of real, wartime-scenario-developed missions and mobilization planning. However, train-up times and the periods when commands are expected to mobilize, deploy, and execute their missions will continue to be limited. The monthly inactive duty training and the 14 to 21 days of annual training that the reserve component soldier receives have not changed, and there is little prospect of increasing those training opportunities.

Citizen-soldiers also are different today than they were 10 years ago, and their attitudes and needs will challenge active component soldiers who must work with them. Because of ever-increasing family commitments, the uncertainty of promotions, and the disruptions caused by frequent deployments, many reserve component soldiers are choosing to leave military service. At the same time, increased real-world demands for military operations mean that reserve component soldiers will continue to be called upon to support a "come as you are" war. TSC's must be ready to support operations anywhere, anytime. The contingencies to which they respond often will be political and economic struggles that involve either the imminent or actual potential for low- to mid-intensity conflict or some sort of peacekeeping requirement. The senior commander of a multicomponent organization must balance a new set of requirements and become a full-time salesman for the virtues of soldiering in the reserve components.

What is the future of organizations like the TSC? It appears that this type of organization will be beneficial to the future structure of our force. It will play an even greater role as we continue to redefine our military force structure in the future. Today's Army of Excellence and the Army After Next envision an environment in which transitions from operation to operation will be time sensitive. There will be increases in the tempo of deployments, while at the same time the Army will continue to reshape, reduce in size, and digitize in place. These transitions certainly will enhance the need for the right forces at the right place at the right time. Where appropriate, select multicomponent organizations will be the cornerstone of our future military success. Augmentations and multicomponent units certainly are sources of the building blocks of the future Army. They will enhance the use of scarce resources, help to keep the personnel ceiling of the active force stable, and optimize our capabilities.

The word "seamless" will become obsolete as multicomponent structures evolve. The Army Chief of Staff, General Eric K. Shinseki, has stated, "We are 'The Army'—totally integrated, with a unity of purpose—no longer the Total Army, no longer the One Army. We are The Army, and we will march into the 21st century as The Army." Further, we are reminded by his predecessor, General Dennis J. Reimer, that "there will not be a revolution in military affairs unless there is a revolution in logistics." Therefore, as logisticians, we must take the initiative today in order to benefit the military of tomorrow. The theater support command offers a logical means of integrating our active and reserve component soldiers to ensure support of "The Army."

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Force XXI in Action

by First Lieutenant Gerald F. Biolchini

Force XXI Redesign—the very words seem to strike fear in the hearts of many throughout the Army. The redesign removes a lot of control over support assets from the combat arms and brings logisticians forward to the fight. With time, trust, and a positive attitude, such a redesign can work. At least that is my conclusion, based on my experience with the B Forward Support Company (FSC) of the redesigned 204th Forward Support Battalion, Fort Hood, Texas, while we supported Task Force 1–67 Armor.

Purpose of the Redesign

Anticipation, integration, continuity, responsiveness, and improvisation are all elements that must be considered when planning for combat service support (CSS) under Force XXI. The purpose of redesigning the forward support battalion (FSB) is to relieve the maneuver commander of the responsibility for the planning and coordination of the logistics of his task force and to bring the logisticians from the brigade support area (BSA) to the front lines. Then the logisticians can be in the fight, seeing and living the action, instead of hearing radio traffic or watching a request come in that is already several hours old. The logisticians can see the battle unfold around them and overcome trouble as it arises, making anticipation, responsiveness, and continuity possible. Integration becomes a must, as the logisticians are forced to deal more closely with their combat arms counterparts. Over time, and with experience on the front line, improvisation will become second nature. Logisticians will be forced to think of new and innovative ways to support the operating tempo of their combat arms comrades.

FSB Organization

As a part of the redesign, the FSB has been completely restructured. It now has three FSC's, one to support each maneuver battalion in the brigade combat team (BCT). The medical company, designated E Company in the redesign, has not changed at all. With recent changes to the Force XXI structure, two new companies have been created. The Headquarters and Headquarters Company (HHC) is now the Headquarters Supply Company (HSC). It contains the supply and transportation (S&T) platoon and the technical supply office (TSO). With a Standard Army Retail Supply System (SARSS)–1 computer to process requests and the S&T platoon to ship supplies to the FSC's, the HSC is the supply hub of the FSB.

The Department of the Army also has approved the concept for the engineer support element (ESE), which will provide logistics support to the Engineer Battalion. It is assigned to D Brigade Support Company (D BSC) (formerly D Base Support Company) and is commanded by a captain. Its new mission is to support those units that are assigned or attached to the brigade, such as the Brigade HHC, the Brigade Reconnaissance Troop, and the Field Artillery Battalion. These modifications were made to distribute the support mission through the battalion. With this type of organization, support during combat operations will be more manageable.

Each FSC has three platoons. The first is the maintenance platoon, which contains the maintenance control office. The platoon leader is the maintenance control officer. A combat repair team supports each line company and is located with its company during operations. This platoon replaces the old shop office and the former battalion motor officer. It has all the Unit Level Logistics System–Ground (ULLS–G) computers that support each line company in the task force and the FSC ULLS–G computer. It also has its own Standard Army Maintenance System (SAMS)–1 computer. The S&T platoon is the workhorse of FSC support operations. The former support platoons of the maneuver battalions were transferred to the FSC. The third platoon is the headquarters platoon of the FSC. Its only essential CSS function is operation of the dining facility.

FSC Operations on the Battlefield

Typically, an FSC is equipped to provide all classes of supply needed by a task force, with the exception of class VIII (medical materiel). On the battlefield, the FSC serves as a new element, the task force support area (TFSA). The TFSA is positioned 7 to 10 kilometers from the forward line of own troops (FLOT). Collocated with the TFSA is the task force administrative logistics operations center (ALOC), which is connected to the FSC commander's tactical operations center (TOC). From there, the FSC support operations officer (SPO) receives CSS mission instructions and tracks support assets.

Logistics packages (LOGPAC's) are assembled and staged in the TFSA and moved to the logistics release point (LRP) for distribution to the first sergeants of the line companies. The TFSA receives resupply from the BSA, which has a larger mission than the TFSA even though it is smaller. The TFSA is also the task force maintenance collection point. Vehicles that exceed the combat repair team's capabilities are recovered to this location. As the battle moves forward, the TFSA obviously gets further and further behind the FLOT.

The FSC commander can use a section of his company called the combat trains command post (CTCP) to maintain a closer distance to the task force and keep logisticians in a proactive role. The CTCP is familiar to combat arms soldiers; the only change occurring in the redesign is that logisticians are now present. Once called the unit maintenance collection point, the CTCP is the location of the task force ALOC, the FSC support operations section, the maintenance control office, and the battalion aid station. The CTCP acts as the maintenance collection site and as the point at which all logistics functions are coordinated and tracked for the task force.

CTCP operations are a challenge, because the FSC SPO frequently is out of touch with the FSC commander. In addition, the only face-to-face communication the SPO has with the S&T platoon leader is during preparation of LOGPAC's and at the LRP. Also, the SPO often is not in direct contact with many of his supplies and assets. The only classes of supply that can be kept on hand at the CTCP are an emergency resupply of bulk class V (ammunition) and bulk class III (petroleum, oils, and lubricants). Yet it is essential that the FSC SPO be kept in the battle so he can see the operation as it unfolds and can schedule resupply times for the task force.

The SPO's sole mission is to get support for his task force. Effective communication with the task force S4 is critical to the success of the mission. The S4 will do most of the conceptual planning for support of the task force. However, the SPO needs to be involved during the planning stages. It is important for the S4 to understand clearly what the FSC can provide. But it should be stressed that improvisation is a key planning consideration. Often it will appear that there is no conceivable way to accomplish a mission. In such cases, logisticians are challenged to devise an unorthodox approach to getting the job done.

Currently, one of the biggest challenges in an FSC is that enablers, such as movement tracking systems to track convoys as they move out or palletized load systems to facilitate the delivery and pickup of supplies, have not yet been fielded to the unit.

LOGPAC Operations

The logistician in the FSC is charged with executing the task force support plan. This means he must spend many hours on the road viewing LOGPAC's and LRP operations and communicating with the task force first sergeants and sergeant major. Occasional trips to the BSA to talk with FSB support operations personnel about upcoming missions or a change in task organization give him an opportunity to see if there are supplies sitting in the BSA that his task force desperately needs.

The method of supply used during Task Force 1–67's train up is known as supply point distribution. The FSC distributes supplies to a known location, and the company first sergeants pick up supplies from that point and deliver them to their companies. A standard LOGPAC is delivered to each line company twice daily. The LOGPAC builder is the HSC first sergeant. He coordinates last-minute changes in headcount and subsistence requirements with the food service noncommissioned officer (NCO) and ensures that the company supply sergeants are doing their jobs. The Combat Service Support Control System (CSSCS), when fielded, should relieve the HSC first sergeant of these duties. Even then, the HSC first sergeant, because of his knowledge about the exact location of mortars, task force scouts, and battalion radio retransmission sites, will be required to provide information on the task force's subsistence requirements to the FSC SPO daily.

Once the LOGPAC is assembled, it is the responsibility of the S&T platoon leader to escort it to the LRP. The first sergeants then lead their sections of the convoy from the LRP to feed and resupply their companies. The same happens on the evening push; however, at 1600, the first sergeants, the task force S4, and the FSC SPO meet at the LRP to discuss any changes in individual requirements and overall logistics operations. At that time, the first sergeants also turn in a Yellow 1 Report, which is a request for any item a company needs in the next 24 to 48 hours. The FSC SPO reviews the report and sends the requested items on the next LOGPAC if the S&T platoon has them on hand. Any request that cannot be filled must be forwarded to FSB Support Operations. In addition, requests to fill the S&T stocks must be submitted. It helps to think of the FSB as supporting the FSC's. The FSC's should have what the task force needs to fight and survive and should be the only elements that coordinate directly with FSB Support Operations.

The key to logistics success is for the FSC to maintain sufficient quantities of items on hand. A main mission of the FSC SPO is to minimize the number of short-fuse requests, and the way to do that is by maintaining sufficient stocks at the TFSA. Stocks that should be kept on hand in sufficient resupply quantities include classes I (subsistence), II (individual clothing and equipment), III (bulk and packaged), IV (construction and barrier materials), V (ammunition), and IX (repair parts and components, as contained in the prescribed load list). Keeping track of the task force's use of all classes of supply will assist greatly in planning future operations and in filling the few short-fuse requests that do come through.

Once the LOGPAC arrives, the first sergeant has 2 hours to return it, or the FSC will have missed its resupply window with higher units. If a company misses the LOGPAC or has an emergency request, the FSC SPO may elect to redirect supplies to the company that missed its resupply window, providing he has maintained historical data on supplies consumed by each of the line companies. If supplies are managed properly, the FSC should be able to get by for 2 days without resupply. A short-fuse request could have a greater impact on the brigade support structure, so immediate resupply should be done only in extreme cases. D BSC has the mission of pushing supplies to the rest of the FSB and also to units operating in the brigade rear area, so the number of short-fuse requests must be kept to a minimum. The FSC SPO must be sensitive to the missions of the brigade, because the FSB SPO will have to manage the task force's logistics priorities, and that task force may be short at the wrong time.

The FSC SPO is the guardian of the task force's logistics, but he also must understand the impact of decisions made at higher levels. The FSB SPO often has to adjust his priorities according to those of the brigade commander. Understanding how to manage those priorities can affect the task force and help ensure synchronized support.

Reverse LRP Operations

Reverse operations are the lifeblood of the FSC. If not properly coordinated and executed, the FSC can run out of supplies in a short time. Battalion Support Operations needs to track convoys and communication with the FSC continuously. It also needs to ensure that reverse LRP's are synchronized with each other and with the brigade commander's priorities. In turn, the FSC SPO needs to ensure that the reverse LRP's are synchronized with the task force's mission plans. After the task force order is briefed and the FSC commander and FSC SPO have finished with the S4 and the CSS plan, the FSC SPO needs to coordinate with the battalion SPO and either request to realign or maintain the reverse LRP's. The battalion SPO then should ensure that the whole plan is synchronized with the brigade plan.

At the reverse LRP, the FSC SPO needs to know the exact manifest of the reverse LOGPAC so he can plan future operations properly, and he should ensure that someone from his section is present to conduct a face-to-face inspection with the S&T platoon leader.

Supply Requests

With whom should the units coordinate logistics support? This seems easy to answer at first; but throw in attachments, short fuses, and anything else the heat of battle can bring about, and this coordination easily can become a nightmare. The S4 should be the primary point of contact for the companies of the task force for any requested support requirements. The S4 is the task force commander's logistics officer and, as such, will have a better idea of his priorities and operation plan. The S4 must be the primary tasking authority for the FSC SPO. This will allow him to plan future operations with the FSC SPO and coordinate task force efforts. The FSC SPO then will plan the logistics support needed for that mission and pass the information to the FSC platoons via the FSC commander.

Incorporating the FSC SPO into the task force planning process can be very beneficial. As the plan develops, the FSC SPO can resolve issues and provide insight on the capabilities of the FSC. It is important to understand that the FSC SPO's responsibility always is to look at the battlefield from the FLOT to the BSA and provide insight on supporting the battle. Just as mechanics are always looking for ways to make cars run better, the FSC SPO should be thinking of ways of maintaining the operating tempo of the battle.

The biggest challenge of an FSC SPO is coordinating class I. Developing the subsistence plan, coordinating with the FSC's food service NCO, and getting the plan back to the task force in time to finish the mission planning is difficult at best. B FSC and Task Force 1–67 solved this problem by having the HSC first sergeant coordinate last-minute changes in headcounts with dining facility personnel. In the future, these requirements will be sent to the FSC SPO electronically and then from the SPO to the dining facility.

Attachments

As soon as a line company is attached to the task force, the FSC SPO and a representative of that company should meet. If the FSC SPO is not accustomed to dealing with the needs of certain modification table of organization and equipment units, such as light infantry or armor units, he should address their special considerations. A mission requirement that cannot be met by the FSC should be brought to the FSB. Before doing so, the FSC SPO should ask the following questions—

- Will the FSB provide reinforcing support?
- Will the FSB be in charge of the entire mission?

• Do the assets from the D BSC belong to the FSC for the mission at hand, or is the mission a D BSC mission?

It is critical that logisticians be up to date on the task organization of the task force. The ESE supports the Engineer Battalion, so the question is: Do they attach assets to the FSC to support the engineers, or does the ESE take care of all engineer mission requests? Task Force 1–67 answered this question by making the FSC SPO the coordinator for all task force requirements. The line companies pass mission requests through the S4 to the FSC SPO. The SPO processes these requests and, based on the FSC commander's priorities and intent, decides which missions can be accomplished by the FSC, which missions should be sent elsewhere, and which missions can be accomplished with a combination of assets from the FSC and the ESE.

According to Special Text 63–10, Tactics, Techniques, and Procedures for the Digitized Forward Support Company, " . . . the FSC commander and the support operations officer assist in the deliberate planning process of the operation." The FSC commander is the only one who can commit FSC assets to a fight. The FSC SPO coordinates mission execution. However, it is often difficult to get the FSC commander away from his company for several hours to plan the next mission.

CTCP Operations

Little is written about how a CTCP operates, so Task Force 1–67 tested and evaluated several courses of action (COA's)—

• COA 1: The S4 and the FSC SPO NCO in charge (NCOIC) are in charge of the CTCP.

• COA 2: The task force HSC commander and FSC SPO NCOIC are in charge of the CTCP.

• COA 3: The task force S4 officer in charge and NCOIC are in charge of the CTCP.

The most efficient method was COA 2. Under the FSC redesign, the HSC commander provides the CTCP with senior tactical leadership close to the battlespace. Also, since the task force ALOC is also the alternate task force TOC, it is essential that the CTCP be ready to receive the command group. This COA also relieves the S4 and the FSC SPO of the day-to-day operations of the CTCP so they can concentrate on mission support.

The HSC commander, the task force executive officer, and the FSC commander must determine their respective roles and responsibilities. Again, FSC assets are a large part of the CTCP, but they exist in the task force battlespace.

Current Challenges

The major obstacle to be overcome by logisticians in the redesign is experience. We lack it at many levels. We lack the knowledge of operating 15 years under the Army of Excellence. Combat arms soldiers have dealt at the ground level for many years, so they know how to get things done and what works and does not work. For instance, it would have taken trial and error for us to figure out the exact amounts of packaged class III to have on each LOGPAC. But by asking the 1–67 Armor personnel what they had done in the past, the B FSC was able to maintain the same support that was provided to the line companies in the past.

From such experience, the B FSC gained a basic knowledge of what it should do. By tracking the amount that the line companies requested on a daily basis, the B FSC SPO projected how much more it would need to add to the daily LOGPAC's to keep the number of requests down. This is the heart and soul of velocity management. Caution should be observed, however; more is better than none. For example, do not worry as much about gallons of fuel as about fuelers. By limiting the number of fuelers you push, you can rest your drivers so they will be ready for short-fuse missions or longer missions if necessary. This type of historical tracking can assist in overseas deployments.

Experience also teaches that not all logisticians are taught the principles of logistics. A young Ordnance, Quartermaster, or Transportation officer can begin as a corps HHC executive officer or as a platoon leader in a nondivisional unit, but at some point he very easily may become an FSB SPO. Lessons learned at the FSC SPO level need to be captured and taught in follow-on schools so young logisticians can learn the basic principles that impact a maneuver unit.

There is still a lot to learn about supporting a task force with the FSC concept. The soldiers and officers of Task Force 1–67 are working hard to record lessons learned so they can pass this knowledge on to others. If the Force XXI concept is to be used by the Army After Next, it is our duty to make sure it works by identifying and overcoming every obstacle that may stand in the way. **ALOG**

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Food Safety Diagnostics: Ensuring Safe Food for Soldiers

by Captain John C. Beach

The United States has the safest food supply in the world. Because various regulatory agencies continuously monitor food safety, Americans take the safety of their food for granted. Still, each year up to 81 million Americans suffer food-borne illnesses, and 9,100 die.

U.S. troops are deployed worldwide to places where commercial food sanitation standards may be inferior and enforcement of those standards may be less than optimal. Food-borne disease outbreaks are a significant threat to our deployed fighting forces, capable of incapacitating many troops at any given moment. This is a risk the Army cannot afford to take. The Army Veterinary Service must do all it can to conserve the Army's fighting strength through an active food-safety surveillance program. Americans expect safe, high-quality food, and U.S. military personnel expect no less.

Having soldiers consume only operational rations in a theater of operations would minimize the threat of a food-borne outbreak. However, consuming only operational rations without class A (freshly prepared food) supplementation would create a serious morale problem with deployed troops. Therefore, field commanders want to maximize the availability of freshly prepared meals. Class A rations, particularly locally procured food items, present the highest danger as a source of food-borne diseases.

In the past, Army food inspectors were unable to ensure food safety in a field environment because portable diagnostics were not available. They based their food-safety efforts on sanitary inspections of food establishments and periodic tests of food in a centralized laboratory. Installation-level veterinary inspection programs sought to identify food quality problems. However, recently developed commercial technology allows for rapid, presumptive screening of high-risk food for bacterial pathogens, spoilage organisms, and pesticides in the field before it is served to soldiers. The 18th Medical Command Veterinary Services, part of U.S. Forces Korea (USFK), is using this technology to ensure that the food we provide to soldiers during peacetime is safe. This technology also will permit high-risk foods to be screened on the battlefield.

The position of the 18th Medical Command Veterinary Services is that to ensure a safe food supply in a forward deployed theater, rapid food-safety laboratory diagnostics must be used.

Food-borne Disease Threats

The majority of food-borne disease outbreaks result from unintentional contamination of a product as a result of inappropriate processing or handling. Outbreaks caused by substandard sanitation or improper food handling are well documented. In 1985, an estimated 350 school children and staff at a Georgia elementary school developed febrile gastroenteritis associated with the bacteria *Salmonella enteriditis*. The food source was identified as turkey salad that had been refrigerated improperly before it was served. In 1997, the largest beef recall in history occurred as a result of *Escherichia (E.) coli* bacteria-contaminated ground beef processed by Hudson Foods of Columbus, Nebraska. The extent and swiftness of this recall resulted in less than 20 illnesses, compared to the Jack-In-The-Box fast-food restaurant outbreak in 1993 that resulted in over 700 illnesses and several deaths. In 1996, a large food-borne disease outbreak occurred in Japan, causing more than 5,000 illnesses and 6 deaths—primarily among schoolchildren. School lunches contaminated with *E. coli* bacteria were identified as the source.

Intentional contamination of our food supply with biological or chemical agents also is a significant threat. Bioterrorist attacks on our food supply could be covert or announced and could be accomplished with selected bacterial pathogens or toxins. The United States actually experienced one such attack in 1984. In The Dalles, Oregon, a religious cult contaminated 10 salad bars in restaurants with the incapacitating bacteria *Salmonella typhimurium* on Election Day to influence the results of county elections. Within 1 month, over 750 cases of *Salmonella typhimurium* were diagnosed. It took more than 2 years of diagnostic effort to determine that this food-borne outbreak was intentional. Similar intentional acts of bioterrorism against U.S. forces are a real threat and could be difficult to detect without an active food-safety surveillance program.

□The Charm Sciences, Inc., Lum-T is an instrument used to complete several diagnostics, such as sanitation validation, fluid dairy shelf-life prediction assay, and pesticide assay.

U.S. Government Initiatives

President Clinton's fiscal year (FY) 1999 budget requested $101 million to improve the safety of the Nation's food supply. The request included an increase in research to develop new tests to detect food-borne pathogens and assess risks to the food supply. Further, the President's FY 2000 budget includes a $144 million request for the Department of Health and Human Services for "bioterrorism preparedness."

A key step in establishing an effective food-safety program in a forward-deployed theater is to have adequate laboratory diagnostics that can identify and characterize rapidly any agent that could cause a food-borne disease outbreak. Within the 18th Medical Command, food-safety efforts have focused on monitoring potentially hazardous foods as they move through the supply system. To enhance current USFK food-safety and -quality programs, the veterinary services decided to use commercial rapid-screening food laboratory diagnostics. Some capabilities of these diagnostics include—

- Microbiology testing of both liquid and solid foods.
- Food surface sanitation validation.
- Dairy product shelf-life prediction testing.
- Pesticide analysis of fresh fruits and vegetables.
- Continuous internal product temperature monitoring of perishable food while in transit.

Commercial rapid food-safety diagnostics have been procured and deployed throughout the Republic of Korea as an integral part of our active food-safety surveillance program. The immediate availability of laboratory data at key food distribution points within the Republic of Korea ensures that all USFK personnel have safe, high-quality food.

Commercial Rapid Food-Safety Diagnostics

Today's consumers demand safe food. The commercial food industry's ability to identify bacterial pathogens and unsafe residues has resulted in an almost fivefold increase in food recalls by major manufacturers since 1988. New technology allows Government regulatory agencies to identify a bacterial pathogen and trace it back to its source more rapidly. The key to this new technology is the availability of rapid food-safety diagnostics.

These rapid food-safety diagnostics provide a quick, "positive or negative" answer before the food product enters the distribution system. Tests take up to 30 hours to complete because of the requirement for a bacterial growth enrichment period. This growth enrichment period is necessary to increase the total number of bacteria so they can be detected using current technology. A negative answer means that the product does not contain that particular bacteria or toxin and no further testing is required. A positive answer means that further testing is needed at a reference laboratory using standard laboratory methods to confirm the actual presence of the bacteria or toxin. For example, rapid screening for *Salmonella typhimurium* requires approximately 24 hours to complete. To confirm the existence of this organism, standard laboratory methods of isolation for 96 to 120 hours must be used.

USFK Food-Safety Diagnostic Capabilities

The 18th Medical Command Veterinary Laboratory has the following rapid food microbiology capabilities—

- ***Prepared growth media.*** Petrifilm Plates, developed by 3M, provide standard bacterial plate counts, total gram-negative coliform counts (indicating fecal contamination), and yeast/mold counts on fluid products. Pathogel, developed by Charm Sciences, Inc., detects the presence of *E. coli* and *Salmonella*.
- ***Blenders.*** The Stomacher Laboratory Blender, manufactured by Seward Ltd. of London, England, is used to conduct microbiological testing on solid food products. The Stomacher blender emulsifies the product in a buffer solution from which we draw sterile liquid aliquots (samples) for microbiological testing.

□This photo shows a portable food microbiology lab in a field environment.

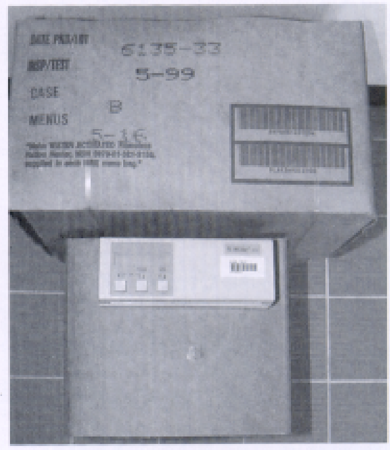
• ***Portable rapid diagnostic kits.*** USFK is procuring these kits to screen for bacterial pathogens and toxins such as *E. coli, Bacillus cereus, Listeria monocytogenes, and Staphyloccocal enterotoxin B*. With these kits, most results can be obtained in 24 to 48 hours. There are two very important benefits of this capability: the kits eliminate the delay caused by obtaining routine results from a stateside laboratory, and they are 100 percent transportable to support class I (subsistence) operations in the field.

• ***Polymerase chain reaction (PCR) technology.*** This is "DNA fingerprinting" technology that can identify a specific bacterial genus and species. This will overcome the inability of rapid microbiology diagnostics to identify specific bacterial organisms (by genus and species). Unfortunately, the current PCR equipment is not field transportable and requires a fixed laboratory. However, the Air Force Force Protection Battlelab at Lackland Air Force Base, Texas, is testing a field portable PCR system made by Idaho Technology, Inc.

• ***Surface sanitation test.*** Another aspect of food safety includes monitoring the cleanliness and sanitation of food contact surfaces. This is extremely important in contract dining facilities that employ personnel from developing countries to handle and prepare food. All efforts to ensure that food is safe while in the supply system can be defeated by improper handling and preparation. The PocketSwab (available from Charm Sciences, Inc.) is a self-contained swab designed to determine the effectiveness of cleaning and sanitizing food contact surfaces by measuring adenosine triphosphate (ATP) levels. ATP levels indicate the organic matter present on a surface, which potentially can support bacterial growth. A properly cleaned and sanitized surface will have very low levels of ATP (less than 5,000). When ATP levels are very high (more than 100,000), the surface is unacceptable. These extremely high ATP levels are commonly associated with the presence of bacteria, either pathogenic or spoilage. The PocketSwab allows us to obtain quantifiable numbers to ensure that food contact surfaces are clean and sanitized before processing any food. This reduces the possibility of food being contaminated while it is being prepared.

• ***Pesticide test.*** The Charm Pesticide Assay (by Charm Sciences, Inc.) can screen locally purchased fresh fruits and vegetables for pesticides in 20 minutes. Since many nerve agents are organophosphates, this technology has the potential for detecting a nerve agent in chemically contaminated rations. To do this, specific tests must be developed for each nerve agent.

• ***Temperature-monitoring devices.*** Temperature damage, either in transit or in storage, always has been a danger for perishable foods. Our ability to monitor the extent of damage resulting from a refrigeration failure always has been very subjective. The MonitorMark (by 3M) is a temperature-sensitive strip that turns blue if the temperature exceeds 40 degrees Fahrenheit. In instances where severe temperature damage occurs, such as at 70 degrees Fahrenheit, the strip turns blue more rapidly. It does not determine when the abuse occurred or its extent, but it alerts the user that temperature damage of the product has occurred. This is an inexpensive means of monitoring chilled food shipments (which should be kept at 34 to 40 degrees Fahrenheit). An even better way to monitor product temperature is with the Sensitech TempTale. The TempTale is a computer chip temperature-monitoring device that can screen internal product temperature continuously, record over 2,000 temperature readings, and provide data analysis when downloaded into a computer. The data analysis feature enables the food inspector to determine the extent of temperature damage to a particular product and make instantaneous decisions on its disposition. For example, if a shipment is received and there was no temperature damage, the product will be issued normally. If a temperature abuse in transit is documented, that product will be priority-issued before its quality deteriorates further. In conjunction with temperature monitoring, routine food microbiology surveillance also is being conducted to determine the level of spoilage bacteria present, as well as to ensure the absence of pathogenic bacteria.



☐A densitometer is used for measuring optical densities on time temperature indicators (TTI's) on MRE cases. The patch in the center of the case is a TTI.

• ***Time temperature indicator*** (TTI). The Fresh-Check TTI, from LifeLines Technology, Inc., is designed as a visual aid in determining the extent of temperature abuse in meals, ready to eat (MRE's). It is designed to change colors at the 50- to 100-degree Fahrenheit range. Visual reading to determine color changes of the TTI is arbitrary, depending on the skill and experience of the inspector. We have eliminated this variable by using a densitometer.

• ***Densitometer.*** A densitometer is an optical density-measuring device that provides the user with a specific optical density reading of the TTI. LifeLines Technology, Inc., also has developed a chart with optical density readings that correspond to the remaining MRE shelf life at various storage temperatures. MRE shelf life is temperature dependent. The inspection test date printed on each case is designed for a storage condition of 80 degrees Fahrenheit for 3 years. MRE's stored at 60 degrees Fahrenheit will have a much longer shelf life than MRE's stored at 90 degrees. This technology aids in assessing unit-level MRE storage conditions without an on-site visit. The ability to determine the remaining shelf life without opening the packages will result in a cost savings to the logistics community.

- ***Fluid dairy shelf-life validation/prediction assay.*** Combined with microbiology screening tests, this test, developed by Charm Sciences, Inc., is used routinely by Army food inspectors to determine the shelf life of extended-shelf-life (ESL) milk. This milk has a 70- to 90-day shelf life and requires refrigeration. ESL milk can be stored beyond this period if it meets safety and quality standards. A qualitative assay will detect increases in microbial ATP, which correlate with the presence of spoilage or pathogenic bacteria before any visible changes are seen in the milk. This enables the inspector to advise the logistician to priority-issue a product before it becomes unacceptable. The result is still a high-quality, safe product for soldiers and their families. Similarly, an assay also can be used to extend expiration dates beyond those on the label.

Future

The threat of weapons of mass destruction is very real. One concern that faces the U.S. Government daily is bioterrorism. Kits for detecting chemical agents in water are well developed and effective. However, our ability to detect chemical and biological agents in food is very limited. Majesco Biologics and the Army Soldier and Biological Chemical Command in Natick, Massachusetts, working independently, are developing biosensor technology to identify bacterial pathogens and toxins in only 15 to 30 minutes by eliminating the requirement for a 24-hour bacterial enrichment phase. This new technology is extremely sensitive and can detect much lower levels of bacteria and toxins than current rapid diagnostics can. Although fielding of biosensor technology is 2 to 3 years away, these advances should be adopted by the Army Veterinary Service to maintain an effective food-safety surveillance program.

This proactive approach to food safety and bioterrorism prevention does not agree with a White Paper published recently by the Office of the Surgeon General entitled "The Vulnerability of the DOD Food Supply to Chemical/Biological Terrorism—The Role of the Army Veterinary Service." This paper advocated a post-epidemiological investigation to determine the source of a biological agent attack. The authors stated that the use of current surveillance technology was too expensive and too manpower intensive. Admittedly, no surveillance system can be 100-percent accurate. In the event of a food-borne disease outbreak, intentional or unintentional, faster identification and characterization of the agent will aid in the medical treatment of those affected. It also will help our medical personnel determine if exposed but asymptomatic personnel require prophylactic treatment. It is the 18th Medical Command Veterinary Services' position that having the capability to screen routinely for select bacterial pathogens and toxins would be a deterrent to bioterrorism.

In support of the Army Medical Department's Medical Reengineering Initiative to redesign its combat health support units, the Army Veterinary Service has developed a food procurement detachment with a portable food microbiology capability. This capability emphasizes rapid food-safety diagnostics in division rear and corps and echelons-above-corps areas of operations. Fielding is scheduled for fiscal year 2002 in the Republic of Korea.

In my opinion, there does not appear to be a collaborative effort between commercial industry and military research laboratories. However, it is encouraging that various Government agencies, such as the Army Soldier and Biological Chemical Command, are developing biosensor technology. Technology continues to improve at a very rapid pace; equipment that is state-of-the-art today may not be tomorrow. Therefore, the contents of the field food microbiology set will be an ongoing evolution. As one item becomes obsolete, it will be replaced by the newest off-the-shelf technology. This new technology will not be intended solely for field use but will be part of our ongoing, active food-safety surveillance program during peacetime.

Natural food-borne outbreaks and bioterrorism will continue to occur worldwide. An active food-safety surveillance program that conducts rapid, presumptive laboratory testing helps to ensure a safe food supply. Our goal is to provide food inspectors with real-time laboratory data for making on-the-spot recommendations concerning food safety and quality. Making use of available commercial technology is the easiest and most efficient way to achieve this goal. **ALOG**

Captain John C. Beach currently is pursuing a master of science degree in food microbiology at Texas A&M University. He was the chief of U.S. Forces Korea Food Safety in Yongsan, South Korea, when he wrote this article. Captain Beach has a doctor of veterinary medicine degree from Oklahoma State University and is a graduate of the Army Medical Department Officer Advanced Course.

Templating Medical Supplies for Deployment

by Lieutenant Colonel David H. Pratt

Strange things and new missions always seem to pop up during the first few months of a new logistics officer's assignment. This axiom was demonstrated a few years ago when the new Installation Medical Supply Officer assigned to Madigan Army Medical Center at Fort Lewis, Washington, faced a particularly vexing challenge in supporting deploying units.

The mission of an installation medical supply activity (IMSA) is twofold. First, it provides medical logistics support to its parent medical treatment facility, ensuring that surgical equipment, medical supply, and service requirements are filled for the hospital so peacetime medical care for soldiers and their families continues unabated. This is the mission most people associate with the IMSA because it is highly visible and consumes the majority of the IMSA staff's time and effort.

The second, perhaps less-heralded, mission of the IMSA is to provide class VIII (medical materiel) support to table of organization and equipment (TOE) units within its geographic region. These units include the full range of deployable medical and nonmedical organizations, from engineer battalions with small, two- to four-person medical sections, to division ready brigades and other rapid-reaction forces, to fully capable combat support hospitals. The often short-fuse deployment of these units makes providing them class VIII support a challenge. The IMSA had few formal tools to facilitate this support in the past. It just did the best it could under the given circumstances.

The IMSA at Madigan Army Medical Center supported more than 74 units from the Active Army, the Army National Guard, and the Army Reserve. Three units—a ranger battalion, a special forces group, and a division ready brigade—required a unique level of support that posed a particularly complex dilemma.

All three of these rapid-reaction units informed the newly assigned IMSA chief that they would be "in the pocket" for deployment in the near future. The special forces and ranger units would need to draw their class VIII loads from the IMSA with as little as 2 hours' notice. The division ready brigade would need its medical supplies within 10 to 11 hours of receiving notification to deploy.

In the past, to prepare for such contingencies, the units stored a pre-positioned set of requisitions at the IMSA that identified the supplies they would need for deployment. Once the unit received a deployment order, the requisitions would be filled from the IMSA's extensive inventory. Backorders were established for items that could not be supplied, and promises were made that the balance of the unit's requirements would follow at a later date.

This process worked exceptionally well when the IMSA's warehouse stored 2,000 to 3,000 lines of stock, valued at $4 to $5 million. However, with the introduction of the Prime Vendor concept and the Government credit card, and with command pressure to reduce inventories at all levels, filling the units' requirements became considerably more difficult. The medical supply warehouse stocks at Madigan's IMSA dropped to less than 900 lines of stock worth approximately 20 percent of its former value. When the rangers, special forces, and division ready brigade presented their demands, the stocks simply were not there to support them.

There was no doubt that the needs of the rapid-reaction forces were valid. The question was what to do about them. Four options were considered—

- Require the units to purchase their medical supplies in advance and store them at their locations.
- Require the units to purchase their supplies in advance and store them at IMSA's warehouse.
- Have the IMSA purchase the supplies and store them for the units at IMSA's warehouse.
- Think of something new.

The first three options were discarded in short order. Neither the IMSA nor the units were in a fiscal position to purchase tens of thousands of dollars worth of supplies and store them on the shelf where they could deteriorate and be wasted. Budgets were just too tight. Further, the ranger and special forces units already lacked storage space for general supplies, so they surely did not have the secure storage space needed for the controlled substances that each unit needed.

After much consideration, the IMSA proposed using the templating process developed by the commander of the 6th Theater Medical Materiel Management Command at Fort Detrick, Maryland. The process is described in a pamphlet published by the Army Medical Materiel Agency entitled "TOE Medical Unit Guidebook for Using Prime Vendor." Using this process, a unit "templates" (models) its class VIII requirements and stores them in a data base. That template then is compared with the IMSA's limited on-hand stock that is stored in the medical supply warehouse.

Key to this process is developing a list of viable substitutes available from stocks within the warehouse inventory for specific drugs and medical and surgical supplies included in the units' templated requirements. In the medical world, this is a very sticky proposition. One drug may appear to be a reasonable substitute for another when, in fact, there may be subtle differences that could have an impact on a patient's health.

With the help of each unit's physician and pharmacy staff (frequently augmented by the Madigan Army Medical Center staff), a list of first-, second-, and third-level substitutes was developed for each unit's templated requirements. The first-level substitute could be a generic drug or item with virtually no difference from the one preferred. The second level could be a quantity-based substitute; for example, two 250-milligram tablets could be substituted for a single 500-milligram tablet. The third level could be a therapeutic substitute—a totally different drug or item that had been determined by a qualified healthcare professional to be acceptable in the absence of the preferred drug or item.

Once the list of substitutes was developed for each entry on the units' templates, the lists (with the substitutes) were compared with the IMSA warehouse's on-hand inventory. The results were amazing. There was a 90-percent match at the first two levels of substitution. In the end, all but approximately $30,000 worth of needed medical supplies could be provided directly to the three units from the IMSA's inventory.

Like other installation supply activities, the IMSA managed its warehouse inventory under the Army Stock Fund. By increasing operational quantities in the warehouse by the amounts required to support the rapid-reaction forces, the units' contingency stocks could be mixed with the IMSA's operational inventory at no expense to the units or to Madigan Army Medical Center. Since the units' medical supplies were stored with the IMSA's operational inventory, they were more likely to be used before their shelf life expired.

The next step was to input each unit's templated requirements into a functional data base that could be maintained easily and accessed constantly. A young officer working in the IMSA's logistics readiness section used Microsoft® Access 97 to develop a menu-driven, user-friendly, prompt-based program that was easily accessible by the units, the warehouse personnel who pulled the supplies, and the inventory manager who maintained the IMSA's stocks. This program was dubbed the "the contingency stocks data base."

Over the following few months, the IMSA signed a memorandum of understanding (MOU) with each supported unit, and the templates were brought on line. As each MOU was signed, the contingency stocks data base was tested to demonstrate to the unit commander that it would, in fact, support his needs. In every case, whether it was a short-notice test or an actual deployment, conducted during the day or in the dead of night, the units were provided supplies within 2 hours of receiving notification to move out.

Since completing the contingency stocks data base for the rangers, the special forces, and the division ready brigade, the program has been expanded to include non-rapid-reaction forces. The expansion was amazingly simple. IMSA replaced warehouse item location identifiers with Prime Vendor index numbers, depot stock numbers, or credit card ordering sources. Units will continue to be added to the data base until the Madigan IMSA has a complete picture of all of its customer's class VIII deployment requirements.

The hardest part of the templating process is deciding what medical supplies the units need to support known or suspected contingency missions. That involves a commitment of time and effort by each unit and demands the involvement of physicians, physician assistants, and nurses. Those personnel actually may work at the local medical treatment facility, and it may be difficult for them to participate. Once the templating is complete, the lion's share of the work is done, however, and the rewards will be great.

Templating and the contingency stocks data base have been proven successful again and again at Fort Lewis. Enhancements to the program in the future could include a direct link between the data base and the IMSA's automated inventory management system or unit access to the program through secure Internet sites. Equipped with an ability to identify, manage, and provide combat unit class VIII requirements in real time with a high degree of reliability, the IMSA and the units it supports at Fort Lewis and in the Army's Western Region are ready for whatever the future has in store. **ALOG**

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Cold War Ship Carries Army Cargo

On the 10th anniversary of the fall of the Berlin Wall, a ship built to carry Soviet military cargo was loaded with U.S. Army equipment bound for American peacekeepers in Kosovo.

"Ten years ago, I never would have imagined this," said Captain Oleg Stebnovsky, master of the Ukrainian cargo ship *MV Balakleya*. The loading took place on 7 and 8 November 1999 in Bremerhaven, Germany. As Stebnovsky spoke, he watched an Army Bradley fighting vehicle ascend the stern ramp. "It's a fitting tribute to this day in history—when the Iron Curtain [was] lifted across the continent. Today, we are working together to maintain the peace in Kosovo," said Stebnovsky, speaking English with a heavy Ukrainian accent.

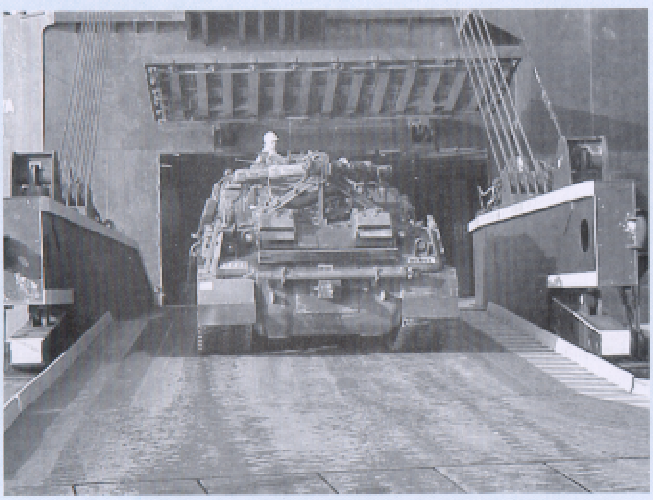
The *Balakleya* was contracted by the U.S. Navy's Military Sealift Command to carry some 700 pieces of equipment belonging to the Army's 3d Brigade Combat Team, 1st Infantry Division (Mechanized), to Thessaloniki, Greece. Loading was directed by the Military Traffic Management Command's 598th Transportation Group, based in Rotterdam, The Netherlands. From Greece, the cargo was transported north in long motor convoys through Macedonia to Kosovo. It arrived in the American sector of Kosovo in time for the mid-December relief of the division's 2d Brigade Combat Team, which deployed to Kosovo in July 1999. About 7,000 U.S. Army personnel based in Europe and the United States are deployed to participate in the North Atlantic Treaty Organization's Kosovo peace implementation force, or KFOR. The U.S. contingent, designated as Task Force Falcon, occupies the multinational brigade sector, southeast.

According to Stebnovsky, the *Balakleya* was designed and built specifically to carry heavy Soviet battle tanks and other wheeled and tracked vehicles and hundreds of troops. "The cargo hold entrances are some 20 feet in diameter. Every inch of this ship was calculated ac-

☐ **Equipment is staged at the Bremerhaven harbor awaiting shipment to Kosovo.**

For the first time in history, a Soviet-built ship is used to transport equipment for the U.S. Army.

☐ At left, the *Balakleya* sits in the Bremerhaven harbor. Above, Captain Oleg Stebnovsky (left), master of the *Balakleya*, stands with second mate Ruslan Snytsar onboard the Soviet-built cargo vessel.



☐ An M88 recovery vehicle is driven onboard the *Balakleya*. At right, the vessel's weatherdeck is loaded with U. S. Army equipment bound for Kosovo.

cording to Soviet battle tanks." In addition, "they built a sauna and a gym specifically for [the troops'] morale."

The voyage from Bremerhaven to Thessaloniki was the first time the *Balakleya* carried equipment for the U.S. Army. However, it was not the first time the ship had been used to transport cargo for the North Atlantic Treaty Organization. The vessel was used some months earlier to move British military equipment and supplies bound for Bosnia-Herzegovina to the port of Split, Croatia.

The *Balakleya*, named for a small city in the southern part of Ukraine near the Black Sea, usually carries commercial cars for companies such as Nissan Motors, observed Stebnovsky. "But," he added, "I hope we can do this again sometime in the future." **ALOG**

The Army Logistician *staff thanks Edward Baxter, Public Affairs Officer for the Military Sealift Command in Naples, Italy; Bram de Jong, Public Affairs Officer for the 598th Transportation Group in Rotterdam, The Netherlands; and John Randt, Public Affairs Officer for the Military Traffic Management Command, Falls Church, Virginia, for their input to this article.*

Improving Reserve Support to Power Projection Platforms

by Major Jeffrey A. Hughes, USAR

In an army that increasingly relies on power projection to accomplish its goals, the installations from which power is projected become critical to military success. These installations are known as power projection platforms (PPP's), and there are 15 of them in the continental United States (CONUS). In a large-scale contingency, the PPP's will be augmented by 15 Army Reserve garrison support units (GSU's). While the GSU's play a crucial role in supporting the PPP's, they face a problem: they do not have standard organizational structures. As a result, their operations are inefficient, and each GSU's ability to support PPP's other than its assigned installation is reduced. This problem will only get worse, because the structure of the PPP's is being redesigned for Force XXI and the Army After Next (AAN). I believe that the GSU's of today do not have the proper structure to support the PPP's of tomorrow.

I have identified five possible solutions for standardizing GSU structures, which I will discuss in this article. But I recommend one of them as superior: organizing GSU's with the same structural template that has been designed for PPP installation garrisons under Force XXI and the AAN.

Structuring for Power Projection

During the Persian Gulf War, the responsibility for receiving reserve component units and processing them for deployment fell to installation garrisons, which remained on each installation after the active component forces based there had deployed. However, because of personnel downsizing, the garrisons did not have enough people to handle the demands made on them. So, following the war, PPP's were formed to correct this problem.

A PPP is an Army installation that supports the mobilization, deployment, redeployment, and demobilization of soldiers and their equipment and supplies. Army Reserve GSU's were organized solely to augment the PPP's. GSU's expand active and reserve component installation base operations (BASOPS) requirements during contingencies and assist in other installation missions during annual training sessions. A GSU's major capabilities include—

- Providing administration, intelligence, operations, management, personnel processing, legal assistance, and logistics support.
- Assisting an installation to ensure the smooth, rapid mobilization of both active and reserve component units and their deployment to overseas theaters.
- Improving contingency operations with support to both on- and off-post units, as well as to reserve component units in annual training at the installation.

Organizing Army Reserve GSU's

An Army Reserve GSU is a table of distribution and allowances (TDA) unit. It mobilizes at its home station and then deploys to its assigned installation. Each GSU is tailored to serve a specific installation. Once it arrives at the installation, the GSU ceases to exist as its own TDA unit, and its structure reflects the installation's TDA. But by tailoring the structure of GSU's to that of installations, the terminology and core structure of GSU's have become inconsistent.

Research on GSU TDA's reveals that every GSU uses a different set of terms to describe its component sections and that every GSU has a different unit structure. Some GSU's have sections such as the arrival departure airfield control group (ADACG) and the directorate of personnel and community affairs, but others do not. This is a direct result of the function of GSU's to augment PPP garrisons. PPP installation garrisons are organized according to FM 100–22, Installation Management, which provides broad guidelines on garrison organizational structure and functional areas of responsibility. It gives a commander maximum flexibility to organize the garrison for the most efficient and effective management of BASOPS. Yet it also allows PPP's to have different structures based on these basic guidelines. To support PPP installation garrisons, GSU's therefore have had to adopt structures that parallel those of the PPP's.

The TDA's of the GSU's also show that GSU's have sections that perform the same tasks as their garrison equivalents but are called by different names. The GSU's often reflect terminology for sections and personnel that is used incorrectly at installation garrisons. Garrisons, according to FM 100–22, are to be organized with directorate staffs. Yet some installations continue to use terminology and sections associated with staff organizations as outlined in FM 101–5, Staff Organization and Operations. For example, PPP's sometimes use the wrong terminology and call the directorate of plans, training, and mobilization the S3 Section. In order for GSU's to augment those PPP's, their TDA's reflect this incorrect terminology.

These differences in GSU's cause confusion about the duties and responsibilities of various sections to support wartime or contingency missions. The Army uses standardized organizations to promote consistency in performance, responsibilities, training, and resources. Nonstandard organizational structures often are inefficient. The various PPP's often are unsure of the responsibilities of the sections within an associated GSU. Personnel within each GSU often are unsure of their own responsibilities to support the PPP and the responsibilities of personnel in other GSU's. Job descriptions for personnel are not standardized, so corresponding personnel in different GSU's cannot share information to assist each other, fill in for each other, or transfer positions.

Fort Benning, Georgia, offers a good example of these problems. Over the last 3 years, various GSU's have been tasked to augment and support Fort Benning. Fort Benning has sections in its PPP installation garrison that do not correspond to the sections in GSU's providing assistance. Personnel from various sections in the GSU must be tasked to provide temporary support to these noncorresponding PPP sections. Obviously this is very inefficient, as time is wasted delegating new assignments and training personnel in their new job tasks. During a deployment, time is of the essence. The Army of today, as a CONUS-based force, will not have the luxury to waste valuable time.

The only guidance to GSU's on their organizational structure has come from the U.S. Army Reserve Command (USARC). In March 1997, the Army Forces Command established a GSU process action team to conduct a mobilization and deployment functional area assessment, identify deficiencies in GSU's, and make recommendations for improvements. Based on these recommendations, USARC in 1998 directed that all GSU's supporting a PPP will have three core elements: finance, military police, and staff judge advocate. These core functional area changes became effective in January 2000.

However, these recommendations alone are not enough to make GSU's more efficient. Finance, military police, and the staff judge advocate are only small portions of a GSU. I believe that the Army should direct GSU's to standardize their entire structure in order to support their wartime mission efficiently and augment the PPP's of Force XXI and the AAN properly. Let's examine five solutions that the Army might adopt for improving GSU organization.

Organization Based on PPP Directorate Staff

Today, some GSU's use the organization of the directorate staff. A possible solution to standardizing GSU organization, therefore, is to require the use of directorate staff organization for all GSU's. FM 100–22 states that the management focus at the installation level is to be the directorate staff. Directors are the key management officials. Their delegated authority varies from full operational control of functions, to supervision of offices that have some autonomy, to providing basic administrative support. Based on guidance from higher headquarters and the installation or garrison commander, directors are responsible for programs, budgeting, and mobilization missions dealing with the deployment of individuals and units.

At the installation, staffs are categorized by duties and functions and are called special, personal, or support activity staffs. The staff size and composition will vary by installation based on its mission. If all GSU's were to standardize their structures using the directorate staff model, the special staff of the GSU would include the inspector general, staff judge advocate, internal review and audit compliance officer, public affairs officer, equal employment opportunity officer, and installation chaplain. The support activity staff would include the directors of plans, training, and mobilization; counterintelligence and security; personnel and community affairs; public works; contracting; logistics; information management; resource management; and the provost marshal.

Organization Based on PPP Facilities

A second possible way to standardize GSU organization is to require that all GSU's organize their sections according to the facilities at their assigned PPP's. Organization based on PPP facilities is being used in part by some GSU's. Examples of this include the ammunition and range sections.

The problem with this concept is that the various PPP's have different capabilities. Some facilities, such as warehousing, are common among PPP's, but others, such as those used for transportation, are not standard. For instance, some PPP's have airfields, while others have ports or railroads and railheads. Some GSU's thus have ADACG's, while others have a port support activity or a rail and yards section.

Another problem with this design is the difficulty that GSU's experience in supporting PPP's other than their assigned installation. When a GSU organized according to facilities tries to augment a PPP other than its assigned installation, it must undertake a massive redelegation of duties. For instance, personnel who usually augment railroads at their assigned PPP have to be retasked or retrained to augment a different section of a new PPP if that new PPP does not have a railroad.

Organization Based on Mandated PPP Facilities

A third possible solution is to standardize only those areas of a GSU that are needed to support the facilities required by FM 100–17, Mobilization, Deployment, Redeployment, Demobilization. FM 100–17 directs that each installation must have the facilities to house, feed, train, and deploy assigned units. By standardizing the GSU into directorates that support these facilities, each GSU would retain the flexibility to augment and support each installation's unique characteristics. Such a GSU would consist of six directorates: training, maintenance, supply, transportation, administration, and billeting.

The training directorate would have training, range, operations, nuclear-biological-chemical (NBC), and security sections. The training section would review the training status of individuals and units. The range section would assist in predeployment weapons training and qualification. The operations section would be responsible for the overall operation of the mobilization unit inprocessing center (MUIC) and the mobilization operations center and the tracking of individuals and units as they process through those centers. The NBC section would assist in predeployment NBC training, and the security section would help in submitting and processing security requirements.

The maintenance directorate would have ammunition, weapons maintenance, and vehicle repair sections. The ammunition section would manage and operate the ammunition supply point. The weapons maintenance section would inspect and repair weapons of deploying individuals and units. The vehicle repair section would inspect and repair all deploying equipment, including wheeled and tracked vehicles.

The supply directorate would have the property control and central issue facility (CIF) sections. The property control section would be responsible for ensuring accountability of all individual and unit property. It also would review and cross-level assets to ensure that all units deployed with necessary equipment. The CIF section would be responsible for ensuring that each individual soldier deployed with the equipment he needed to support the operation.

The transportation directorate would have the unit movement and transportation sections. The unit movement section would be responsible for ensuring that all unit movement plans, including the Automated Unit Equipment List and the Deployment Equipment List, were updated in accordance with Army regulations. The transportation section would be responsible for ensuring that the transportation needs of all individuals and units were arranged and coordinated. This coordination would require planning for all movements in and around the installation, movements to various ports, and movements to training facilities throughout the training area.

The administration directorate would include the identification cards and tags, military pay, MUIC, soldier readiness processing (SRP), family support, and casualty assistance sections. The identification cards and tags and military pay sections would take care of the functions reflected in their names. The MUIC section would consist of administrative personnel provided to the MUIC (which is controlled by the operations section of the training directorate) to conduct an initial assessment of each individual or unit and determine their deployability. The SRP section would be responsible for the overall operation of the SRP center, which corrects personnel and equipment deficiencies of units and equipment deficiencies of individuals before they deploy. The family support section would be responsible for ensuring that family members receive the assistance they need before and during the deployment.

The billeting directorate would have operations, billeting, and supply sections. The operations section would schedule individuals and units in and out of housing and provide overall command and control of billeting. The billeting section would be responsible for assigning housing to deploying individuals and units. The supply section would issue linens and provide necessary supplies to housing facilities.

A GSU organized with these six directorates—training, maintenance, supply, transportation, administration, and billeting—would be required to have the sections listed for each directorate but would have the flexibility to add sections based on the needs of its assigned PPP. If the GSU was assigned to a host PPP that did not include one of its additional sections, that section, as a whole, would be reassigned to another area of need at the PPP.

Organization Based on Teams

A fourth possible solution is to create a team structure. Each team would have the capabilities of the entire GSU organization in miniature. Sections would be configured with personnel having the functional abilities listed in FM 100–22: training, maintenance, supply, transportation, administration, and billeting.

This structure would give GSU's the ability to send teams to augment and support installations without having to mobilize the entire GSU. Such a capability could expand the functions that GSU's could perform to help units improve their readiness. For example, teams from a GSU could be sent to units to conduct readiness assistance visits. These visits would determine and correct unit deficiencies, so that the units would be ready for deployment on a moment's notice. This would be invaluable to units with a latest arrival date of less than 30 days. A team structure, with personnel in the functional areas common to all PPP's, would allow a GSU to augment and support PPP's other than its assigned installation without having to undertake massive reassignments of personnel.

Organization Based on PPP Template

A fifth possible solution is to restructure GSU's to reflect the new template of the PPP installation garrison. PPP installation garrisons are being reengineered so they can operate more efficiently and with fewer personnel in preparation for Force XXI and the AAN. They are being redesigned to work like businesses that are aligned by the processes needed to produce their products. Installation processes thus are being grouped into similar functions, linked to key business drivers (core competencies), and assigned to business centers. This process will reduce redundancies and inefficiencies that currently occur within garrison organizational structures.

The structure recommended for the PPP installation garrison includes a strategic planning office (SPO); a supporting installation business office (IBO); and five business centers, each with an internal business office providing budgeting, personnel, and contracting capabilities. The SPO supports the installation mission and the business centers. It performs installation strategic planning, integration, and synchronization, using personnel currently in garrison staff positions, and includes a strategic planner and staff. The IBO supports the five business centers and contains all assets needed to program and reprogram resources to meet customer requirements. It also provides personnel and contracting services. It includes a chief financial officer, contracting officer, and personnel officer.

Of the five business centers, the readiness business center supports the installation mission by deploying the force and maintaining readiness. It incorporates functions performed by the directorate of plans and operations, the personnel security section under the directorate of counterintelligence and security, and the mobilization and reserve components training branch under the assistant chief of staff for reserve components. It includes divisions of training; logistics; and plans, operations, security, and mobilization.

The community activities and services business center supports the installation mission by maintaining quality of life programs. It incorporates the installation organization known as the directorate of personnel and community activities. The new business center includes divisions of community and recreation, personnel support services, risk reduction, education, and hospitality.

The information technology business center improves installation efficiency by providing, supporting, and securing information technology. The installation organizations replaced by this center include the directorate of information management and the information security section under the directorate of counterintelligence and security. The new center includes divisions of automation, communications, and informational services.

The public safety business center supports the installation by providing security and safety to the installation and the force. Installation organizations that are incorporated in this center are the provost marshal, the directorate of safety, the directorate of counterintelligence and security manager, and the fire department and hazardous materials section from the directorate of public works and environment. The new business center includes the police department, fire department, and safety office.

Finally, the public works business center supports the installation mission by maintaining readiness and quality of life and sustaining the environment. The installation organization included in this center was previously known as the directorate of public works and environment. The new business center has facility maintenance, housing, environmental and natural resources, and construction management divisions.

This structure accomplishes the GSU mission of supporting an assigned PPP without sacrificing the flexibility a GSU needs to augment any PPP installation garrison. It is a logical alignment of GSU functions and responsibilities. By using the same structure as the garrison and thus the same terminology to describe functional areas and personnel, it facilitates communication between the PPP and GSU. It also eliminates confusion about who is responsible for what within a GSU. This organization streamlines processes and creates a more integrated operation.

I believe that a GSU organization based on the PPP installation garrison template for Force XXI and the AAN is the only possible solution that prepares GSU's to support the PPP's of tomorrow. The other solutions may be excellent possibilities for standardizing GSU's for today's Army. But it would be a waste of time and resources to implement a solution that would not be the best for Force XXI and the AAN. By the time changes in GSU structure were in effect, PPP's already would be transitioning to the new Force XXI and AAN structures. The GSU's would not be able to augment them effectively, and thus the GSU structure again would be outdated. The Army should mandate that Army Reserve GSU's adopt the structure of the PPP Installation Garrison Template for Force XXI and the AAN. **ALOG**

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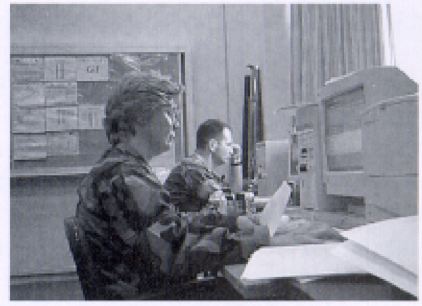
Prairie Warrior Logistics Challenge



by Lieutenant Colonel Joseph B. Lofgren
and Major Mark E. Stewart

"Managing continual change." It's the only way to describe the efforts of the logistics operations cells during the thick of the fight in exercise Prairie Warrior. Officers are all over the room in small groups of two or three—posting status boards, updating briefing charts, and reaching decisions that make sustainment of forces in the field possible. In the background, printers stream forth reams of paper containing logistics updates and status reports requested by commodity managers.

As fast as the printouts come, they are quickly ripped from the printers and electronically transmitted to various locations in the log cells to be analyzed and acted upon. Analog and digital information is fused together by action officers. Officers operating computers stare intently at their terminals as keyboards click throughout the room. They are extracting pertinent information needed by the commander to offset a potential sustainment problem.

Occasionally, a terminal operator shouts above the fray so that his report of a developing situation can be heard and understood by everyone in the room. Simultaneously, briefings are ongoing to update the chain of command. A sidebar discussion focuses on preparing yet another briefing that is scheduled in only a few hours, or even minutes. Noticeably mixed in with the camouflage-clad students are several civilian contractors. Referred to as "tie guys," they move hurriedly from terminal to terminal, attempting to head off any unforeseen hardware or software glitches that would hold up the exercise. All the while, in spite of the chaos, learning is taking place.

For each resident class of the Command and General Staff Officer Course (CGSOC) at the Army Command and General Staff College at Fort Leavenworth, Kansas, the academic year culminates in the capstone exercise known as Prairie Warrior (PW). PW is a corps-level Battle Command Training Program warfighter computer simulation that is designed to demonstrate the students' military decision-making and leadership abilities. All facets of military planning were included in PW99, including logistics. The training objective for the logistics students involved with the exercise was to plan and execute combat service support operations, with an emphasis on using logistics automation systems; managing the reception, staging, onward movement, and integration (RSOI) process; and sustaining the battle.

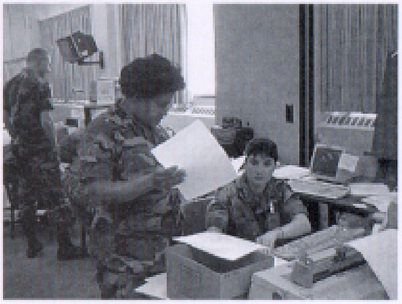
Learning and Planning

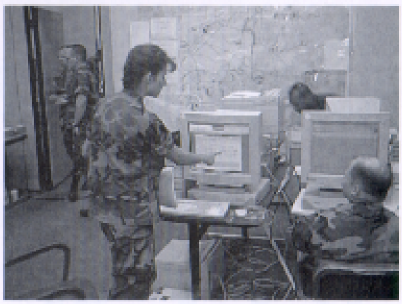
Although PW99 lasted only 2 weeks, planning for the simulation began several months earlier. The initial preparation for PW99 included selecting logisticians from the class who would compose the table of distribution and allowances (TDA) for corps, corps support command (COSCOM), and division units. Students were chosen for various roles based on instructor input, their future assignments, and by volunteering. The 85 logisticians from the CGSOC class who participated in PW99 ranged across the spectrum of the logistics branches and brought widely varying levels of experience to the exercise. Most students selected as PW logisticians served in the exercise as unit commanders or support operations officers or acted in other primary logistics staff positions, including a notional joint staff.

After completing required core classes during Term I of the academic year, the logistics students involved in PW attended classes in which they began planning for the exercise using the military decision-making process. Each logistician attended at least one of six preparatory courses designed to facilitate interactive sustainment and coordination planning for the student-authored corps operation plan (OPLAN). In addition to the classes required to plan for the exercise, the PW participants continued to take a full graduate-level course load. These supplementary elective courses, while not directly related to PW, focused on history, joint and multinational operations, and other military-related subjects. Time management became critical for the students as they sought to meet both their non-PW academic demands and PW planning requirements.

Overcoming the Corps-Level Challenge

Logisticians had numerous challenges in planning and executing sustainment for PW99. The most significant challenge was to overcome their inexperience. Most students attending CGSOC have not served in staff po-





sitions above the division level. The entire PW99 exercise was planned and executed by students who role-played commanders and associated staff members from the corps and division levels. These students, acting in the roles of more senior officers, were afforded the opportunity to learn corps-level sustainment operations firsthand. Student logisticians not only participated in the estimate process and military decision-making process for the corps OPLAN, but they also created numerous comprehensive execution orders based on the corps plan for subordinate logistics units in the exercise's task organization.

This was no easy accomplishment when one considers the students' already significant academic work loads. Consequently, in addition to learning how to function as a cohesive staff, the students had to use a large portion of their PW classroom time learning applications of logistics doctrine at both the operational and tactical levels. Not all student logisticians come to CGSOC with the same knowledge and experience levels, so a baseline of current logistics doctrine had to be established before full-scale planning for PW logistics support could begin.

Specific factors that had to be reckoned with were theater RSOI, use of the Combat Service Support Control System (CSSCS), and the threat posed by a world-class opposing force intent on disrupting the logistics flow. Further complicating the PW logisticians' mission was a mixed digital- and analog-supported force that was not only joint but multinational as well. The use of this force supported the idea that we will deploy and fight with both analog and digital units for a time into the future, until the entire force is upgraded to the digital mode. Finally, but no less important, adding formidable and restrictive terrain to the scenario called for creative problem-solving from combat arms and logistics planners alike. Doctrine provided the guiding principles for "out-of-the-box" solutions to tough logistics situations.

Producing Better Logisticians

Education of the students took place in three areas. First, the students had the opportunity to explore, understand, and appreciate the tasks performed by both their superiors and their subordinates in the sustainment planning process.

Second, the planning process, before actual execution of the exercise, proved to be the most valuable learning experience for the logisticians in PW. Students quickly found that coordinating and synchronizing the support plan with the maneuver plan at all levels was essential for success and that the ability to forecast needs one mission ahead of the current operation won the logistics battle. The log planners anticipated future support requirements from the PW force in the field, while remaining flexible enough to react to unexpected near-term requirements. Getting the right mix of units, by type and capability needed to meet those requirements, to the right place on the battlefield proved to be a formidable, but not unworkable, task.

Finally, the students gained appreciation for CSSCS and its capabilities to help logisticians make timely, accurate support decisions based on near-real-time information.

Success in the tough PW scenario was not easy for the student sustainment planners. However, armed with recently acquired logistics doctrine and mentorship from the Command and General Staff College Department of Logistics and Resource Operations, the student logistics chain of command created, synchronized, and executed a successful sustainment plan that served as a positive enabler for combat operations in PW99.

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Capitalizing on Digital Logistics at CGSC

by Lieutenant Colonel Sanford T. Sheaks

The Army Command and General Staff College is using the Combat Service Support Control System in the simulated Prairie Warrior exercise to show its students the power of information sharing.

The Command and General Staff Officer Course (CGSOC) at the Army Command and General Staff College at Fort Leavenworth, Kansas, is integrating instruction on the Combat Service Support Control System (CSSCS) into its curriculum, and it is having great success using the system. The end-of-course command post exercise (CPX) called Prairie Warrior gives us an outstanding picture of how CSSCS will be used in the near future and shows students at first hand how to provide command and control for division support command (DISCOM) units in a digital division.

What Is CSSCS?

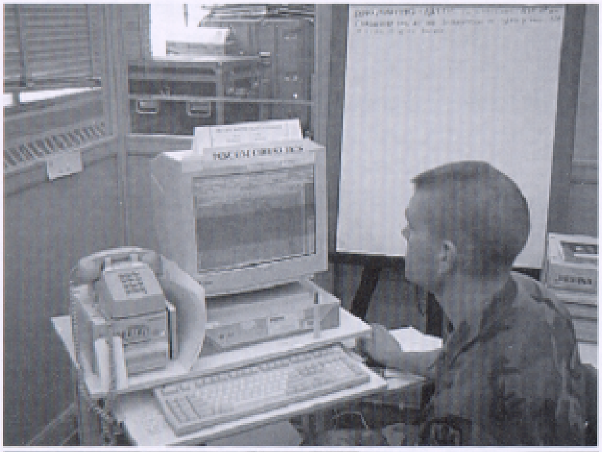
Previous articles in *Army Logistician* have detailed the purpose and capabilities of CSSCS. Here is a much shorter summary: CSSCS provides selected logistics and operational information that supports logistics awareness and decision making to both logisticians and operators. CSSCS is unlike Standard Army Management Information Systems (STAMIS), such as the Unit Level Logistics System. STAMIS provide highly detailed logistics data and are used for commodity management. CSSCS provides logistics information that can be tailored for specific needs and is used for command and control—it puts logistics data into operational terms. CSSCS receives data from supported units, supplying units, and national systems, and it displays information that is useful to both the logistician and the tactician.

CSSCS obtains logistics data from various sources on the battlefield. However, until the spring of 1999, CPX's and Battle Command Training Program warfighter exercises had very limited success in pulling in all the required data for making CSSCS useful. As a consequence, CSSCS was used mainly for e-mail transmission and word processing. Along with its companion Army Tactical Command and Control Systems (ATCCS), like the Maneuver Control System (MCS) and the Army Field Artillery Target Data System, CSSCS was not living up to all of its advertised capabilities during computer-simulated CPX's. All that changed with Prairie Warrior '99. What made our experience at CGSOC so successful was that the simulation community was able to input the logistics data to CSSCS.

The Prairie Warrior Environment

Prairie Warrior is a 5-day CPX that uses a confederation of simulation models to depict the modern joint and combined battlefield. CGSOC students, plus U.S. sister services and foreign allies, participate in the exercise, fighting a well-equipped and well-trained foe on the island nation of Pacifica.

During Prairie Warrior '99, we simulated the battlefield environment as the Army thinks it will be in 8 years—in other words, with all of the Army's planned



high-tech digital enhancements fielded and in use. For example, when the Force XXI Battle Command Brigade and Below (FBCB2) computer system is fielded to maneuver battalions, each combat vehicle will be able to provide location and logistics data up the chain digitally, with little human prompting or interaction. This future system was one of the several inputs to both MCS and CSSCS in Prairie Warrior, providing both battlefield awareness and maneuver unit logistics awareness.

The CGSOC logisticians involved in Prairie Warrior '99 were assigned positions within a digital DISCOM. We simulated the 4th Infantry Division (Mechanized) (4ID) by using their modification table of organization and equipment and by learning and practicing emerging digital doctrine. Student logisticians planned the logistics fight at the division, DISCOM, and support battalion levels, and they fought against the world-class opposing force along with 130 other students simulating all the major 4ID units. Students also role-played the key positions at the corps and corps support command levels to assist in creating a realistic exercise.

Receiving Data on CSSCS

The most significant benefit of CSSCS use for the students was that the two simulation models—the Combat Service Support Training Simulation System (CSSTSS) and the Corps Battle Simulation (CBS)—and the interface software between them provided the students with detailed logistics and operational data routinely and assuredly. Students could see 1½-hour-old unit location data down to the battalion and company levels and known enemy location data, and all with user-friendly graphics and operational information. CSSCS also portrayed direct support supply stock status for classes I (subsistence), II (personal demand items), III (petroleum, oils, and lubricants, both bulk and packaged), V (ammunition), and IX (repair parts). Additionally, it showed unit data for bulk class III, class VII (major end items), and personnel.

For muddy-boots soldiers, CSSCS assisted greatly in generating and passing logistics status (LOGSTAT) information. CSSCS collected status data on both equipment and supplies and provided a LOGSTAT report whenever needed. This happened automatically by feeding STAMIS data (normally received on the battlefield on a floppy disk) through the combat service support simulation driver, CSSTSS. This was very handy and saved a lot of manual effort.

Providing a Common Picture

The information obtained from CSSCS provides a robust picture for staff officers. Under the Army Battle Command System, of which it is the logistics component, CSSCS furnishes "the common relevant picture." All nodes in the ATCCS network, no matter the level or battlefield function, can see what everyone else sees. An MCS station in a maneuver brigade can connect to a CSSCS node and obtain information on battle losses, the personnel situation, and fuel and ammunition requirements for units in the brigade. A CSSCS station can connect to an MCS station and view current friendly and enemy unit locations to coordinate resupply operations better and avoid known enemy positions.

One student playing a forward support battalion (FSB) commander used operational graphics to maneuver his units through an area that was seeded with enemy minefields. He called up engineer overlays that showed the most current breeches and minefield locations. He also saw the last known enemy locations in the rear area, which affected his decision making about future positions. This is simply using automation to share information, and all users have access to the data.

Another student FSB commander used the reports function in CSSCS to make ad hoc inquiries of the supply point and unit data base. He tailored the report designs and created information that was most relevant to his requirements. Additionally, he received all orders and messages through CSSCS, thus keeping informed of current and future tactical plans. He reported on these techniques at nightly after-action reviews, and other commanders and staff officers then were able to learn the same techniques and use them the next day.

Optimal Conditions at the CPX

During Prairie Warrior, CSSCS and the other ATCCS were able to tie together the battlefield operating systems by sharing information with those who needed it. In our little digital CPX world, where the clerks were perfect and the signal shots were always up, the information was fast and reliable—and useful.

All was not perfect with our digital simulation, though. Student players sometimes would find inconsistencies in data as they cross-checked sources, and the two simulation models varied occasionally in supply and equipment nomenclature (not unlike the real world). Nevertheless, enough data were passed to CSSCS that we had a reliably accurate and consistent picture of the current situation. In the CPX world, things will get better and better and result in better training and more confidence in our digital command and control tools.

In the old analog world, the DISCOM battle staff noncommissioned officers (NCO's) in a division rear command post (CP) would become expert at making the rounds in the CP complex to collect data. They then would post the data to maps, update charts, and post new reports to briefing books. All of this was used to provide the DISCOM commander and staff with logistics and operational information to aid in command and control and decision making. It took time.

I had great faith in our analog system because we rehearsed it and understood how to use it to collect the data we required. But while the analog way worked (and still works), it required a lot of human motion and tedious handwork to make the information available and useful. The digital method requires attention, but not nearly as much manual effort as the analog and flat-map way I first learned.

Regardless of the Force XXI division structure or digital versus analog command and control methods, staffs must be trained on the tools available. It seems that not many soldiers are aware of what is available now through ATCCS and the power of mass information-sharing. Soldiers at all levels in the command and control process must know about CSSCS and how to use it. The CSSCS operator, his NCO, his captain, the executive officer, and the commander must have a thorough understanding of the capabilities and limitations of the system. Then they must train for battle with it to see how it actually fits into and complements the command process. They must know through experience which information sources are reliable and which might be suspect. They must know how to avoid the problems of deskside management and micromanagement, both of which can be pitfalls when so much operational data are available so readily in the headquarters. This will take a lot of training, both in the schoolhouse and in the field. Units must train with and deploy with CSSCS.

But wait a minute. The Army doesn't yet have all the "enablers" fielded to make this digital system work fully. We are using a combination of the new and the old. The signal system doesn't have enough bandwidth or the right new equipment; all the old STAMIS are relics and often require floppy disk data transfer or cumbersome e-mail gyrations; the data will still be garbage if we don't watch the inputs; and so forth. All true. But our only option is to change everything at once, and no nation can achieve such a feat. The Army is making solid progress in information dominance on the battlefield, and eventually we will be able to execute our decisions far ahead of our analog competitors. It's getting a lot better, as we have learned at the CGSOC. **ALOG**

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Integrating Active and Reserve Component Training

by Major John Knight, USAR

Increased deployments and decreased budgets, when combined with a reduction in force structure, are having an adverse effect on the Army's readiness posture. But the Army's leaders cannot afford simply to wait for increased budget allocations to solve the problem. Instead, they should focus on what they can do immediately to increase readiness with little or no increased spending. This requires creative thinking to implement imaginative, low-cost programs that will enhance combat readiness.

One solution has been increased use of the reserve components (RC). This is in line with Force XXI doctrine, which relies heavily on RC augmentation. But RC units arguably are worse off than their active component (AC) counterparts. Many RC units are having difficulty maintaining current readiness standards. Many units still have obsolete equipment, and those with newer equipment struggle to meet new training and maintenance requirements.

Despite congressional directives to move towards a "seamless Army," the AC and the RC continue to compete for limited resources and, by and large, remain separate entities. It is imperative that these two forces begin working together more closely in order to enhance the Army's total force-projection capabilities. If Active Army, Army National Guard, and Army Reserve forces continue to compete for resources and continue to train in relative isolation, overall Army readiness will suffer. In fact, if budget constraints and current operating tempo continue and the Active Army continues to deploy in multiple operations other than war, a return to a "hollow Army" is inevitable.

Given the monetary, training, and equipment restraints facing both AC and RC forces, the Army must find the most efficient and cost-effective means of training RC combat service support (CSS) units within the Force XXI structure. I believe that the solution is a partnership program similar to the North Atlantic Treaty Organization's (NATO's) interoperability training program. Project Partnership is aimed at increasing individual and collective training through exchange programs between the AC and RC.

Integrating AC and RC CSS Units

There are many current initiatives that have brought the two components closer together, such as full-time AC personnel serving in RC units, AC regional training brigades using lane training methods to train RC units, and RC units participating in Operation Bright Star and other major joint training exercises. These programs are needed to enhance collective and unit training, but they often fall short of training individual RC soldiers on new, sophisticated equipment using the most modern doctrine in realistic environments. As the Army moves forward with Force XXI doctrine and training-intensive technology, it faces even greater challenges in preparing, manning, and equipping RC forces to integrate seamlessly.

TRADOC Pamphlet 525–53, Operational Concept Combat Service Support, makes the following major assumption regarding RC forces in Force XXI—

> In addition to support provided by the active Army, both the U.S. Army Reserves and the Army National Guard will be relied upon to provide a number of CSS units and functions in support of the full range of military operations and missions. Given a shrinking force structure and declining defense expenditures in general, this reliance on RC CSS capabilities will increase in the future. The RC will continue to maintain a significant portion of the Army's CSS force structure.

It is imperative, therefore, that RC forces are trained, equipped, and manned properly. However, military planners at the highest levels are still grappling with the question of how best to integrate the RC into the Force XXI structure. As former Assistant Secretary of Defense for Reserve Affairs Stephen Duncan stated—

> The Total Force Policy of the future should not attempt to make active, career soldiers and reserve soldiers fungible items or mirror images of each other. Given the limited training and budgets, it is unrealistic to attempt to make all or even most reserve units the absolute equal of the best active units. The readiness and capability of many reserve units, however, do compare very favorably with those of active units and because of previous military or civilian experience, many reservists have individual capabilities and technical competence that exceed those of active soldiers. The objective must be to integrate the capabilities and strengths of active and reserve units in the most cost-effective manner, i.e., in a manner that

provides the most total military capability and flexibility possible within the limitations of the budget.

AC and RC Training Limitations

Because AC and RC forces face monetary difficulties and RC forces in particular have severe training constraints, both components could benefit from combining their personnel, training, and equipment assets and drawing from each other's inherent strengths. Properly executed, the product—combat readiness—would be greater than the sum of the parts.

Each component faces unique training restraints. In an August 1998 *Army Times* article, Colonel Richard Geier, Director of the Army Armor School, asserted, "The bottom line is, our base ops are just not funded, and so training is subsidizing base ops. That's what's happening across the [Active] Army." RC forces also must work and train within austere budgets. Moreover, they face severe training limitations. Reservists normally are limited to 39 days of training per year: 24 days of individual drilling time (IDT) and 15 days of annual training (AT). Because many RC units do not have enough money to conduct mission-essential task list (METL) training in a field environment, particularly during drill weekends, much precious training time is lost doing non-mission-essential tasks.

For example, if individual RC soldiers could integrate their training days with the training of AC units, both would benefit from the exchange. The AC unit would gain soldiers to supplement their inevitable personnel shortfalls, while the RC soldiers would receive individual skills training in a field environment using modern doctrine, tactics, and equipment. This kind of exchange does occur, but it is coordinated far in advance and only for limited numbers of soldiers in limited specialties and only for very select missions. It rarely occurs on a habitual basis between AC and RC units with similar missions below brigade level.

Project Partnership

A regular training relationship is exactly what General George S. Blanchard, then commander of U.S. Army, Europe (USAREUR), sought to encourage 20 years ago through Project Partnership, except that the units involved were multinational rather than U.S. Army AC and RC units—

> Project Partnership is a program that is designed to promote better working relationships between American and German units. Comparable-type units sign partnership agreements to train, work and play together. The underlying thought is that units that can work and play together will be able to fight together.

These exchanges took place not only at the individual level but also at the collective and unit levels and higher. NATO Return of Forces to Germany (REFORGER) exercises stressed logistics interoperability in order to conserve limited support resources. CSS units from two countries participated in win-win scenarios in which more realistic and efficient training occurred at a lower cost. This type of habitual relationship can be established at a minimal cost.

Just as interoperability is a combat multiplier within NATO, so can integrated AC and RC training increase the force-projection capabilities of the Total Army. Combined training must be integrated into every single training opportunity and at all levels of training, individual and collective. AC and RC units must plan their training schedules with their counterparts in mind. If an RC company conducts AT, for example, it should coordinate with its partnership units and request individual augmentees where it has personnel shortages. Similarly, every time a unit conducts marksmanship training, it should offer slots to its counterparts to take advantage of the opportunity and save money. Such events foster increased understanding by both AC and RC soldiers of the other's role. Overall unit readiness would improve on both sides if such partnership units took full advantage of each other's training opportunities.

Ideally, these unit partnerships would occur between units with similar missions and within the same geographical area. For RC units near major Army facilities, training opportunities could be significant. Unfortunately, many RC units are located in remote locations, far removed from active-duty installations. Their unit partnerships generally would be confined to exchanges during annual training periods and during AC collective training exercises.

There are very restrictive regulations regarding combining IDT days, traveling beyond a 50-mile radius of the unit, and conducting training on other than drill weekends. These regulations need to be evaluated to allow for more flexible and productive training. If RC personnel could combine IDT training days into longer blocks of time, they could participate in realistic AC collective training, such as at the National Training Center and the Joint Readiness Training Center. Sending RC soldiers to training centers and active-duty soldiers to RC AT would create additional travel costs. But these travel expenditures would be a small price to pay for the opportunity to conduct realistic, integrated training. Units should make this kind of travel a high priority. Additionally, RC units should attempt to send key leaders to such exercises in order to take advantage of train-the-trainer opportunities.

These types of training exchanges deviate from the traditional fixed drill weekends culminating in a final 2-week AT period. While not all individual reservists have the flexibility to miss additional workdays beyond their 2-week AT to attend AC collective training events, many can and will seek out such training opportunities. This type of flexible training must be incorporated into RC training because Force XXI envisions multifunctional, modular, tailorable, and flexible CSS units that can task-organize and operate using split-based operations. If individuals or teams habitually train with AC units, the experience gained will simplify their integration into a Force XXI CSS force structure during future deployments.

Mutual Trust and Respect

Sending individual soldiers outside of their chain of command entails risk. Partnership units, when working together closely and often, must overcome issues of mistrust and preconceived notions. Habitual partnerships should be instituted with long-term goals in mind. Partnership units, if managed correctly, will achieve trust and confidence in each other's leaders and abilities. The potential long-term benefits seem to outweigh the risk of exposing soldiers to an unfamiliar unit's leadership. After all, the Total Army concept mandates that AC and RC units will have to rely on one another in combat situations.

Reserve Force Modernization Problems

Besides improving the integration of AC and RC units for future deployments, a partnership program also would benefit RC units greatly by allowing them to train on the latest Army equipment. Reserve units are usually among the last to receive force modernization equipment. As the Army continues to field highly sophisticated equipment under Force XXI, RC units will not be able to keep pace with their AC counterparts. New Army doctrine emphasizes the increased use of RC forces and the fielding of more complex, computerized equipment, which will require more intense initial and sustainment training. Most RC units will not see this equipment until they are mobilized. By then, it will be too late. There simply will not be enough time to conduct extensive post-mobilization training.

RC units faced this problem during the Gulf War. Upon mobilization, many RC units finally received the most modern equipment, but they had to extend their post-mobilization training period in order to field it and become proficient in using it. According to a 1993 General Accounting Office report—

> . . . if reserve forces are to be effectively integrated with active forces in future contingencies, reserve units need to gain experience during peacetime on the equipment they will use when mobilized. Although improvements have been made in this area, the significant equipment shortages that surfaced in mobilizing reserves for the Gulf war indicate room for improvement. Given limited resources, the cost of filling shortages must be weighed against the risks of being unable to correct the shortages upon mobilization and the impacts such shortages could have on the units' ability to deploy.

A partnership program proposal would allow RC soldiers to train on the newest equipment, thus enabling them to draw pre-positioned supplies or be issued new equipment at their mobilization stations without requiring a significant amount of post-mobilization learning time. It is likely that the Army will not have the luxury to conduct extensive post-mobilization training during future deployments, as was the case during the Gulf War. We must prepare during peacetime by immediately implementing partnership training programs.

Implementing Partnership Policies

The Army must implement policies that both mandate and encourage AC and RC units to form habitual relationships and see that exchanges occur regularly. Project Partnership is based on a USAREUR training regulation that mandates certain relationships; exchanges usually are encouraged through numerous incentives, such as annual awards to the most active partnerships and the most innovative interoperability exercises. Units within USAREUR normally include interoperability training as part of their quarterly training briefs.

These same policies easily could be incorporated into the Total Army, and at very little cost. The overall impact would be increased individual RC soldier competence, improved AC and RC collective training exercises, and decreased cultural barriers that exist between AC and RC soldiers and leaders.

General Blanchard was able to overcome language, equipment standardization, and cultural and doctrinal differences within NATO forces to improve combat readiness through interoperablily training. Surely today's Army can overcome the differences that exist between AC and RC forces to become a "seamless" Army instead of a "hollow" one. Only through integration can the Army of Excellence achieve the vision of Force XXI.

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Determining War Reserves: A Better Way

by Henry D. Simberg

Using equipment usage profiles and improved part reliability estimates to calculate class IX war reserve stocks yields some surprising results. But these tools will ensure that the soldier has the parts he needs.

According to the Army's Defense Planning Guidance, war reserve requirements are to be based on supporting two major theaters of war nearly simultaneously. The Army Materiel Command (AMC) currently is responsible for the Army's war reserve requirements determination process. The Army War Reserve Automated Process (AWRAP), within the Commodity Command Standard System (CCSS), provides the standardized method of computing war reserve requirements at AMC's major subordinate commands. The Tank-automotive and Armaments Command (TACOM), Aviation and Missile Command, Communications and Electronics Command, and Soldier and Biological Chemical Command all generate war reserve requirements yearly using the AWRAP.

Basically, the AWRAP consists of determining the appropriate quantity of soldiers and end-items needed for the two-major-theaters scenario, generating the secondary item requirements for supporting that scenario, and posting the results within CCSS as well as in the Army's Total Asset Visibility data base.

However, the existing wartime class IX (repair parts and components) logistics planning factors do not represent the Army's current wartime planning guidance. Supporting the M1A1 Abrams tank in a wartime scenario is a case in point. By using equipment usage profiles and improved wartime part reliability estimates, the Army can gain a more accurate picture of the tank's expected wartime use and part reliability in a theater of war. The use of these improved estimates may increase the M1A1's class IX war reserve requirements (and war reserve budget requirements), but the resulting stocks will reflect more accurately what will be needed in theater.

Class IX AWRAP

The Provisioning Master Record (PMR) is the primary source for the class IX portion of AWRAP to obtain detailed spare and repair parts information on those end items selected for war reserve consideration. The PMR is a parts data base used primarily to determine initial and follow-on provisioning of an end item, as well as war reserve requirements. The PMR is developed during the end item's acquisition phase and is updated frequently throughout its life cycle as part changes and modifications occur. It contains much of the essential information needed to compute class IX war reserve requirements, including each part's national stock number (NSN), unit price, wartime reliability estimate, maintenance data, and wartime essentiality to the end item.

The Total Army Equipment Distribution Program (TAEDP) also is used in the class IX portion of AWRAP to identify the specific end items, along with their respective densities, planned to be deployed in each theater of war. For war reserve end items identified by the TAEDP, AWRAP extracts and builds a class IX parts data base from the appropriate PMR's. The resulting parts data base then is linked to the TAEDP's list of end item densities by theater. Once this process is completed, AWRAP uses the Optimal Stock Requirements Analysis Program to compute class IX requirements by theater.

Failure Factor 2

A crucial class IX data element that greatly affects the requirements determination process in AWRAP is the wartime reliability estimate. This is the primary indicator of the logistics support (in the form of supply or maintenance) that a part will require during wartime. Wartime part reliability estimates are located in each end item's PMR and are labeled failure factor 2, or FF2. According to the CCSS Provisioning Guide, "The Failure Factor 2 represents the number of wartime reliability failures requiring removal and replacement of a support item, per 100 end items per year, based on a known or estimated usage."

Class IX FF2's initially are computed by a contractor during the logistics support analysis process and are provided to the Government as part of the information it must deliver (in this case as part of the PMR). The Government then is responsible for updating the FF2's as required.

One of the problems with using class IX FF2's, however, is that the "known or estimated usage," as expressed in the CCSS Provisioning Guide, either is not known or is based on obsolete information. The Army has had no officially approved usage profiles for the current two-major-theaters scenario on which to base its FF2's. As a result, the AMC major subordinate commands have not updated their parts FF2's to reflect the current wartime planning guidance. In fact, in many instances, the FF2 is simply a multiplier of the peacetime reliability estimate, or failure factor 1 (FF1).

The practice of determining an FF2 based on a multiple of FF1 is condoned by the Army. This is demonstrated by the CCSS Provisioning Guide, which allows the use of peacetime multipliers to estimate wartime reliability. These multipliers typically are based on what type of part goes on an end item. For example, according to the CCSS Provisioning Guide, a multiplier of 1.5 should be applied to a part's FF1 to compute its FF2 if the part is included on an end item's fire control system. If a part is included on an end item's communication system, a multiplier of 2.0 should be used. To illustrate this point, if a fire control part on the M1A1 tank has a peacetime FF1 of 10 failures per 100 end items per year, the multiplier of 1.5 will be applied, and its wartime FF2 will be computed to be 15 failures per 100 end items per year.

Here is the crux of the problem. The existing class IX wartime reliability estimates do not represent the Army's current planning guidance for supporting two major theaters of war nearly simultaneously. As a result, the Army's wartime requirements determination process, as it exists today, does not yield valid class IX materiel requirements. Senior military leadership has recognized this deficiency and as a consequence, in recent years, has provided no new money for the Army's war reserve budget.

The Proposed Solution

In recent years, there has been a coordinated effort among the Army's Deputy Chief of Staff for Logistics, Headquarters AMC, and the Army Materiel Systems Analysis Activity (AMSAA) to develop more accurate class IX wartime reliability estimates. The proposed solution for this challenge involves calculating estimates using two data elements: mean usage between replacements (MUBR) and scenario-based equipment usage profiles (EUP's). With the use of MUBR and EUP's, it is possible to generate scenario-based wartime reliability estimates that not only will be more accurate but ultimately will produce class IX wartime requirements that better represent the current planning guidance.

Mean Usage Between Replacements

MUBR is the first data element essential to computing scenario-based wartime reliability estimates. MUBR is defined simply as how long a part on a particular end item will operate—in miles, hours, or rounds—before it requires replacement. The computation of MUBR involves adding up the total mileage, hours, or rounds for an end item and dividing that sum by the total number of replacements for a particular part. For example, say an M1A1 tank traveled 2,000 miles and required 2 engine replacements during that interval. The resulting MUBR computation would divide the 2,000 miles by 2 engines to produce a value of 1,000 miles between engine replacements. Therefore, the MUBR for that tank engine would be 1,000 miles.

For the purposes of war reserves, it would not be entirely accurate to compute MUBR based on a peacetime operating environment. Although collecting data on peacetime part replacements would indicate inherent reliability, it could underestimate the wartime application of MUBR. The stresses and strains of an increased operating tempo often result in an increased replacement rate for certain mission-essential parts. So the data used to compute operating tempo MUBR must be gathered from a location that reflects wartime operations.

The National Training Center (NTC) at Fort Irwin, California, is just such a location. The NTC conducts 2- to 3-week exercises of battalion-sized groups that simulate an intense combat environment. The M1A1 tank, M2/3 Bradley fighting vehicle, and many other tracked and wheeled systems are put through the paces of conducting a battlefield operation. The Army recognized that an abundance of potentially useful information could be collected and analyzed from the NTC, so it initiated the Field Exercise Data Collection (FEDC) program.

The FEDC program was designed and implemented specifically to capture data on end-item usage and part replacements that occur during battalion-sized rotations at the NTC. The data are stored in a relational data base and analyzed for wartime planning purposes. The FEDC data are by far the Army's best source of information on part replacement rates under a scenario that most closely resembles a wartime operating tempo. It is from the FEDC data base that class IX MUBR will be computed for war reserve applications.

Equipment Usage Profiles

The next piece of information needed to generate accurate, scenario-based wartime reliability estimates is the EUP. EUP's provide data on how many hours, miles, or rounds a weapon system in a particular unit will be used in a specific theater of war. Army Training and Doctrine Command schools currently develop weapon system EUP's by wartime scenario and by combat posture (attack, delay, defend, reserve, and static). The resulting posture-based EUP's are furnished to the Army Combined Arms Support Command (CASCOM) at Fort Lee, Virginia, for further refinement. CASCOM applies a Total Army Analysis, scenario-based percent distribution to each of the combat postures to produce a daily average scenario-specific EUP by weapon system and specific unit.

AMSAA takes that information from CASCOM, applies TAEDP end-item densities by specific unit, and computes a density-weighted average for each EUP. This final step produces a single, daily average weapon system EUP for each theater of war.

Improved FF2's

Weapon system EUP's and class IX MUBR then are joined together to produce scenario-based reliability estimates, or "new and improved" FF2's. As an example, using the NTC FEDC data base, the MUBR of the M1A1 tank engine was computed to be 2,174 miles. For discussion purposes, let's say that the EUP of the M1A1 tank was computed to be 30 miles per day in a theater of war. The calculation to produce the new scenario-specific FF2 for the M1A1 tank engine is as follows—

$$FF2 = \frac{EUP}{MUBR} \times 100 \text{ end items} \times 365 \text{ days/year}$$

$$FF2 = \frac{30.00}{2174} \times 100 \text{ end items} \times 365 \text{ days/year}$$

$$FF2 = 504 \text{ failures per 100 end items per year}$$

This example illustrates the final step in producing scenario-specific wartime part reliability estimates for computing class IX war reserves. Of course, this technique can be applied to all end items and parts for which EUP and MUBR data are available. The use of end-item EUP's and part MUBR allows the Army to generate class IX war reserve requirements that are based on its current two-major-theaters scenario. As a result, the Army can produce war reserve budget estimates that can be justified and defended in the budget cycle.

M1A1 Tank Failure Factor Comparison

Now that the procedure for developing scenario-specific reliability estimates has been examined, the impact of actually using these new FF2's on class IX war reserve computations can be explored.

The Army currently pre-positions class IX war reserve stock in each major theater to support its power projection strategy. By pre-positioning assets in theaters, the Army reduces the amount of time required to ship those assets to those locations. The result is an increased readiness posture in the theater. To understand how the new EUP's and MUBR will affect class IX pre-positioned assets, it is valuable to directly compare requirements computed before and after EUP and MUBR use. Since the M1A1 tank represents a large portion of the dollar value of all class IX requirements in pre-positioned war reserves, it again can serve as a case study.

It is helpful to compare the differences between the PMR-based estimates and the EUP- and MUBR-generated failure factors. The chart below compares the

NSN	Nomenclature	Price ($)	PMR FF2	EUP/MUBR FF2
2835012168639	Engine, Gas Turbine	521,700.00	120	504
2835012691234	Engine Module Forward	222,330.00	90	250
2835011787245	Engine Module Rear	193,108.00	50	300
2520013259834	Transmission, Hydraulic	190,486.00	65	100
1240012939706	Thermal Receiver	95,723.63	10	325
1240013800280	Sight Unit	64,496.47	110	250
2835011787246	Reduction Gearbox	46,306.62	25	300
2835011978325	Gearbox, Accessory	26,943.43	15	275
5975013169270	Interconnecting Box	20,475.28	3	100
1220013720720	Computer, Fire Control	19,921.42	12	200

☐ This chart compares FF2's for the top 10 cost drivers for the M1A1 tank as calculated using the PMR and the EUP and MUBR (notational data). The FF2 columns show the number of replacements needed per 100 end items per year.

FF2's for the M1A1's top 10 war-reserve-part cost drivers. For each cost driver, the EUP- and MUBR-based FF2 is significantly larger than the PMR-based FF2. One explanation for the large differences can be found in the M1A1's usage profile in a theater of war. Since the PMR-based FF2's are determined by a multiplier of the peacetime failure factor, it may be assumed that the M1A1's wartime usage is based on the same multiplier as well. However, additional analysis has revealed that this is not the case.

Class IX Requirements Determination

In order to determine accurately the impact the new EUP and MUBR failure factors have on the M1A1's war reserve requirements, class IX requirements based on each FF2 were computed and compared. For this effort, the Army's approved model for determining class IX wartime requirements, the Optimum Stock Requirements Analysis Program (OSRAP), was used. OSRAP is a readiness-based sparing model that is used to determine what class IX stocks are needed to achieve weapon system operational availability requirements at the least cost. OSRAP currently is used to compute class IX requirements for Army war reserves, operational planning, and contingency operations.

For this analysis, OSRAP was configured to compute a least-cost, 15-day authorized stockage list (ASL) "push package" that will achieve a 90-percent readiness rate over the 15-day period for a generic battalion of 58 M1A1 tanks. A push package implies that the ASL will not be resupplied during the 15-day period. These stock characteristics are consistent with what the Army wants to achieve when it pre-positions class IX wartime assets.

OSRAP then was run using both the original PMR FF2's and the new EUP and MUBR FF2's. The results indicate that, compared to the PMR FF2's, using EUP and MUBR FF2's to compute class IX war reserve requirements for a battalion of M1A1 tanks results in significant increases of stock in terms of cost, weight, and cube. (See the chart at right.) From this analysis, it appears that using the new EUP- and MUBR-based FF2's will increase the M1A1's requirement for class IX pre-positioned war reserves significantly.

The increase in cost, weight, and cube, while at first glance alarming, is not necessarily a bad thing. For the first time, the Army will be basing its war reserve requirements on usage profiles and reliability estimates that reflect the current planning guidance. From the results shown, it appears that by using PMR-based FF2's, the Army has been underestimating its requirements for class IX M1A1 tank war reserve assets. If the M1A1's EUP is an accurate reflection of the tank usage that will be seen in a wartime theater, then the requirements will represent what class IX stocks will be needed. The result will be the amount of war reserve stocks actually required to support the soldier in the field.

	PMR FF2's	EUP/MUBR FF2's
Cost ($)	3.89M	9.83M
Weight (lbs.)	117,018	45,413
Cube (cu. ft.)	3,957	8,049

□By using the EUP and MUBR FF2's, the cost, weight, and volume (cube) of the stocks needed to support an M1A1 tank battalion increase significantly (notational data).

Equipment usage profiles and improved part reliability estimates will increase the M1A1 tank's class IX prepositioned war reserve requirement. Using these tools will result in an increase in the estimated cost, weight, and cube of a battalion's worth of M1A1 class IX stocks. However, these increases can be attributed primarily to the inadequacy of the wartime part reliability estimates currently in the M1A1's PMR. These wartime logistics planning factors simply do not represent the Army's current planning guidance of supporting two major theaters nearly simultaneously.

Equipment usage profiles and improved wartime part reliability estimates provide a more accurate picture of the M1A1 tank's expected wartime utilization and part failure rate. This means the Army can produce a war reserves budget that can be defended and justified. The result will be increased readiness for the soldier in the field, who will rely on these stocks to support wartime operations in the major theaters of war. **ALOG**

Henry D. Simberg is the acting team leader of the Logistics Concepts Analysis Team in the Logistics Analysis Division of the Army Materiel Systems Analysis Activity at Aberdeen Proving Ground, Maryland. He holds a B.S. degree in industrial engineering from West Virginia University and is a graduate of the Army Logistics Management College's Operations Research Systems Analysis Military Applications Course I and the Logistics Executive Development Course, for which he completed this article.

Commentary

PMCS Training—Getting Back to Basics

by James A. Barrante

Maintaining Army equipment to standard long has been considered the Army's first line of defense. As the 21st century approaches, a revolution is taking place in all areas of military logistics. Maintenance of weapon systems is vital to the National Military Strategy, to combatant commanders, and, most importantly, to soldiers. Some Army leaders have suggested that, "when it comes to training the force, we need to get back to the basics." In the Army, maintenance basics begin at the user level with what the program logisticians refer to as preventive maintenance checks and services (PMCS).

Maintenance standards are published as PMCS tables in the –10 and –20 series technical manuals (TM's). However, not everyone follows the basic PMCS steps contained in the TM's. If your unit were called upon tomorrow, would its assigned equipment be ready? Could your unit respond to the needs of the combatant commander in chief within 96 hours as stipulated in the National Military Strategy?

An Improved PMCS Training Program

The possibility of deploying to two nearly simultaneous conflicts could become a reality as the Army enters the 21st century. The Army has been downsized, and so has its equipment authorization. Much of the equipment has been replaced by newer, more expensive digitized equipment. Leaders at all levels must ensure that their soldiers receive training and supervision in maintaining this equipment so it will be ready for immediate use.

As chief of the 21st Theater Support Command (TSC) Maintenance Assistance and Instruction Team (MAIT) in Kaiserslautern, Germany, for the past 5 years, I have seen some equipment reported as fully mission capable when, in fact, it was not. For example, I have seen M16A2 rifles that had not undergone annual gauging stored in the unit arms room. Others had been returned to the unit after gauging and placed back in the racks for use in spite of discrepancies noted by direct support maintenance personnel. My team also has witnessed drivers operating vehicles that had not been brake-tested as required. These are serious safety issues that could put soldiers in harm's way.

Leaders who are concerned about the safety of their soldiers and the readiness of their equipment should establish PMCS as one of their top priorities. Their PMCS training program also should be assessed regularly by experts. The MAIT, which is established by Army Regulation (AR) 750–1, Leader's Unit Maintenance Handbook, provides such assessments. In the 21st TSC, the MAIT not only teaches PMCS but also provides follow-up assistance as needed.

Leadership Responsibilities

Field Manual (FM) 25–100, Training the Force, states: "Maintenance training designed to keep equipment in the fight is of equal importance to soldiers being expert in its use. Soldiers and leaders are responsible for maintaining all assigned equipment in a high state of readiness in support of training or combat employment."

Leaders must stress the significance of implementing and sustaining an effective PMCS training program. One leader who did just that was Major General Charles S. Mahan, then Commanding General of the 21st Theater Army Area Command. In an awards ceremony in February 1999 he stated—

> . . . civilian employees have stepped up to the challenge and assumed responsibilities and roles that were always uniquely military in the past. In the old days, assistance teams were always comprised of the best mechanics in an organization. They would go through motor pools and provide instruction for soldiers and first-line supervisors on how to care for and maintain their equipment and vehicles. Now, with fewer soldiers, but recognizing the need for the same program, that mission has been given to the civilian work force. The contributions of the maintenance assistance and instruction team have . . . caused [battalion commanders] to request the team's presence in their motor pools and classrooms to provide instruction to vehicle and equipment operators. That instruction has saved the command money, because now soldiers are performing equipment checks and services properly.

Mandated PMCS Training

To ensure that PMCS training is not overlooked, the

Army Training and Doctrine Command should incorporate a requirement for PMCS training in AR 350–1, Army Training. Also, PMCS training should be mandatory for all Army leaders on their assigned equipment. As a step in that direction, the commanders of V Corps and the 21st TSC have mandated PMCS instructor certification courses for leaders.

The Army will continue to do more with less, but its equipment must be safe and ready for use. PMCS training is not only the foundation of successful combat readiness; it saves money and other Army resources and is essential to the safety of soldiers.

James A. Barrante is the Chief of the 21st Theater Support Command Maintenance Assistance and Instruction Team in Kaiserslautern, Germany. He has a bachelor's degree in business management from Eastern Illinois University and is a graduate of the Army Management Staff College.

Commentary

Improving Inventory Control

by Captain Larry Howard

Inventory control is perhaps the single most important function within a supply support activity. Simply put, it is the process of counting and adjusting inventory levels in accordance with prescribed regulations. Supply support activities systematically perform wall-to-wall, cyclic, and special inventories for the sole purpose of bringing stock accounting records into line with the actual physical locations of stock found in a warehouse or storage area. These inventories minimize any problems caused by undiscovered posting errors and operational gains and losses on the stock record account. The stock record officer (SRO) subsequently conducts research that either documents the reason for an adjustment or concludes that no reason could be found. Unfortunately, this approach does little or nothing to "control" inventory. Instead of focusing on the results of cyclic counting, we should focus on eliminating inaccuracies before they occur. Here are three things that can help if you manage a supply support activity.

Start by maintaining an inventory adjustment report (IAR) log that not only identifies the IAR document number with a corresponding gain or loss, but also notes the nomenclature, location, and reason for an adjustment. This will serve as a starting point for identifying trends in inventory inaccuracies by item, location, or type of error.

Second, the research conducted by the SRO must go beyond simply explaining or identifying the reason for an inaccuracy. It must extend to determining supply policy or procedural shortcomings.

Third, develop an inventory schedule to *supplement* the required monthly 10-percent inventory. The reason for this is simple: the sooner an inventory inaccuracy is identified, the greater is the possibility of finding its true cause. Remember Pareto's Law—a small number of items will dominate the results achieved in any situation—and prioritize your authorized stockage list (ASL) by item value; shoot for a 15-30-55-percent split. I use the following guidelines to prioritize items for inventory—

- A lines: These are the highest priority items and require monthly inventories. Criteria for this category include a value of more than $1,000.
- B lines: These are items with a normal priority and should be inventoried quarterly. Criteria include a value of $100 to $999.
- C lines: These are low priority items that can be inventoried semiannually. Criteria include a value of less than $100.

Traditional inventory control methods do not alleviate the causes of inventory inaccuracy, they merely report on them. The goal should be to achieve 100-percent inventory accuracy by eliminating the possibility of inaccuracy in the first place. Inventory errors cost money, time, and effort and will continue to occur until internal supply processes are examined in detail and revised procedures are put in place as preventive measures.

Captain Larry Howard is assigned to the 100th Area Support Group, 7th Army Training Command, where he is the accountable officer for the Regional Supply Support Activity in Vilseck, Germany. He holds a B.S. degree from North Georgia College and is a graduate of the Combined Logistics Officers Advanced Course.

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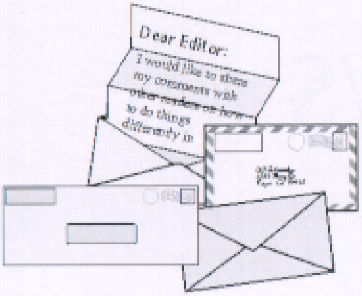

LOG NOTES

Logistics Warrior Award

Recognizing excellence is a way of taking care of personnel. Most Intelligence units have a program to identify Linguist of the Quarter and of the Year, but they rarely have a program in place to recognize the achievements of support personnel. As the brigade S4 for the 703d Military Intelligence Brigade, I was able, with the assistance of many, to bring to reality an idea I had envisioned when I took over the position in July 1998. We created what is known as the "Logistics Warrior Award" to recognize the achievements of personnel in the field of logistics, including supply, maintenance, and engineering.

This award is presented on a quarterly basis to the individual—military or civilian—who has demonstrated excellence in the field of logistics. Since its inception, we have given three Logistics Warrior Awards to personnel within the brigade.

To start the program, we designed a memorandum of instruction to lay out the program design. Each quarter, a voting committee nominates the individual they feel best demonstrated the qualities befitting the Logistics Warrior Award. Individual achievements considered by the committee include both on- and off-duty actions. The voting committee members are the brigade S4, resource management officer, information management officer, and the battalion S4. In case of a tie, which has happened, the deputy commander has the tie-breaking vote.

An official ceremony is conducted each quarter to present the 703d Military Intelligence Brigade Logistics Warrior Award. The Logistics Warrior Award recipient receives a specially designed and framed certificate signed by the brigade commander and a unit coin, has his name placed on the Logistics Warrior Plaque that is hung in the logistics wing, and has lunch at his choice of restaurant with the brigade S4. Also, the individual's photo is framed with a nameplate and hung under the plaque. The photo and plaque are posted so unit members can recognize the recipient for his outstanding achievement and support to the unit.

I have written this letter to share our program, so other units in the Intelligence and Security Command and the Army can incorporate such a program to recognize the outstanding accomplishments of their support personnel. Recognition helps motivate personnel and is an important aspect in today's Army. The Logistics Warrior Award Program is one such way of accomplishing this for our personnel. If anyone would like a copy of the Logistics Warrior Award memorandum of instruction, please contact me at (808) 655–9676 or DSN 455–9676.

Major Benjamin Henderson
Schofield Barracks, Hawaii

Contractors on the Battlefield

"Contractors on the Battlefield in the 21st Century," by Captain Isolde Garcia-Perez, was very interesting and disturbing. As a Department of the Army civilian, I am fully aware of the trend toward contracting in our Government at large. As a citizen of this country, I am concerned. If my history serves me correctly, one of the reasons for the fall of the Roman Empire was that it spread itself so thin it reinforced its soldiers with locals.

The decision has been made to use more contractors. Captain Garcia-Perez identifies steps that must be taken to ensure commanders of Force XXI and the Army After Next know what to be aware of and how to address it.

I found it amusing that in the same issue, "Out-of-the-Box Logistics," by Major Hurmayonne Morgan and Lieutenant Colonel Gerald Dolinish, did not even touch on contract personnel. We are indeed behind the power curve.

Both articles were well written. I suggest that you send a copy of the first article to the writers of the second so they can implement training along this line when working these exercises. If we do not include contractors, are we not setting ourselves up for a fall? Is it not like having great movement plans and then throwing them out and doing it differently when activated?

If they were both viable points, maybe it would be wiser to not put conflicting attitudes on the same subject in the same issue.

Kathleen Sumrall
Fort McCoy, Wisconsin

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