ARMY LOGISTICIAN

MARCH-APRIL 1998

Preserving Transportation Infrastructures

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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-dns1.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

In contingency operations and in times of conflict, trucks and other wheeled vehicles play an important role in transporting equipment and supplies to sustain military operations. The potential for damage to primitive and sophisticated road networks in the area of operations is great. The article that begins on page 11 describes measures that can be taken to preserve roads and extend the service life of tires.

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

By Order of the Secretary of the Army:

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

Official:

Joel B. Hudson

JOEL B. HUDSON
Administrative Assistant
to the Secretary of the Army
04291

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- Joint Operations and Logistics Support
- Defending Outside the Wire
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- Radioactive Material and You
- Convoy Support Center in Croatia
- Expedient HET Upload Operations

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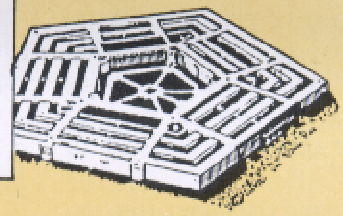
ALOG NEWS



NEW EDITOR: Janice W. Heretick has been selected as Editor of *Army Logistician* professional bulletin effective 4 January 1998. Janice has been a writer-editor for the bulletin for 9 years. She also has experience in writing doctrine and training products for the Quartermaster School and in writing, teaching, and management for state government. I invite you to share your comments and suggestions concerning the bulletin with her, and I strongly encourage civilian and military personnel to submit articles for publication.

Barbara G. Mroczkowski
Assistant Commandant
Army Logistics Management College
Fort Lee, Virginia

DOD REFORMS BUSINESS PRACTICES

The revolution in military affairs that has swept through the Department of Defense (DOD) since the end of the Cold War took another significant step forward last November with the release of the Defense Reform Initiative by Secretary of Defense William S. Cohen. The initiative seeks to apply the best management and organizational techniques of American business—the so-called revolution in business affairs—to DOD. The goal is to reduce overhead and support structures in order to free resources for investment in weapons while at the same time improving the efficiency and effectiveness of support. The Defense Reform Initiative will be executed in four major areas—

- Re-engineering: applying the best business practices of the private sector in DOD.
- Consolidating: streamlining DOD organizations.
- Competing: using market mechanisms to foster efficiency and improve customer service in support activities.
- Eliminating: reducing excess support structure.

Adopting the Best Business Practices

According to the Defense Reform Initiative report, "American business [today] is the envy of the world and productivity is at an all-time high." Accordingly, several initiatives will apply "the lessons of the business world to the business of defense." They include the following—

- By 1 January 2000, all contracting for major weapon systems, including contractor selection, contract writing and administration, and payment and accounting, will be performed electronically.
- DOD will make full use of electronic funds transfer in contract administration. There has been much progress in this area: in fiscal year (FY) 1996, 57 percent of payments under DOD's major contract payment system (amounting to 81 percent of the contract money disbursed) were made electronically.
- By FY 2000, 90 percent of DOD micropurchases (those under $2,500) will be made using the international merchant purchase authorization card (IMPAC). The IMPAC is a commercial credit card that allows Government activities to buy goods and services directly from vendors rather than having to submit requests through procurement offices.

A MESSAGE TO OUR SUBSCRIBERS:
The *Army Logistician* staff would like to apologize to those of you who received late or incorrect numbers of copies of the November-December 1997 issue of *Army Logistician*. We are sorry if you were inconvenienced in the process. We also want to thank those of you who called to let us know about the problems. We believe the errors have been corrected, but if you continue to experience problems, please call us at (804) 765-4761 or DSN 539-4761, or send e-mail to alog@lee-dns1.army.mil.

• DOD will increase its use of electronic catalogs and "shopping malls" for procuring goods and services. The Defense Logistics Agency (DLA) has started an electronic shopping mall called "Emall" that allows users to search for and order millions of DOD and commercial items.

• DOD will continue to expand the paper-free environment for providing weapon systems support. By 1 January 2000, 85 percent of technical manuals and 80 percent of technical drawings will be provided electronically, compared to 63 and 48 percent today.

• By 1 July of this year, DOD will stop printing all DOD-wide regulations and instructions and make them available only through the Internet or on CD-ROM's.

• By FY 2000, DLA plans to increase the use of Prime Vendor contracts from 32 to 40 percent of its sales. Under the Prime Vendor concept, DOD contracts with a single commercial vendor to purchase and store supplies and deliver them to DOD customers as needed. [See the article, "Prime Vendor: Velocity Management at DLA," in the January-February 1998 issue of *Army Logistician*.]

• DOD will continue to foster "just-in-time" logistics. Under this concept, contracts with vendors and transporters allow items to be delivered to military customers when they are needed, thereby eliminating the need for those customers to store large quantities of materiel in case of a need. DOD is developing a system that will provide total visibility of supplies and equipment. This system has been fielded to the U.S. Atlantic, Central, and European Commands and is scheduled to become fully operational in 2000.

• In April, DOD will begin implementing a new, simplified, decentralized process for managing temporary duty travel. This process, tested in 25 pilot projects last year, will be implemented fully in DOD by October 2000.

• Movement of household goods also will be reformed. A program called "Member-Arranged Moves" will permit military personnel to select a local carrier that best meets their moving needs, rather than have a carrier assigned to them. The Do-It-Yourself (DITY) moving program will be streamlined and its reimbursement rate increased from 80 to 95 percent to offer service personnel a greater financial incentive to move themselves.

Changing the Organization

The Defense Reform Initiative calls for significant reorganization of DOD elements and reductions in their staffing. These changes are designed to flatten and streamline DOD headquarters organizations, focus the Office of the Secretary of Defense (OSD) on core policymaking and oversight tasks, and move operational management responsibilities to the "lowest appropriate level."

Personnel reductions will cut staffing as follows—

• OSD by 33 percent, based on FY 1996 levels, by mid-1999.

• Defense agencies such as DLA by 21 percent over the next 5 years.

• DOD field activities and other organizations reporting to OSD by 36 percent over the next 2 years.

• Joint Staff and associated activities by 29 percent by the end of FY 2003.

• Headquarters of the unified combatant commands by 7 percent by the end of FY 2003.

• All other headquarters elements, including the military departments and their major commands, by 10 percent from their FY 1998 levels by the end of FY 2003.

Among the reorganizations, the Under Secretary of Defense for Acquisition and Technology will become the Chief Information Officer for DOD and will assume the command, control, and communications functions previously performed by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence. (That official will become the Assistant Secretary for Intelligence.) This organizational shift recognizes one of the most significant developments in the military in recent years: the integration of automated information systems into every aspect of military activity. With information systems now ubiquitous, a separate management structure for them is no longer needed.

The position of Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs will be abolished and its functions transferred to several other elements. The Army will assume responsibility for chemical demilitarization programs. Other functions will go to the Under Secretary for Acquisition and Technology, the Director of Defense Research and Engineering, and a new Defense agency, the Threat Reduction and Treaty Compliance Agency. The last will merge the Defense Special Weapons Agency (known until recently as the Defense Nuclear Agency), the On-Site Inspection Agency, and the Defense Technology Security Administration.

In an effort to attain world-class educational standards in DOD's schools and professional development programs, DOD will establish a Chancellor for Education and Professional Development. This official will—

• Develop and supervise a coordinated DOD program of civilian professional education and training.

• Develop standards for academic quality.

- Eliminate duplicate or unnecessary programs.
- Ensure that DOD education and training programs provide needed career development and job skills.

The Chancellor will utilize a consortium of DOD schools, working much like the Defense Acquisition University currently does.

The Secretary of the Army acts as DOD's executive agent for responding to domestic civil emergencies. The Director of Military Support (DOMS) executes this function for the Secretary. To improve the use of National Guard and other reserve component units in emergencies, DOD will restructure DOMS to give more responsibility to the National Guard. Up to one-half of the DOMS staff positions will be filled by reserve component officers, and the deputy director of DOMS will be a general officer from the National Guard Bureau. These changes also will recognize the fact that the National Guard usually takes the lead in responding to domestic emergencies.

Streamlining Through Competition

DOD will use the competitive powers of the marketplace to become more efficient. The two main initiatives in this area are continued use of competitions between Government organizations and the private sector (under Office of Management and Budget Circular A-76 procedures) and maximum use of competition for performing depot maintenance.

Between 1979 and 1994, DOD conducted 2,138 competitions (510 in the Army), of which Government organizations won about one-half. These competitions have reduced annual operating costs by 31 percent (27 percent in the Army) and produced annual average savings of $1.478 billion ($470 million in the Army). DOD will build on this progress: by 1999, DOD will evaluate the entire civilian and military work force to identify functions that are commercial in nature and can be opened for competition under the A-76 procedures. DOD will concentrate on competitions for these functions: disposal of surplus property, sales from the National Defense Stockpile, management of leased property, operation of drug testing laboratories, and provision of personnel services and civilian, military retiree, and annuitant pay.

DOD officials believe that much depot-level maintenance can be performed by the private sector at significant cost savings. For the most part, depot maintenance is excluded from A-76 competitions by law. However, DOD studies indicate that a significant amount of the depot maintenance work load is performed by contractors (37 percent for the Army). DOD will use competitions between Government organizations and the private sector as much as the law permits to improve depot maintenance efficiency.

Eliminating Unneeded Infrastructure

DOD will pursue several initiatives to reduce the size of its infrastructure and associated costs—

- DOD will ask the Congress to authorize two more rounds of base realignment and closure (BRAC) studies, in 2001 and 2005. The four previous BRAC efforts (in 1988, 1991, 1993, and 1995) will result in 97 major installation closures, 55 major realignments, and annual savings after FY 2001 of $5.6 billion.
- DOD will pursue consolidations of operational functions in fewer, larger facilities. Major candidates for consolidation include Defense Information Systems Agency megacenters, Defense Finance and Accounting Service offices, laboratories, and test and evaluation facilities. DOD also will analyze possibilities for regional sharing of support across installations, commands, and services.
- DOD will increase funding to demolish 50,000 unneeded buildings by FY 2003.
- DOD will ask the Congress for permanent authority to use the private sector to improve and replace inadequate military housing. DOD expects to privatize 3,500 housing units in FY 1998, 15,000 units by FY 1999, and 30,000 units by FY 2000.
- In the area of installation utilities, DOD will focus on managing energy rather than power infrastructure. To achieve this goal, DOD will use authority recently granted by the Congress to aggressively pursue privatization of its utility (electric, natural gas, water, and waste water) systems. To date, 25 systems have been privatized, 45 systems are in the process of being privatized, 147 systems are being studied, and 506 systems remain to be studied. In a related initiative, DLA's Defense Fuel Supply Center will become the Defense Energy Management Center and will undertake a program to foster integrated energy management among installations on a regional basis.

Implementing the Defense Reform Initiative will require congressional action in many cases. To oversee the reform process, Secretary Cohen has established a Defense Management Council. Chaired by the Deputy Secretary of Defense, its members will include the four under secretaries of defense, the three under secretaries of the services, the Vice Chairman of the Joint Chiefs of Staff, and the four service vice chiefs. The council also will recommend additional reforms, examine other opportunities for consolidating management activities in the military departments and Defense agencies, and consult with business leaders on new solutions to management challenges.

—Story by Robert D. Paulus

(News continued on page 40)

ALOG NEWS

(Continued from page 3)

DIVISION EXPERIMENT EVALUATES FORCE XXI LOGISTICS

The Force XXI combat service support (CSS) concept works, as demonstrated in the Division Advanced Warfighting Experiment (DAWE) conducted 5 to 13 November 1997 by the Army Training and Doctrine Command (TRADOC) and the 4th Infantry Division Experimental Force at Fort Hood, Texas. The CSS objectives of the DAWE were to evaluate the Force XXI CSS concept, the Force XXI CSS organizations that are designed to execute the concept, and the requirements that Force XXI logistics will place on echelons-above-division units.

The Force XXI CSS concept is founded on the principles of distribution-based, centralized, and anticipatory logistics. The move to distribution-based logistics resulted from reductions in stockage levels across the division. Centralized logistics followed a reduction of 1,442 CSS soldiers in the current Army of Excellence division structure. Centralization is more efficient and maximizes the battlefield distribution system. Finally, anticipatory logistics, enabled through the use of the Combat Service Support Control System (CSSCS), Global Combat Support System-Army (GCSS–Army), formerly known as Integrated Combat Service Support System (ICS^3), and other enablers, is required by the Force XXI logistician's need to know the support requirements far enough in advance to ensure that adequate logistics support is in the right place at the right time.

The structure that was designed to execute this new CSS concept is referred to as the conservative heavy design (CHD). The current number of CSS spaces in the division support command (DISCOM) under the CHD is 4,321, as set by TRADOC. One of the biggest changes in the DISCOM design is the forward support company (FSC), which was formed by consolidating elements from a maneuver-battalion's support, maintenance, and medical platoons with direct support-level maintenance and maintenance management, a support operations section, and CSS command and control. This reflects centralization and extends the logistics pipeline further forward on the battlefield.

The division organization was able to execute its missions without being constrained by logistics. The modularity of the units, particularly the FSC, allowed logistics leaders to move idle or uncommitted CSS assets to the right place on the battlefield, at the right time, to provide maximum logistics support.

During the DAWE, logistics leaders often were able to anticipate support requirements and shift or mass CSS assets. This was possible because of improved situational awareness, both in tactics and logistics, as provided by the CSSCS, working with the Army Tactical Command and Control System and other enablers. Enablers are the keys to success in Force XXI CSS. Some enablers, such as CSSCS, are developed only partially and require additional funding. Without the enablers, the battlefield distribution system cannot be maximized and support requirements cannot be anticipated to the optimum extent.

The DAWE demonstrated that the increased size and noncontiguous nature of Force XXI battle space makes lateral redistribution of assets a challenge. In many cases, logisticians found it easier to redirect inbound assets. This increase in dispersion of units and the size of the battle space also places an increased emphasis on rear area operations. Long-range reconnaissance patrols, special operations forces, and bypassed enemy troops are significant threats to supply routes and the CSS assets that travel on them.

ACQUISITION REFORM DRIVES CHANGES

The Army Materiel Command Logistics Support Activity (LOGSA) at Redstone Arsenal, Alabama, has published several new documents to comply with changes brought about by acquisition reform initiatives. MIL-PRF-49506, Logistics Management Information Performance Specification, approved on 11 November 1996, replaced MIL-STD-1388-2B, Logistics Support Analysis Record. This performance specification is used to obtain from contractors data that are needed for internal Government systems and processes. The logistics data includes discrete elements for provisioning and support equipment, as well as generic reports that can be used to obtain almost any type of logistics information.

MIL-HDBK-502, Department of Defense Acquisition Logistics Handbook, dated 30 May 1997, replaced MIL-STD-1388-1A, Logistics Support Analysis. The handbook offers guidance on acquisition logistics as an integral part of the systems engineering process, sample logistics performance requirements, and guidance on incorporating logistics issues into solicitations. It is applicable to all types of materiel and automated information systems and all acquisition strategies.

Electronic copies of the handbook and MIL-PRF-49506 are available for download on the Logistics Planning and Requirements System (LOGPARS) web page, http://www.logpars.army.mil/alc/LogEngr.htm.

Still to come is an Acquisition Logistics Primer that will replace the old Logistics Support Analysis Primer. The primer will be a quick reference source for personnel involved with acquisition logistics for Army systems.

For more information, contact Joe Ketron at (205) 955–9836 or DSN 645–9836 (e-mail: jketron@logsa.army.mil) or Jay Lasher at (205) 955–9837 or DSN 645–9837 (e-mail: jlasher@logsa.army.mil).

RESERVES CONDUCT CSSTSS EXERCISE

The Army Reserve conducted its first combat service support (CSS) training simulation system (CSSTSS) simulation exercise (SIMEX) in an inactive-duty-for-training (IDT) status last September. The participating group commanders found that the SIMEX effectively stressed their staffs and provided more effective CSS training than that offered in other simulations used by the Army Reserve.

The 78th Division (Exercise) (DIVEX), Edison, New Jersey, was tasked by the Army Reserve Command to conduct a pilot test using CSSTSS to determine its viability for training CSS battalion and group staffs during a weekend drill. Using a modified Prairie Warrior data base, five CSS groups operated at 5 locations in 4 states in the SIMEX: the 475th Quartermaster Group, Farrell, Pennsylvania; the 300th Transportation Group, Butler, Pennsylvania; the 38th Ordnance Group, Charleston, West Virginia; the 390th Personnel Group, Richmond, Virginia; and the 300th Area Support Group, Fort Lee, Virginia. The 310th Theater Army Area Command, Fort Belvoir, Virginia, provided a small group to function as a theater support command at the 78th Division's battle projection center in Fort Dix, New Jersey.

The SIMEX ran from 1800 hours on 11 September until 0800 hours on 14 September. The opposing forces (OPFOR) cell fought a series of "battles" with the battle driver subsystem. The battles created corps sustainment requirements that were fed into the CSSTSS emulated Standard Army Management Information System (STAMIS) to reflect the generated logistics work load. Daily roll-ups were used to monitor unit progress and check the accuracy of data posted by the groups on the status boards.

Due to the success of the SIMEX, a proposal has been developed to conduct a single SIMEX from a mainframe and transmitted to all five DIVEX's. This way, CSS units all over the country can simultaneously participate in one SIMEX through their host DIVEX's. This will increase training opportunities and eliminate the cost of conducting multiple exercises.

In Fiscal Year 1998, two DIVEX's, the 78th and the 87th, will be conducting an exercise in this manner. The 375th Transportation Group, Mobile, Alabama, will join the 475th Quartermaster Group, the 300th Transportation Group, and the 390th Personnel Group for a SIMEX in August. Any unit that is interested in participating in a CSSTSS SIMEX should contact their host DIVEX.

For more information on conducting a SIMEX, contact Don Billoni at (706) 545-4796, DSN 835-4796, or e-mail billonid@benning-emh2.army.mil. For more information on CSSTSS simulation, contact Lieutenant Colonel Charles Huffman at (804) 765-1447, DSN 539-1447, or e-mail huffmanc@lee-dns1.army.mil.

AMC CENTRALIZES SKOT MANAGEMENT

The Army Materiel Command (AMC) has established a program manager (PM) for sets, kits, outfits, and tools (SKOT) at the Armament and Chemical Acquisition and Logistics Activity (ACALA), Rock Island Arsenal, Illinois. ACALA is an activity of the Tank-automotive and Armaments Command (TACOM), Warren, Michigan.

The PM-SKOT will standardize policies, seek innovative ways to quickly supply the right tools at the right time, and make sure that supply catalogs are complete, up to date, and available to users. The office will serve as a single source for information and guidance on AMC SKOT and will ensure that soldiers' questions are quickly answered.

The PM is developing a data base that will list all tools currently available to the Army. The data base will help to eliminate duplicate tools and reduce the number of special tools ordered. The PM-SKOT will attempt to shorten the processes for supplying replacement tools and for making old SKOT's obsolete.

AMC currently is loading all SKO supply catalogs on CD-ROM's for ease of use by soldiers and to facilitate keeping the catalogs up to date. AMC also will be looking at existing tool sets to see how the sets can be reconfigured into lightweight tool boxes that are easily inventoried and plans to maximize the use of warranted tools.

For more information about PM-SKOT, call Michael Kolb or Wayne Schaaf at (309) 782-5107/6325 or DSN 793-5107/6325 or send e-mail to mkolb@ria-emh2.army.mil.

SOLDIERS TO GET BETTER BARRACKS

Forty-five barracks projects now underway will provide new or renovated quarters for nearly 12,000 single soldiers at 20 installations worldwide. The barracks renovation projects will continue at a cost of $500 million a year until 2012. By that date, all permanent party, single soldiers will be housed in new or upgraded barracks.

A 1992 survey of single servicemembers showed that the quality of barracks strongly influenced whether or not they stayed in the military. Of the soldiers surveyed, 73 percent indicated that it was important to have private rooms, 65 percent were dissatisfied with the privacy of their current rooms, and 51 percent said barracks improvements would increase the likelihood of reenlistment.

Construction standards approved by the Secretary of Defense in 1995 call for a barracks room with a separate sleeping area for each soldier at the rank of specialist and below. They will share a bathroom and service area. Sergeants and staff sergeants will have larger quarters that include a private sleeping area, living room, bath, and service area. Furniture selection for the new quarters will be based in part on soldier input.

According to Dean Stefanides, chief of the Army Housing Division in the Office of the Assistant Chief of Staff for Installation Management, "The new barracks standards, while accommodating single soldiers' needs and their desire for privacy, still allow for unit integrity and the development of camaraderie and teamwork, essential elements of the Army culture. Although the size of our force has decreased and resources are scarce, the Army remains committed to improving the quality of life for our single soldiers."

IRRADIATED FOODS SAFER, TASTIER

The Soldier Systems Command's (SSCOM's) Natick Research, Development, and Engineering Center (NRDEC), Massachusetts, is continuing its efforts to introduce irradiated foods to military and civilian consumers. Irradiated foods are safer to eat, more nutritious, better tasting, and more resistant to spoilage than foods treated by other methods.

NRDEC research indicates that low doses of radiation effectively render bacteria, such as e.coli and salmonella, harmless without leaving any lingering levels of radioactivity. Though difficult to calculate, costs associated with disposing of spoiled food and time lost from work due to food-borne illnesses are significant.

According to Vicki Loveridge, a food technologist who is heading up NRDEC's irradiation research, the proteins, fats, carbohydrates, and minerals in irradiated foods retain their nutritional value. The vitamin content is equal to or greater than other processed foods. Irradiation also delays ripening, aging, and decay of fresh produce. For meats, such as a chilled hamburger, irradiation can extend freshness from 4 days to 3 weeks. For that reason, the National Aeronautics and Space Administration includes irradiated meats on its space shuttle missions, and irradiated foods are routinely used in some hospitals and on cruise ships.

Other institutions that endorse food irradiation include the American Medical Association, the U.S. Department of Agriculture, the U.S. Food and Drug Administration, the American Meat Institute, the Mayo Clinic, and *Prevention* magazine.

DOD MARROW DONOR PROGRAM IS LIFESAVING OPPORTUNITY

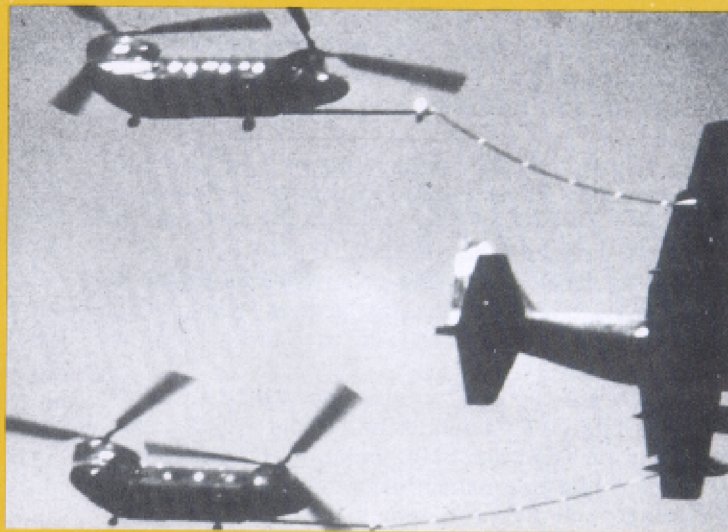
Soldiers, sailors, airmen, and marines might be able to survive exposure to chemical or radioactive agents if bone marrow transplants were readily available. Many other people who suffer from one of more than 60 blood diseases could have a better chance at life through a marrow transplant. The Department of Defense (DOD) bone marrow registration program provides a contingency registry of potential bone marrow donors for the Armed Forces and also offers a lifesaving opportunity to many others. DOD's program is a part of the National Marrow Donor Program.

In July and August 1997, the Blood Platoon of the 32d Medical Logistics Battalion (Forward), XVIII Airborne Corps, Fort Bragg, North Carolina, planned, coordinated, and executed the largest, most successful bone marrow donor registration drive in the 10-year history of the National Marrow Donor Program. The military portion of Operation Life Gift was sponsored by the 44th Medical Brigade. Their efforts resulted in 10,476 individuals being registered as potential marrow donors in the Fayetteville, Fort Bragg, and Pope Air Force Base area. Of those registered, 9,228 were DOD personnel.

Registration in the program requires learning about the responsibilities of being a bone marrow donor, completing a health screening form, and providing one small tube of blood. For information on Operation Life Gift, call Major Herman Peterson at (910) 396-7313 or DSN 236-9964. For information on the DOD bone marrow registration program, call 1-800-MARROW3.

REFUELING IN THE AIR

☐ The MH-47 helicopters in the photo are being refueled from an MC-130P aircraft during nighttime operations. The MH-47's are Chinook helicopters that have been modified for inflight refueling. They can conduct overt and covert infiltrations, exfiltrations, air assault, resupply, and sling operations in a wide range of environmental conditions. The MH-47 also is used for shipboard, platform, urban, water, and parachute operations, mass casualty evacuation, and combat search and rescue. The MC-130P aircraft provides aerial refueling of special operations helicopters and can infiltrate enemy territory and resupply special operations forces by airdrop or inland operations.



FM 22-100 SCHEDULED FOR SPRING RELEASE

A revision of Field Manual 22-100, Army Leadership, is scheduled for release this spring. The revised manual focuses on character and recognizes the tremendous moral responsibility leaders have to the people they lead as well as to those they serve.

Lieutenant Colonels Cranson Butler and Tim Challans of the Center for Army Leadership at Fort Leavenworth, Kansas, emphasize that the revision is not a result of recent sexual misconduct incidents in the Army. "The character-development initiative began years before these incidents in the Army and accusations of misconduct in other branches of the service," says Challans. The revision was directed in March 1995 by then Army Chief of Staff General Gordon R. Sullivan in an effort to ensure that the manual would continue to have relevance into the 21st century.

The purposes of the manual are to—

• Provide a unified theory of leadership for America's Army (both active and reserve components) composed of commissioned officers, warrant officers, noncommissioned officers, enlisted personnel, and Department of the Army civilians and is based on the latest, most appropriate theories.

• Provide leadership doctrine that enables leaders to meet mission requirements during times of peace or during any of the doctrinal types of operations: offensive, defensive, stability, or support.

• Provide a comprehensive and adaptable manual for the 21st century.

For the first time, Army civilian employees are included in the scope of the manual. "It is Total Army leadership doctrine," says Butler.

The new manual will be considerably larger than the current version of FM 22-100 because it includes information from six publications that it supersedes: FM's 22-9, Soldier Performance in Continuous Operations; 22-100, Military Leadership; 22-101, Leadership Counseling; 22-102, Soldier Team Development; 22-103, Leadership and Command at Senior Levels; and Department of the Army Pamphlet 600-80, Executive Leadership. When completed, revised FM 22-100 will be on the World Wide Web at http://www-cgsc.army.mil/cdd/f290. htm.

MTMC SETS SYMPOSIUM DATE

The Military Traffic Management Command (MTMC), Falls Church, Virginia, will host a training symposium 2 to 5 March at the Adam's Mark Hotel in Denver, Colorado. The theme of the symposium will be "When cora pleted eaching for the Highest—Excellence in Traffic Management."

Special panels, service meetings, and exhibits will focus on maintaining and improving the quality of transportation service to Department of Defense customers during a time of diminishing resources. Among those attending will be military and civilian transportation policy makers and managers who are responsible for moving passengers, personal property, and freight.

For information, call Jeanie Winslow or Jeanetta Sydnor at (703) 681–3754 or DSN 761–3754.

ICODES AIDS BRIGHT STAR '97 DEPLOYMENT

U.S. forces deploying to Egypt last fall for Exercise Bright Star '97 used a software program to generate automated ship stow plans. The new Integrated Computerized Deployment System (ICODES) reduces stow planning time and requires fewer people than manual planning.

The Military Traffic Management Command and California State Polytechnic University at San Luis Obispo developed ICODES. It relies on artificial intelligence principles to help decision makers solve complex stowage problems. The program uses modules within the system, referred to as "expert agents," that interact with each other to assist the user during the stow planning process.

ICODES is a flexible tool that accommodates multiple force load-outs, maintains unit integrity, integrates port execution and stow plan operations, captures lessons learned, and automatically configures cargo. It will not replace stow planners; rather, it gives them a tool with which to respond quickly to no-notice or short-notice deployments or exercises. In the past, it took three people 3 days to produce one stow plan. With ICODES, one stow planner can produce four stow plans in an hour.

LOGISTICS AWARDS PRESENTED

The Program Executive Officer for Tactical Missiles, Brigadier General Willie B. Nance, Jr., and Larry W. Hill of the Office of the Deputy Chief of Staff for Logistics, Department of the Army (DA), recently recognized the achievements of Army personnel who performed exceptional integrated logistics support (ILS) functions last year. For fiscal year 1997, the ILS Awards program was expanded to recognize both a team and individual award winner in each category if applicable. The winners of the ILS Achievement of the Year Awards for excellence are—

- *ILS Execution/Process Improvement–Team.* For ILS process streamlining: Logistics Partnership Council, consisting of the Army Tank-automotive and Armaments Command at Warren, Michigan, and Rock Island Arsenal, Illinois, and the United Defense Limited Partnership at San Jose, California, and York, Pennsylvania.
- *ILS Management–Team.* For development of effective logistics support for the XM94 operator training package: Army Chemical and Biological Defense Command Logistics Team, Aberdeen Proving Ground, Maryland.
- *ILS Management–Individual.* For innovative support equipment integration and supply support of TACMS Block 1A: Mary S. Carter, Army Tactical Missile System (TACMS)-Brilliant Anti-Armor Submunition Project Office, Program Executive Office-Tactical Missiles, Huntsville, Alabama.
- *Logistics Support for Materiel/Information System–Team.* For work on electronic technical manual digitization: Army Materiel Command Logistics Support Activity Electronics Technical Manual Team, Huntsville, Alabama.
- *Logistics Support for Materiel/Information System–Individual.* For management of the heads-up display computer-based training: William Berardi, Army Communications-Electronics Command, Fort Monmouth, New Jersey.

The winners received DA Certificates of Achievement and plaques at the DA ILS Symposium awards ceremony at Huntsville, Alabama, on 5 November 1997. Subsequent DA-funded monetary awards were provided to winners at their commands.

FORT STEWART UNIT NAMED BEST IN 1997

The 1st Battalion, 9th Field Artillery, logistics section at Fort Stewart, Georgia, was named as the Best Logistics Unit in the Army for 1997.

Major General James C. Riley, commander of Fort Stewart and 3d Infantry Division (Mechanized), presented the award to the battalion and gave each soldier a 3d Infantry Division commander's coin. The competition, which began in August 1996, involved numerous inspections by the division, XVIII Airborne Corps, and Army Forces Command.

USASMA SURVEYS TRAINING NEEDS

The U.S. Army Sergeants Major Academy (USASMA) is collecting task performance and training emphasis data to determine the common tasks every enlisted soldier needs to know and when they should learn those tasks. The data will be collected from 20,000 Active Army, Army National Guard, and Army Reserve soldiers worldwide this spring. The surveys will be completed using a computer instead of a pencil.

The Army Research Institute will analyze the automated responses, and the data will be used to update Initial Entry Training, the Primary Leadership Development Course, the Basic Noncommissioned Officer (NCO) Course, the Advanced NCO Course, the First Sergeant Course, the Battle Staff NCO Course, and the Sergeants Major Course.

For more information, call Robert Oberlender at (915) 568-8129, DSN 978-8129, or send e-mail to oberlenderb@bliss-usasma.army.mil.

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ARMY TESTS INTERMODAL SURGE

Turbo Intermodal Surge (TIS) is a relatively new transportation concept designed to assist in deploying military equipment on commercial vessels and vehicles. Flatracks, 20-foot MILVAN's, and 40-foot containers are used to transport equipment to the users. TIS delivers more equipment in a shorter period of time than conventional Army methods.

In April 1997, TIS was used for the first time overseas to support Cobra Gold '97, an annual joint military training exercise in Thailand. The U.S. Transportation Command (USTRANSCOM) spent $7 million to test and evaluate this new concept that can be used to supplement rapid deployment of forces worldwide. In Cobra Gold '97, an inland port support activity delivered unit equipment close to the training site. TIS eliminated the necessity of using a convoy to move equipment from far-away ports to the exercise area. In previous Cobra Gold exercises, soldiers who were tired and affected by jet lag faced a 2-day convoy to the exercise area soon after they arrived in Thailand. Using TIS reduced the possibility of vehicle accidents, maintenance problems, and damage and theft of equipment during a convoy operation.

To be effective, TIS requires detailed planning. TIS port support activity operations require a large, hard-surface area that has a good road network and is free of overhead obstructions. The site must have the appropriate number of personnel to forecast mission requirements, set up base camp operations, and perform split-based operations in a safe, professional manner. Everyone must use the USTRANSCOM standards for properly chaining and binding equipment onto flatracks. Use of the correct special tools, chains and bindings, and blocking and bracing materials is important. Use of dual-opening containers can facilitate TIS operations in confined areas by allowing vehicles access from both ends.

Disadvantages of using TIS include the tremendous amount of manual labor required to configure equipment properly for shipment. Blocking, bracing, loading, and unloading of containers and flatracks is much more laborious and time consuming than using roll-on-roll-off ships. Also, the interiors of the containers are hot and confined, making soldier tasks inside them difficult and exhausting. During Cobra Gold '97, record high temperatures created an obstacle to mission accomplishment because frequent breaks were needed to prevent heat exhaustion. Also, most of the contracted truck drivers had no specific delivery route or schedule, so soldiers sometimes waited for hours, not knowing when equipment would arrive from the port. The Cobra Gold experience will help planners avoid problems with TIS in the future.

ALOG SYSTEMS

The information presented in Army Logistician's ALOG 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-dns1.army.mil or phone (804) 734-1207 or DSN 687-1207.*

—Editor

INTEGRATED LOGISTICS ANALYSIS PROGRAM INTRODUCED

Managers of Army resources and logistics now have a tool that collects and integrates logistics and finance information into one program and gives decision makers critical information with which to make timely, accurate decisions. This tool is the Integrated Logistics Analysis Program (ILAP). ILAP extracts information from the Standard Army Retail Supply System (SARSS), Standard Army Maintenance System (SAMS), Standard Army Financial Inventory Accounting and Resources Systems (STARFIARS), Standard Finance System (STANFINS), and data base Commitment Accounting System (dCAS). It presents this information in logical, easy-to-use reports in both computer and hard-copy media. It also provides the capability to extract information from Federal logistics data on compact disk (FEDLOG) and the Logistics Intelligence File (LIF).

ILAP's proven record of success can be traced back to its origin as a locally developed, unique data base designed by logistics managers in the 5th Infantry Division at Fort Polk, Louisiana. These managers, like many others throughout the Army, found themselves in the unenviable position of having to make decisions without having a total picture of the logistics and financial posture of the unit. Their insights into management problems led to the evolution of a program that became the foundation of today's ILAP suite of programs. ILAP enhances the management decision process for all decision makers.

ILAP operates at virtually every level within the Army. Users of Unit-ILAP are provided information from Standard Army Management Information Systems (STAMIS), and they have access to key planning and reference data from the Operating and Support Management Information System (OSMIS). Corps-ILAP provides tactical support unit managers at the corps level and nondivisional corps support unit managers access to logistics data from the corps/theater automatic data processing service center (CTASC) and the Army's total asset visibility (TAV) system. Installation-ILAP will complete the ILAP suite for both tactical and nontactical logistics and financial management. Subordinate Corps-ILAP summary data provides major Army command (MACOM)-level users with a theater-level view of their logistics and financial posture. A derivative of the ILAP program operates at the joint forces level in Korea. It gives the Commander, U.S. Combined Forces, Korea, a complete view of the posture of U.S. Army and Air Force and Republic of Korea forces retail logistics and prepositioned stocks. This program is called CINC [commander-in-chief] View. The system used by U.S. Army, Europe, is called LOGNET.

Each level of ILAP operates on a Windows NT network. Unit-ILAP, the original and most widely used in the suite, is an MS-DOS FoxPro data base application. It operates on nondevelopmental item (NDI) hardware in logistics and resource management locations at the division materiel management center level and below. All other levels of the ILAP suite are full 32-bit applications operating in the Windows environment using an Oracle data base management system. They are employed at levels responsible for echelons-above-division management decision and analysis. Installation- and Corps-ILAP also use NDI for their hardware.

ILAP can connect to a number of networks for data transfer. It can use either a modem or Internet protocol to transfer data from a STAMIS or to and from other ILAP sites. Its configuration accommodates several different communication packages and protocols, including Citrix WinFrame, Files Transfer Protocol, and diskettes. It interfaces electronically with SAMS, SARSS, STANFINS, STARFIARS, dCAS, and TAV.

ILAP significantly improves logistics management efforts by providing near-real-time data from Army STAMIS in formats that are convenient to the user. Because of ILAP's rapid prototype development, it can be modified almost instantly to meet the Army's needs and fix known weaknesses in the logistics and financial areas.

ILAP has reduced the manual efforts involved in logistics and financial data review to provide better decision support tools. Manager decision review processes, such as repair of items versus buying new items, maintaining stockage levels versus ordering items as required, reconciling logistics transactions with financial transactions, and determining inventory values and financial posture, are simple keystroke processes.

Program efficiency is maintained and ILAP maintenance costs are reduced through a technical support process that combines the traditional help desk with World Wide Web technology and a unique remote monitoring capability. Web technology makes information such as fielding schedules, "frequently asked questions," white papers on key topics, and user manuals readily available to the user. Centralized ILAP specialists augment unit staffs through systematic remote access and routine "health" checkups. This remote monitoring significantly improves ILAP effectiveness by minimizing downtime due to user errors and reduces the overall cost of maintaining ILAP.

The ILAP technical support staff dedicates specialists to each command or activity, thereby building a working relationship that increases understanding of user needs, trust between supporter and client, and support efficiency to clients.

ILAP is being developed and fielded under the combined sponsorship of the Assistant Secretary of the Army for Financial Management and Comptroller (ASA FM&C), Army Deputy Chief of Staff for Logistics, Combined Arms Support Command, and Program Executive Officer, STAMIS. Although the name "ILAP" implies a primary focus on logistics, the ASA FM&C presence ensures that there is a healthy representation of financial data as well. ILAP is being fielded Army-wide to promote efficiency and economy at all levels.

Interest among potential ILAP users continues to grow as word of its success spreads. Recent logistics and financial efficiency objectives greatly affect the Army's day-to-day operations and necessitate integration of data from both functional areas for comparative analysis. The Army's solution to this dilemma is to incorporate ILAP into its evolving integration efforts.

All ILAP functions will converge into the Global Combat Support System-Army (GCSS-Army), formerly known as Integrated Combat Service Support System (ICS^3). GCSS-Army will be the Army's single, seamless, integrated, interactive combat service support (CSS) automation and information management system. As the Army transitions its automation processes from CSS vertical management systems to integrated information systems, ILAP provides an interim solution for the merging of management information. ILAP provides a new management perspective to the myriad segregated information systems and is the first glimpse of what is possible to integrate logistics management information.

Peter O. Johnson, Project Manager, Integrated Logistics Systems, manages ILAP. Edward G. Talpas serves as project officer. Questions and comments may be phoned to (804) 734-7142 or DSN 687-7142, or emailed to talpase@dns1.army.mil. Information on ILAP is also available on the World Wide Web at http://132.159.41.67.

INTEGRATED RCAS INCORPORATES STAMIS

The 99th Regional Support Command, headquartered in Pittsburgh, Pennsylvania, is among the first U.S. Army Reserve (USAR) commands to receive the integrated Reserve Components Automation System (RCAS). RCAS is a system of hardware and software designed specifically for the Army National Guard and USAR. RCAS incorporates Army STAMIS for logistics, personnel, finance, and reserve component-unique functions. RCAS runs on IBM-compatible, pentium-based computers using the Microsoft NT operating system. Because RCAS is a server-based system, the reserve components were required to upgrade or install new local area networks and modernize communications infrastructures.

The logistics STAMIS incorporated into RCAS include the: Unit Level Logistics System (ULLS)-S-4, ULLS-Ground, and Standard Property Book System-Redesign (SPBS-R). The Project Manager (PM)-RCAS and PM-Integrated Logistics Systems (ILOGS) worked together closely to ensure that technical requirements and support were exchanged adequately. The incorporation of the STAMIS required the temporary swapping out of Windows NT to Windows 95. Windows 95 then was used to open a disk operating system (DOS) to run ULLS and emulate the Virtuous operating program to run SPBS-R. Although these operating system tasks are complex, they are invisible to the user.

With RCAS, operators can benefit from the full range of software available through MS Office, other STAMIS, and e-mail. E-mail is an excellent way to send STAMIS files over long distances, such as to geographically dispersed reserve component units. To use STAMIS e-mail files, users must first transfer files to diskettes, since STAMIS still looks for files in its "A"drive.

RCAS allows the reserve components to "catch up" in terms of logistics functionality and, in some respects, puts them ahead of the active component.

Modeling Cargo

MTMC's Transportation Engineering Agency helps Military Ocean Terminal Sunny Point (MOTSU) conduct "what if" planning drills.

When Army units must deploy overseas, their weapons, ammunition, equipment, and supplies have to be moved by sea or air to the theater of operations. At such times, the efficient flow of materiel through seaports and airports in the continental Unites States becomes crucial to mission success. If that flow is not managed properly, the port can become a bottleneck and the deployment can be hindered. The Military Traffic Management Command Transportation Engineering Agency (MTMCTEA), at Newport News, Virginia, works to avoid such problems and ensure that the movement of cargo to and through ports is smooth and efficient. To demonstrate how MTMCTEA contributes to the Army, I'd like to share with *Army Logistician* readers a recent project in which we assisted one of the Army's most important ports in finding a better way of determining how to manage its cargo flow.

Historically, MTMCTEA has modeled installation cargo and movements for analysis and studies. During a 1996 review of a cargo throughput analysis of Military Ocean Terminal Sunny Point (MOTSU), North Carolina, MOTSU's commander, Colonel Donald D. Parker, requested that his staff have access to the MTMCTEA model. He wanted his staff to be able to run their own "what if" drills to determine the impacts on the flow of cargo through MOTSU when variables are changed, such as equipment quantities, explosive limits, available holding areas, work crew sizes and efficiency, disasters, and cargo shipping modes.

With the help of the MOTSU staff, we began immediate development of an MS Windows interface for the model, animation, and data programs of the MTMCTEA model. The resulting interface program, called RunTime, allows MOTSU personnel to modify variables in the model, run the model, and view both animation and output reports.

The Stochastic Model

The RunTime program is a stochastic model. "Stochastic" means "probability based." The model defines a range of values for each action in the cargo flow, such as 3 to 5 minutes to complete a container transfer. When that particular action occurs, the computer uses random numbers to select a time value (say, 4.3 minutes) for it. When the same action occurs again, the computer randomly selects another value within the range (such as 3.6 minutes).

For computer types among our readers, let me digress a

Flow at MOTSU

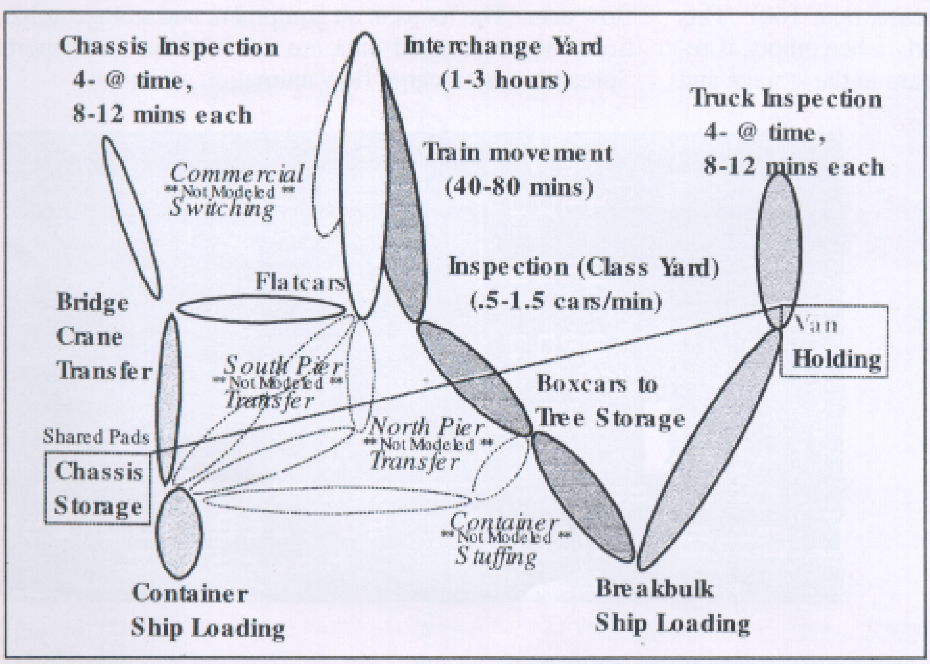
by Roger Straight

moment to provide some technical description of what we did. We developed RunTime in MS Visual Basic. The RunTime module accesses and runs a compiled model written in GPSS/H from Wolverine Software. The GPSS/H model produces the animation file, which RunTime executes through Proof Animation (which also is from Wolverine Software). RunTime accesses the spreadsheets, with data from the GPSS/H model through Lotus 1-2-3. RunTime requires a separate security key (dongel) from Wolverine Software to run the compiled stochastic model and the animation.

The model of MOTSU cargo flows provides real-world variables and logic to ensure that cargo movements meet the limits and constraints of actual (though simplified) operations. The model generates 23 types of notional munitions, each with assigned weight, volume, explosive quantity, and movement category for both container and breakbulk operations. We aggregated these notional munitions from the 130 actual types of ammunition found in the fiscal year 1994 war movement plan. The model generates quantities of each notional munition from a distribution based on the same plan.

The notional munitions are loaded into either containers (on chassis or flatcars), vans, or boxcars based on the transport weight or volume limits of those vehicles. The various vehicles then are assigned to a ship and begin moving into MOTSU based on real-world arrival experience and constraints. Rail arrivals are constrained by the size of the interchange yard and MOTSU's experience with commercial rail delivery and constraints.

The available equipment, speed limits, and movement time ranges dictate and regulate the flow of trucks and railcars through MOTSU and onto the ship. The computer varies the average time by about 25 percent up or down (one standard deviation, normal distribution); this reflects the normal variation in each action required to move a piece of cargo from the MOTSU gate to loading on the ship. Each piece of cargo flows through almost 100 different actions, each with its own range and average time (remember the stochastic model). The chart below is a simplified view of the overall cargo flows at MOTSU. Each oval and node represents many activities, time ranges, facility and equipment constraints, and logic interactions.



This is a simplified view of the overall cargo flow at MOTSU. The ovals and nodes represent almost 100 different actions.

As an example of factors the model must consider, moving a train from the interchange yard to the class yard will require one to three locomotives, depending on the total weight of the railcars and their cargoes. If most or all locomotives are working elsewhere, the pickup at the interchange yard must wait until enough locomotives are free. If adding the train to the class yard will exceed the yard's explosive limits, the train cannot enter the yard; it must wait until other locomotives move railcars to storage or offload them, thereby reducing the amount of explosives in the yard.

The flow model is instrumented to collect data of interest to analysts and staff. Each hour, we can measure the pieces of equipment used at MOTSU and how many minutes they are used; how much equipment and ammunition is in storage and what percentage of total storage space is in use; and what is moved and where. The data collected on equipment, storage, and movement hourly utilization, averages, minimums, and maximums fills three large spreadsheets. Basically, we now have detailed data on areas of specific interest. We have modeled the physical flow into and through MOTSU and can instrument to measure happenings in the model. We can see the ebb and flow of work in various areas and the impacts on adjacent and downstream activities. We decide what we want to know and measure it in the model.

In the chart below, an extract from the animation of the cargo flows from a model run shows the variation of net explosive weight (NEW) over 8 days as boxcars and flatcars arrive and depart the class yard. (NEW is the explosive effect of each different munition expressed in pounds. It is used for making safety calculations and determining limits.) The bars on the left side of the chart show the railcars at a particular time (in this case, hour 160). This variation in the class yard, particularly when empty, is reflected in varying degrees downstream in the storage and shiploading areas. This detail gives an executive or manager a much better overall picture.

Stochastic models can bury the user in data. The real skill needed by the user is selecting, identifying, and presenting the appropriate areas and data in the model that highlight the options available and the impacts of specific changes or questions.

The Interface Program

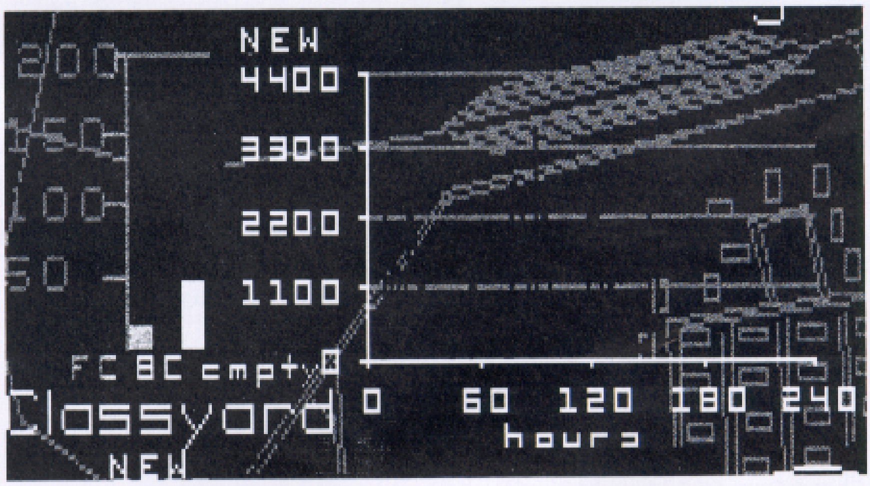
The chart at right shows the main menu screen of the RunTime program. From here, the user can access the six variable screens. These screens allow the user to make changes to nearly 150 model variables, from equipment quantities to storage limits and cargo distribution to cargo arrival and ship sizes. The user also runs the model and accesses the output data, reports, and animation from here.

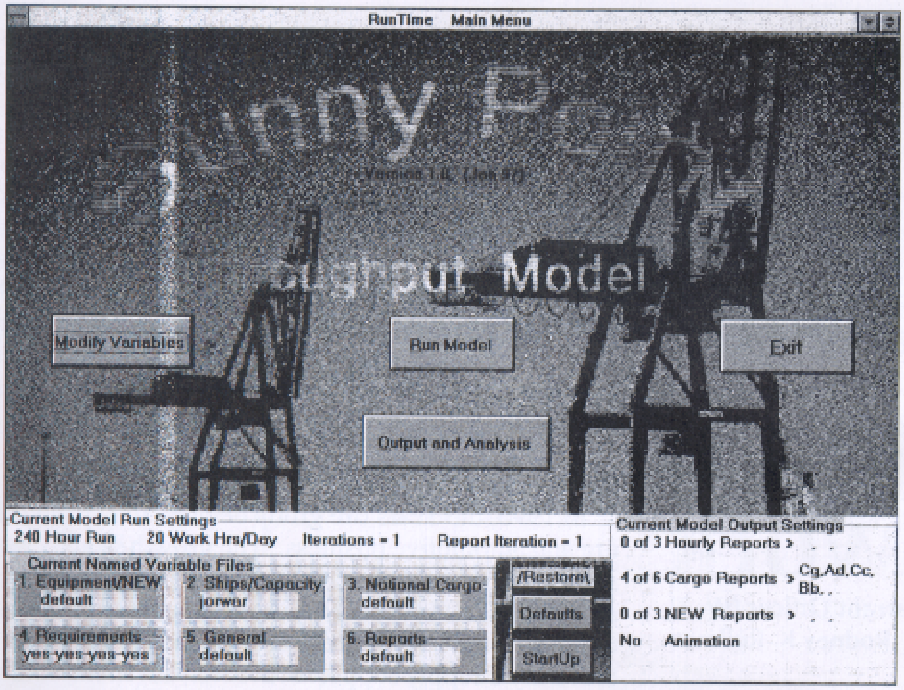
The user can modify the variable screens to conduct a "what if" drill. The first variable screen is the Equipment and NEW screen. From here, the user can modify equipment and storage pad quantities, NEW limits, and the number of crews available to work in various areas. The default values are those used in the MTMCTEA model for the cargo flow analysis.

From the second screen—Ships and Cargo Capacity—users can modify cargo types, storage quantities, arrival modes, and ship settings. They also can modify the model distributions of ship capacity, time between ships, and loading start factors. The other four variable screens are Notional Cargo, Requirements, General, and Reports. These contain other variables and settings the user can select.

After the user sets the variables and runs the model, RunTime displays selected reports accessed from the Output and Analysis screen. This screen also provides general flow data. The focus is on equipment and storage utilization. More detailed data are available in the Reports, Spreadsheets, or cargo flow animation selections.

☐ This is a portion of an animated depiction of cargo flows showing changes in net explosive weight over 8 days.





The main menu of RunTime provides access to six variable screens, shown in lower left corner.

The animation provides moment-to-moment status of a number of cargo flow areas. This is a changing visual picture of the status and flow of cargo in the model. The impacts and constraints of various areas are sometimes easier to identify in animation than from the data in reports or spreadsheets. The animation also provides a dynamite briefing demonstration on the complexity of port operations.

Half of a "What If" Drill

On 5 February 1997, MTMCTEA passed the completed RunTime stochastic cargo-flow modeling package to the MOTSU staff. On 14 February, the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), Department of the Army, requested that MTMCTEA and MOTSU investigate the concept of direct delivery of flatcars with containers to the wharf for shiploading. RunTime would be put to use very quickly.

We had available the current operational model for the baseline and half of the needed direct-delivery stochastic model. We added the model language for railcar delivery to the wharf and rail, crane, and ship interactions, while MOTSU looked at the impacts of dealing with a high tempo of ship operations.

The modified model started generating the concept data in mid-March. Review and analysis focused on the critical areas and began reducing data for briefings and decision support. Detailed coordination and reviews follow. Scheduling meeting times and making sure executives were available consumed more time.

Everything came together on 15 April, when MTMCTEA and MOTSU presented a formal briefing on the impacts and options of direct flatcar delivery to the DCSLOG. The backup data, charts, and animation were extensive, from the overview to the "down 'n' dirty" detail level. When you have the data, the charts tend to be impressive.

In summary, MOTSU now has a stochastic model for conducting local "what if" and planning drills. Just as the installation commander desired, the MOTSU staff now can determine the impact of many possible factors on every aspect of port operations. The result will be increased readiness at one of the Army's major ports, and that can only benefit the Army's ability to deploy in contingencies.

Roger Straight is a civil engineer at the Military Traffic Management Command Transportation Engineering Agency, Newport News, Virginia. His work in the Infrastructure Division is primarily concerned with analysis of expected cargo flows and facility impacts on military installations during contingencies.

Building a Tire Distribution Network

by Chief Warrant Officer (W–3)
Rodney K. Rollman

As I began my training-with-industry (TWI) assignment at Sears, Roebuck, and Co., in Hoffman Estates, Illinois, I wondered what I would be doing there and whether or not I would return to the Army a better logistician because of it. My first few weeks as a member of the Sears Logistics Group consisted of meetings, orientations, briefings, and a 3-day overview. All of these activities had been planned and designed to indoctrinate me to the Sears business world and educate me about corporate America. I would be working with folks at the executive vice president level and would have unrestricted access to all areas of Sears' vast logistics network.

After the visits and orientations were completed, I was assigned to assist with "the tire project." I was part of a four-man team that was responsible for redesigning the tire distribution network and establishing five tire distribution centers (TDC's) to support the Sears tire group. This was an important project in the overall strategy for the Sears automotive business and a good opportunity for me to participate actively in and learn about corporate logistics.

A Member of the Team

The tire distribution team consisted of the tire network director, an operations manager, a single point of contact for logistics issues, and me—the TWI rookie. Before my arrival, the team already had begun the complex process of managing the integration and execution of all logistics functions required to make the redesign of the tire distribution network a reality: warehousing, transportation, acquisition, automation, third-party service, and vendor relations. My training and hands-on work assignment at Sears were now in full swing. As my knowledge of the operation and the people involved in the project grew, so did my conviction that I was working with first-rate professionals whose talents would ensure the successful implementation of the tire distribution network.

Background

In 1996, the Sears tire group decided to expand their tire and automotive business. The growth would create storage capacity and manpower problems at the retail replenishment centers (RRC's) that stock tires and automotive products. RRC's are the industry version of the Army's supply support activities. Given the volume trends at that time, the RRC's would not be able to support future inventory increases and sustain a high level of desired customer service. So the Sears Logistics Group was tasked to find a way to improve distribution and service to approximately 1,100 stores while reducing operating expenses.

Sears logisticians determined that the best way to support the tire group would be to establish one logistics network of five regional TDC's throughout the United States. They would conduct a network and supply chain study to determine the optimal network design. The study would target ways to minimize distribution and transportation costs, reduce pipeline inventory, enhance inventory deployment, and achieve desired levels of customer support.

After the network design was completed and agreed upon, the next step was to plan the automation and inventory management, transportation, warehousing, and TDC operations required to bring the network on line.

Automation and Inventory Management

Sears automated logistics systems are much more complex than Army systems. Each system performs a specialized function. No one system does it all. One system deals with replenishment, another with transportation, another with warehousing, and so on. Many personnel and man-hours were required to establish the automated systems and the connectivity among them that were needed to support each TDC. Great effort was put into integrating functions.

Initial stockage levels and inventory planning decisions

In the photo above, an employee at the Middletown, Pennsylvania, tire distribution center is "order-picking" to fill a customer's request. At right, a forklift operator places tires in their proper locations on one of the 82-section aisles in the warehouse.

for the TDC's were made at the corporate headquarters by inventory managers. TDC stockage levels, known as fixed expected needs (FEN's), were based on the needs of individual stores and their anticipated seasonal requirements. TDC inventory and FEN levels are designed to umbrella store inventory and FEN's in the same manner that Army supply support activities umbrella prescribed load lists but the TDC's depend on pipeline speed and just-in-time inventories as opposed to depth of stockage. Initial orders were placed 6 to 8 weeks before the activation of each TDC to allow adequate time for receiving and warehousing tires. Inventory and replenishment actions were monitored closely for the first month to ensure that FEN levels were compatible with actual requirements. After the first month, inventory and FEN levels were driven by normal demands or sales promotions.

Transportation

Transportation was an integral part of the logistics network design. The transportation slice represented a significant opportunity for cost savings through consolidated distribution and load optimization. During the network planning phase, a transportation cost analysis of all stores was conducted by region to determine the best sites for the TDC's. We also needed to figure out the number of deliveries required by each store per week and the TDC to which each store should be assigned based on proximity and costs.

After the TDC locations were set and transportation requirements were known, bids were solicited from third-party transportation providers. The transportation contracts were awarded to the best qualified provider based on historical performance and cost. Inbound vendor shipments were contracted from 50 ship points to the 5 TDC locations. Outbound shipments (from TDC's to stores) for 75,000 deliveries were contracted based on weight. The shipments to stores were scheduled by using dynamic runs (a term used when shipments are maximized by configuring store deliveries based on route and cargo weight). The dynamic runs optimize transportation assets and ensure that the trucks are filled to maximum capacity.

The Sears Logistics Group continually evaluated transportation costs and performance statistics to ensure cost savings and quality customer service. Transportation support was essential to the successful activation of each TDC.

TDC Planning

Each TDC had been strategically located and assigned responsibility for providing tire support to stores in a particular region. The number of states and stores supported by each TDC would vary based on the results of the transportation and cost study. Each TDC would support an average of 220 stores in 10 states. Four of the TDC's would be established in existing buildings. A new warehouse would be built for the fifth. The TDC's would receive, put away, pick, ship, and safeguard automotive and tire products. They would have no influence on replenishment and distribution of inventory. These functions would be performed by automated systems at the corporate headquarters. TDC's would conduct operations using the automated distribution operating system that would control inventory and keep freight moving through the TDC.

Each TDC would have to be manned and equipped and its newly hired personnel trained. Corporate headquarters would finance the operation, and staff departments would assist in bringing the TDC's on line, but the TDC managers ultimately would be responsible for the implementation and success of their operations.

The managers had myriad tasks to accomplish. They hired and trained personnel, procured supplies and equipment, established warehouse operations, drafted security and fire regulations, set up a mail system, determined employee benefits, and performed other tasks too numerous to mention. The TDC's were to be stand-alone Sears operations that required minimal guidance from corporate headquarters after they were established.

Execution

After opening dates for each TDC were confirmed, it was time to bring the TDC network on line. The TDC managers and corporate staff did a superb job in meeting activation deadlines. All TDC's opened on time.

Each TDC was time-phased into operation beginning in October 1996 and ending in March 1997. Each TDC required a gradual buildup of new inventory from vendors and the transfer of tires and automotive products from the RRC's that were supporting 1,100 stores. The conversion process had to be monitored closely to ensure that the right amount of inventory was transferred at the right time to avoid shortages in customer stores. Inbound deliveries of new products were also time-phased to expand the inventory. The incremental flow of inventory into the TDC's was designed to maintain a manageable work load and allow the TDC managers the time and assets to bring the operation on line.

As expected, there were some problems with the first TDC opening but no show stoppers. Most of the problems involved automated system and replenishment issues. Reaction time was swift and corrective action was immediate, thanks to the planning and meetings that lead up to opening day. Working task documents and weekly update meetings tracked progress and anticipated problems so corrective actions could be taken immediately. Receiving and shipping procedures were fine-tuned and operating procedures adjusted during the first few weeks. Problems inherent in warehouse operations continued during that time but had no negative impact on customer support. As the TDC adapted to its operating procedures, problems began to disappear, and the TDC evolved into a coherent team that functioned independent of corporate-level assistance. The first TDC opening surpassed expectations and served as a model for future TDC's.

As the remaining TDC's came on line, each activation process improved. The RRC's also improved inventory transition procedures and shipments to the TDC's. The time-phasing of each TDC opening allowed time for lessons learned to be studied, refined, and applied to subsequent openings. Time-phasing the TDC openings also ensured continued quality support to customer stores by not overloading a new, untested distribution network.

The RRC's continued to support the stores in their regions until the entire TDC network was established and could relieve them of tire distribution. The bottom-line keys to success were planning, the logisticians' ability to understand and coordinate business requirements, and first-rate management assistance in bringing the network on line.

Network Complete

The new Sears tire distribution network is a huge success. Since the redesign of the network, the TDC's have shipped over six million tires to 1,100 stores, reduced total distribution time, and realized multimillion-dollar savings over planned expenses. Members of the Sears Logistics Group truly have demonstrated their reputation as world-class logisticians, and I have completed my introduction to corporate business logistics. I was fortunate throughout my assignment to work first-hand with a superb logistics organization and contribute to its success. As a result, I have returned to the Army with a better understanding of total logistics.

ALOG

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Preserving Transportation Infrastructures

by Major Robin L. Hagerty, George L. Mason, and James G. Mason

Introducing forces into a country to accomplish humanitarian or peacekeeping missions always includes an early assessment of that country's road network and its ability to support the volume of truck convoys required to sustain the operation. Mission planning goals usually include reduced costs, a timely conclusion of the effort, and minimal deterioration of the country's road networks. These goals can result in a conflict between transporting the required tonnage and protecting roads from excessive damage. In underdeveloped areas, the road network most likely will be the only infrastructure sufficiently developed to support delivery of materiel to users. The road network quickly becomes a prime candidate for overuse and rapid deterioration.

Recent humanitarian operations in remote areas of Africa and Bosnia underscored the need for a strategy to deal with road networks that cannot sustain the constant weight and unique configurations of military loads. Traditionally, equipment and materiel are transported from a fixed seaport or airfield to the end of an unimproved dirt road. As the route conditions and topography change, materiel must be transloaded to various modes of transport. Unimproved secondary roads are fine for single-axle vehicles and foot traffic; however, loaded M923-series trucks will rapidly deteriorate the road's subgrade. Initial road failure is indicated when the drivers complain about pot holes, surface rutting, and roughness. Road surface deterioration increases driver fatigue, limits vehicle speed, reduces vehicle load capacity, and accelerates vehicle maintenance requirements.

Repeated heavy-wheel loads will deteriorate the roadway, ultimately rendering the road impassable. To predict how a road will respond to repeated heavy-wheel loads, the transporter must consider the effects of weather, road construction, and subgrade composition. The bias-ply tires used on M923 trucks have limited sidewall flexibility and must operate at a tire pressure of 80 pounds per square inch (psi). The high tire pressure contributes to road deterioration and limits a tire's ability to absorb the stresses of the load and the uneven road surface. Therefore, the tire transmits most of the load stress directly into the road, while the uneven road stresses are transmitted to the driver.

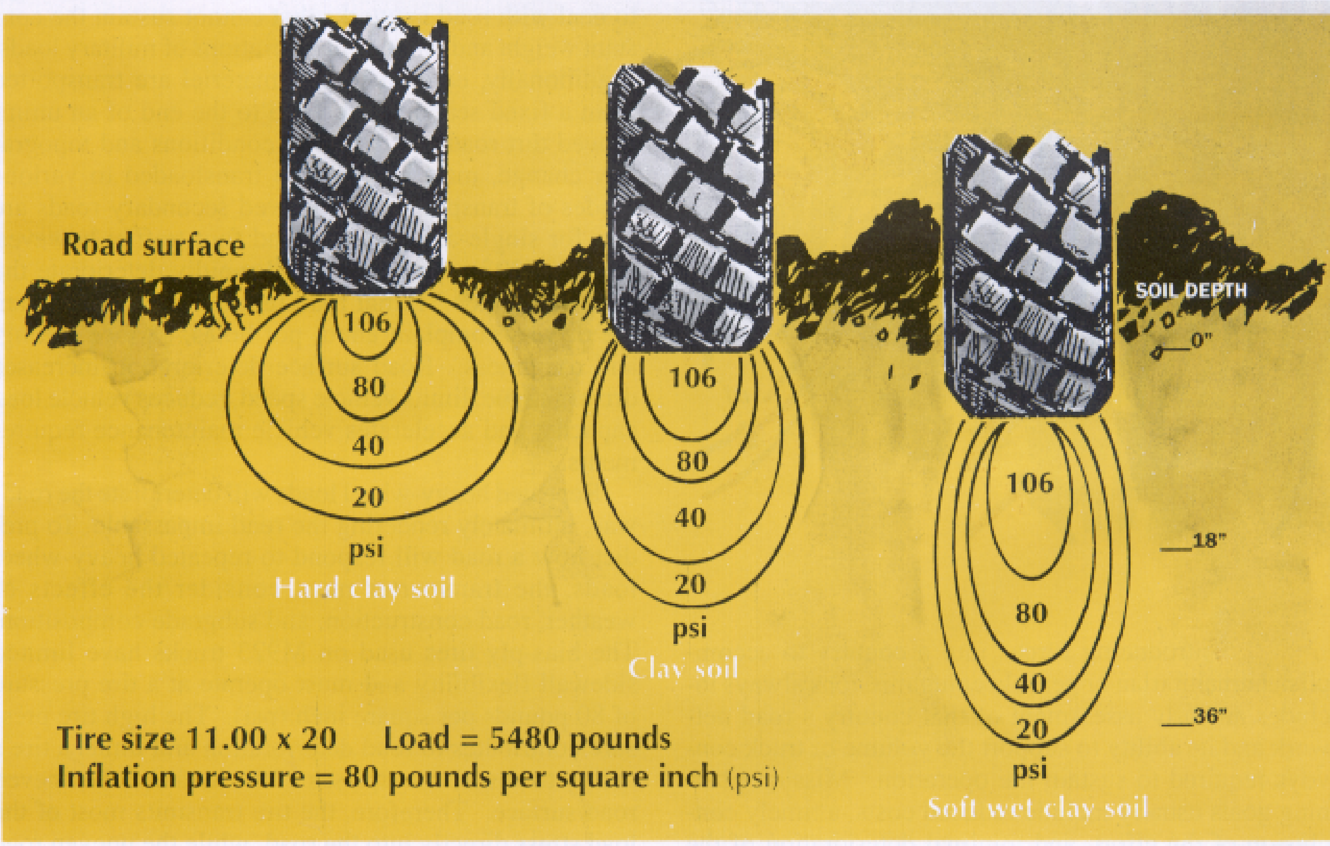
The most common approaches for estimating the stresses imposed by repeated heavy-wheel loads involve a combination of experimental data, analytical evaluations, relevant experience, and engineering judgment. However, transporters are primarily concerned with the changes in road surface conditions that inhibit throughput. Tire design can help retain road resiliency by absorbing part of the stresses; however, without periodic maintenance, the road surface's ability to absorb the load stresses deteriorates, causing the surface and subgrade to separate, and ruts and rough surfaces appear. Rutting begins a chain of events that quickly makes a road impassable. As the ruts become deeper, the drivers must slow down or risk axle breakage.

The chart below illustrates bias-ply tires of an M923 cargo truck, calculated wheel loads, and the stress distributions on the road's subgrade on various soil types. The calculated wheel load is the net vehicle weight of 22,515 pounds, combined with its rated gross cargo capacity of 10,000 pounds. The figure also shows the relationship between the soil strength and the tire's ability to penetrate the soil and create ruts.

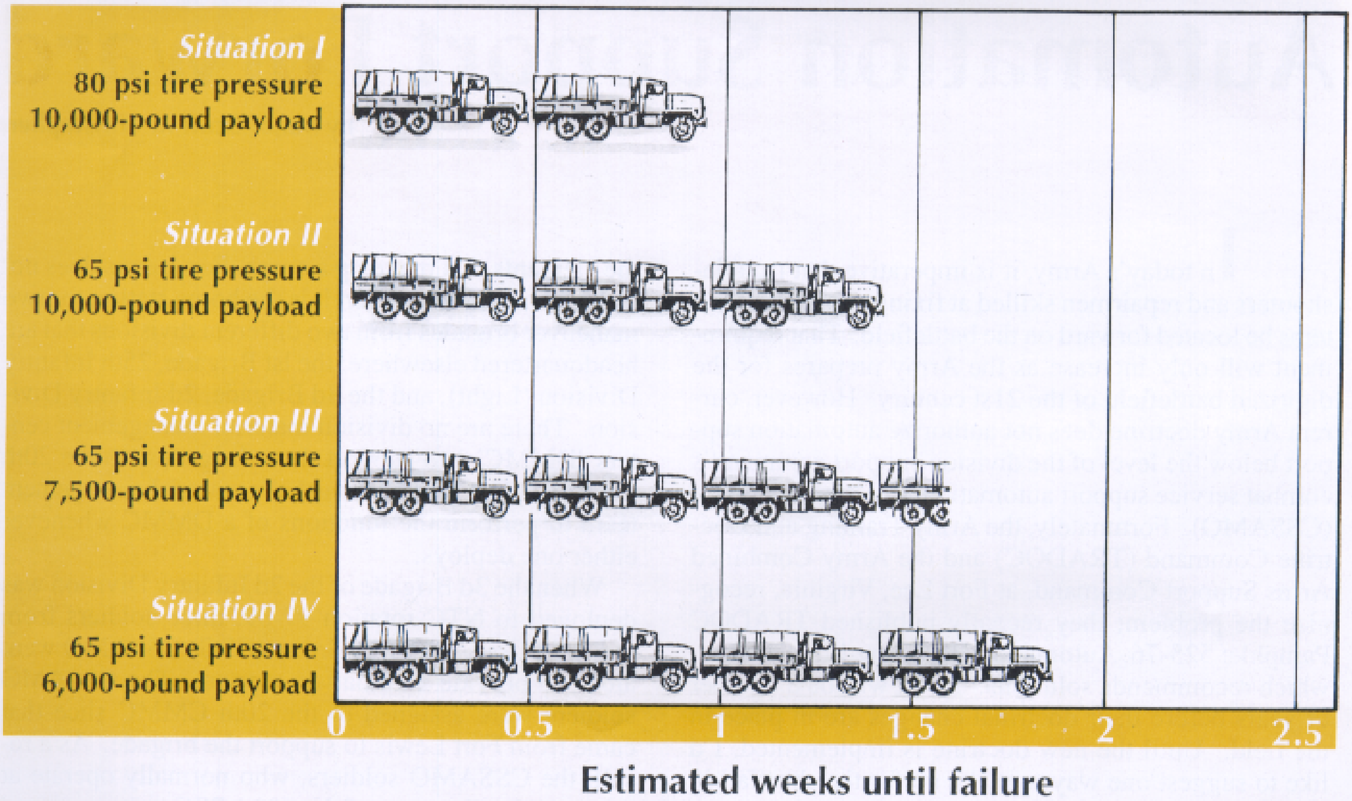
Although engineers can calculate the effects of wear on unimproved roads, transporters do not have a background in these analytical methods. For field applications, convoy planners need a methodology, based on scientific principles, that is easy to understand and simple to apply. The options available to the transporter include reduced tire pressure, reduced vehicle speed, or reduced vehicle weight.

This common-sense approach consists of three independent actions. Applying one or more of these alternatives, in response to varied weather and road conditions, will extend road life and lessen the potential of damage to the truck's suspension—

- Reducing tire pressure increases the size of the tire footprint and decreases the transmitted wheel load stresses. Although reducing tire pressure will distribute load stresses more evenly over a wider tire contact area, caution should be exercised. If tire pressure reductions exceed 25 pounds per square inch, the tire could become deformed and damaged.
- Reducing speed will also result in a more even distribution of the shock wave through the soil and will lessen driver discomfort.
- Reducing vehicle weight offers the greatest po-



☐ **Tire and load stress on three types of soils.**



□ Road failure rates based on tire pressure and payload.

tential for extending road life while preserving driver comfort. When planning throughput estimates in remote areas, transporters normally use the cross-country load weight, which is approximately 75 percent of the vehicle's rated capacity, as a base calculation. A weight reduction of 1,500 pounds from the estimated cross-country cargo load of 7,500 pounds to 6,000 pounds will reduce vehicle-caused road deterioration.

The chart above illustrates the net effect gained from these simple alternatives. Situation I shows how long tires and roads will last when no action is taken. Situation II shows the results when only the tire pressure is reduced. Situation III results are based on reducing tire pressure and vehicle weight, which significantly delayed tire and road failure. Situation IV is with reduced tire pressure and a vehicle weight reduction of 1,500 pounds below the normal cross-country planning load. These calculations are based on previous research in this field conducted at the Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. The vehicle used was an M923-series 5-ton truck, with a cargo weight of 10,000 pounds. As illustrated, Situation IV had the greatest potential for increased road life span. Road life can be doubled if preventive actions are taken.

There is a direct correlation between road use, road degradation, and number of convoy operations. Understanding the correlation between traffic and road degradation and the relationship between vehicle speeds and surface roughness is critical for military convoys.

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James G. Mason is a researcher in the fields of military transportation and logistics for Applied Research Associates, Inc., Vicksburg, Mississippi. He is a graduate of the Army Command and General Staff College.

Note: The data presented in this article were based on research conducted under the Research, Development, Testing, and Evaluation program of the Army Corps of Engineers by the Army Engineer Waterways Experiment Station. The Chief of Engineers granted permission to publish this information.

Automation Support Forward

by Major Scott R. Christopher

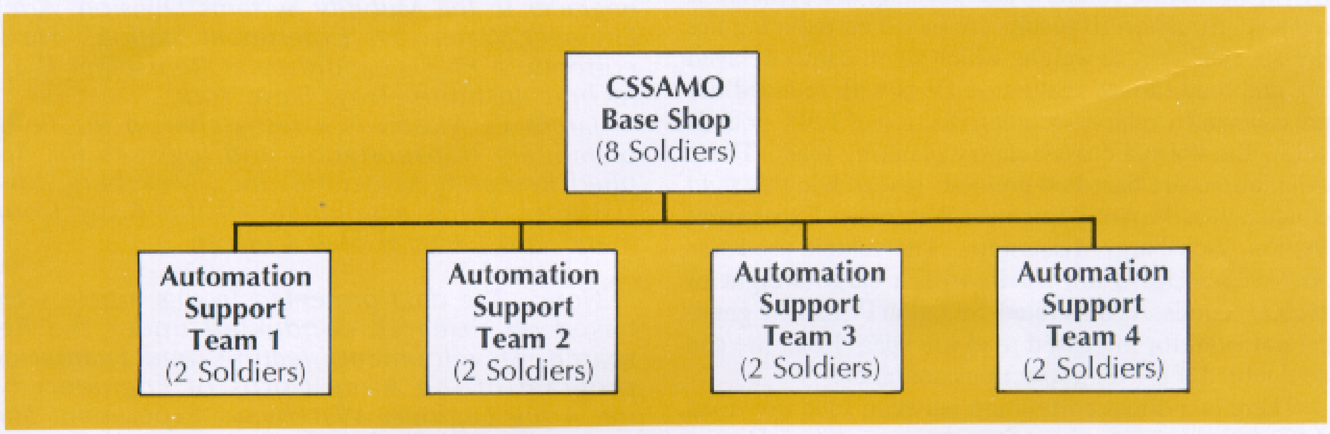
In today's Army, it is imperative that troubleshooters and repairmen skilled at fixing automated systems be located forward on the battlefield. That requirement will only increase as the Army prepares for the digitized battlefield of the 21st century. However, current Army doctrine does not authorize automation support below the level of the division support command's combat service support automation management office (CSSAMO). Fortunately, the Army Training and Doctrine Command (TRADOC) and the Army Combined Arms Support Command, at Fort Lee, Virginia, recognize the problem; they recently published TRADOC Pamphlet 525-76, Automation Hardware Maintenance, which recommends solutions. But it will be a number of years before their doctrinal changes are in place in the field. Until the new doctrine is implemented, I'd like to suggest one way to make up for the shortfall in forward automation maintenance support. My interim solution, based on my experience at the National Training Center (NTC) at Fort Irwin, California, uses CSSAMO personnel to provide the needed capability.

Supporting a Brigade's Computers

NTC rotation 97-09 offered logisticians at Fort Lewis, Washington, an opportunity to use CSSAMO personnel to support computer systems under the Army's "fix forward" concept. The opportunity arose because of the unusual mix of units based at Fort Lewis and the need to support them in innovative ways when they deploy. While it is the home of I Corps, as well as most of the elements that make up a corps, Fort Lewis does not host a division. However, it is the home station for two maneuver brigades from two different divisions that are headquartered elsewhere: the lst Brigade, 25th Infantry Division (Light), and the 3d Brigade, 2d Infantry Division. There are no division materiel management centers (DMMC's) to support those brigades, so the 20th Corps MMC (CMMC) furnishes a materiel management team to perform the functions of a DMMC whenever either one deploys.

When the 3d Brigade of the 2d Infantry Division was deployed to NTC rotation 97-09, three soldiers from the 593d Corps Support Group (CSG) CSSAMO went along to provide automation support. The CSSAMO soldiers were assigned to the 20th CMMC slice that came from Fort Lewis to support the brigade. As a result, the CSSAMO soldiers, who normally operate at the corps level as part of the 593d CSG, were required to operate at the division level during the NTC rotation.

The biggest problem in providing automation repair support was figuring out where to position the CSSAMO soldiers on the battlefield to support the brigade task force's 32 computer systems. The task force had 27 Unit Level Logistics System-Ground (ULLS-G) systems, 1 Standard Army Maintenance System-1 (SAMS-1) system, 3 SAMS-2 systems, and 1 Standard Army Retail Supply System-1 (SARSS-1) system. The CSSAMO traditionally works in the rear, where customers retrograde systems to it for repair. This method is satisfactory in the garrison environment of Fort Lewis,



The author proposes this structure for the combat service support automation management office to provide support forward to combat brigades.

but it would not work at the NTC. So three options were considered for using the CSSAMO soldiers to provide the needed forward support.

The first option was to schedule times during which the CSSAMO soldiers would move forward into the maneuver box to meet customers, who would bring them their broken or inoperable automatic data processing (ADP) equipment. The CSSAMO soldiers would either repair the equipment on the spot, conduct a float transaction (swap a working system for the broken one), or take the equipment back to the rear and return it the next day after repair. Because of the high operating tempo and the unpredictability of the battles at the NTC, this option was not selected.

The second option was to evacuate computers to the replicated division support area (DSA) and fix them there. This sounded like a good plan at first, since that was the way the CSSAMO was used to operating and the soldiers were comfortable with that procedure. But once the factors of time and distance were analyzed, and everyone realized that it might be 24 hours before a customer unit received its equipment back in an operational status, this option lost its credibility.

Forward-Deployed CSSAMO Support

The third option—the one that was selected—was to position two CSSAMO noncommissioned officers (NCO's) forward on the battlefield in the brigade support area (BSA) and leave the NCO in charge (NCOIC) in the replicated DSA to provide support to the forward-deployed team. The forward-deployed team was under the operational control of the support operations officer of the 296th Forward Support Battalion. The NCOIC was responsible for procuring parts for the forward team, pushing those parts forward, and repairing the systems located in the DSA.

The forward-deployed team located their operation next to the technical supply platoon in the BSA. There were two reasons for this. First, the tech supply platoon is responsible for operating the SARSS-1 site that is the umbilical cord for class IX (repair parts) supply. This one computer system is probably the most critical computer system within the BSA, and the operations of the forward-deployed team benefited from being in close proximity to it. The second reason was because the tech supply platoon usually knows when a supported unit is experiencing problems with its automated logistics systems; it therefore could serve as a valuable source of information for the team.

The forward team worked out of a modified high-mobility, multipurpose, wheeled vehicle (HMMWV) (M998) that they prepared before the NTC rotation. The modification consisted of a metal shell that was placed in the back of the HMMWV. The shell was shipped to the NTC in a 20-foot-long CONEX container along with the DMMC slice's equipment. The shell had a work area for repairing computers and a storage area for float items and repair parts. The shell was wired for 120 volts of electrical power and was powered by a commercial 8-kilowatt generator. It was designed to be 100-percent self-contained and provide the forward-deployed team with the ability to work on computer systems when no power was available. Without the HMMWV shell, the team's ability to repair computer systems would have been degraded, particularly since the NTC does not provide any type of shelter to the DMMC slice for this purpose.

During the 2-week period that the 3d Brigade was "in the box," the forward-deployed team repaired 27 systems. Since the team was located in the BSA and the systems that they repaired also were located there, response time from identification of a malfunction to repair was minimal. The NCOIC in the DSA had daily contact with the team and supplied them with all the repair parts they needed, either by pushing them forward on the logpacks or by driving them from the DSA to the BSA.

Overall, this was a great learning experience for all soldiers involved. It allowed the CSSAMO soldiers to work and live forward with the soldiers in the BSA, and it provided the soldiers in the BSA an opportunity to see that CSSAMO soldiers can do their job anywhere on the battlefield. It also reinforced the long-standing logistics principle of "fix forward." This is one way we can do so now.

Of course, the CSSAMO usually will operate at the division level. The CSSAMO could be structured to provide automation support forward from the division level (see chart at left). Under this structure, the CSSAMO base shop would provide support to division troops, while two-soldier automation support teams would provide support forward to the division's combat brigades. ADP equipment and associated software are vitally important to logistics on the battlefield, and we must have the capability to troubleshoot and repair these within the BSA. If used creatively, the CSSAMO can be the solution. **ALOG**

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Aviation Logistics in the 21st Century

by Lieutenant Colonel Paul J. Myers

Army aviation is a vital component of our national military strategy. Although not a substitute for other elements of the combined arms team, aviation does bring a unique, three-dimensional versatility to the battlefield. Today, Army aviation's greatest contribution is the ability it gives commanders to apply decisive combat power at critical times, virtually anywhere on the battlefield. Army aviation will increase its value in digitized combat of the 21st century by using computerized systems on modernized aircraft to gather battlefield information.

Significantly, the combat readiness of this immense capability rests on a complex support infrastructure that is increasingly affected by fiscal constraints. Since aviation is so important to national military strategy, it is imperative that the Army continue finding ways to invest in aviation modernization programs without affecting current readiness. One solution to this challenge is to reduce the operating and support (O&S) costs associated with aviation logistics. This strategy focuses on two underlying concepts: streamlining the aviation support infrastructure and incorporating innovative technologies into future aviation systems.

Background

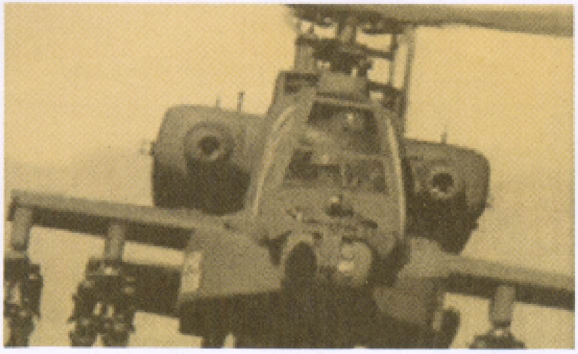
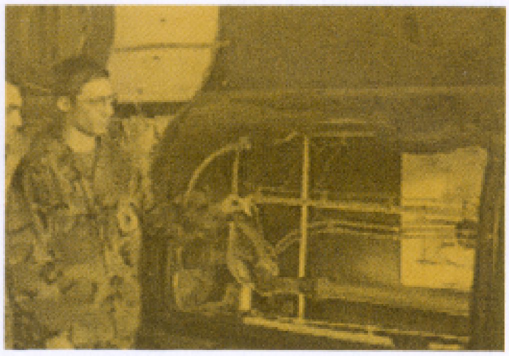
Regardless of aviation's role in national military strategy, there are two compelling reasons to reduce O&S costs. First, Army aviation is a comparatively expensive capability to build and maintain. Second, the current aviation support infrastructure is resource-intensive and particularly inefficient when compared to industry.

The Army has spent many years developing a sound aviation support system, but it is based on a Cold War paradigm. Currently, aviation maintenance is performed at three levels. A portion of this three-level support system contains a number of built-in redundancies—similar repair functions conducted at more than one level of maintenance. The present supply system, predicated on multiple levels of retail and wholesale activities, is unwieldy in terms of asset visibility, repair parts distribution, and supply procedures. Cutbacks in force structure and increases in short-term, worldwide commitments are rendering many aspects of the present supply system inadequate.

To address these issues, Army aviation must change its time-proven methods of logistics support. However, changes must be considered within the context of national security policies. Any alterations to the infrastructure geared toward reducing costs must leave support structures that are capable of supporting the entire spectrum of military missions from regional conflicts to military operations other than war. Additionally, changes must accommodate joint and multinational environments while integrating necessary and economically feasible industrial capabilities into the support structure.

Numerous approaches to reducing O&S costs exist. Five merit consideration. First, restructure the logistics infrastructure by transitioning to a two-level support concept and outsourcing noncritical military functions. Second, reduce aviation's operational tempo (OPTEMPO) by substituting nonaviation alternatives for aviation capabilities. Third, consolidate aviation support facilities and training activities at a few selected sites. Fourth, reduce the readiness criteria of units below force composition 1 by developing a tiered approach to readiness. Fifth, increase the efficiency of the logistics infrastructure by implementing velocity management programs and using innovative technologies in aviation-related systems.

These five approaches are by no means all inclusive. They do, however, reflect a complex blend of many alternatives for reducing O&S costs. There may be no best course of action, and, unfortunately, any approach to reducing costs is guaranteed to be unpopular. Although the ultimate objective of reducing O&S costs is to afford both modernization and readiness in the austere fiscal environment of the 21st century, readiness must remain the number one priority.

Streamlining the Aviation Support Infrastructure

The first step in reducing O&S costs is streamlining the aviation support infrastructure. Twenty-first century force structures must be highly responsive, mobile, and able to deploy rapidly with supported units. They must be capable of functioning within fast moving, dynamic environments using fewer tools, diagnostic test sets, and highly skilled repairers. There are five key considerations related to effectively streamlining aviation support structures. These are acquisition reform, redesigned force structures, increased support efficiencies, realigned military occupational specialties (MOS's), and updated training methods.

Acquisition reform. The intent of acquisition reform is to reduce the time and cost of bringing aviation systems from requirements definition to fielding. To do this, reform must eliminate defense-unique processes and obsolete military standards, change how front-end analysis is performed, exploit new approaches to identifying system requirements using performance-based supportability criteria, and rethink how new systems are fielded.

Elimination of defense-unique requirements avoids the red tape inhibiting support organizations' efforts to purchase commercial, nondevelopmental items. These items generally cost less than items made to military specifications and, in most instances, are fielded faster. Since most technological advances are now coming from industry, unique and obsolete military standards should be eliminated in favor of the best commercial practices.

Performing better front-end analysis improves the acquisition process by lowering overall life cycle costs. Currently, the Army uses the logistics support analysis (LSA) process when performing integrated logistics support (ILS). ILS is a management function that provides the initial planning, funding, and controls to ensure that production systems meet performance requirements. The problem with LSA is its process orientation, which requires extensive resources.

Performance-based supportability (PBS) is a systems approach to designing products to meet supportability performance measures. PBS improves the way logistics support requirements are identified. It incorporates supportability analysis as an essential part of systems engineering and establishes supportability as a measurable and predictable performance measure. Unlike in the past, when the Department of Defense (DOD) treated costs as a dependent variable in defining system requirements, PBS puts cost into the "mix" and makes it a variable like any other performance measure.

A common practice with current fielding plans is to ensure that all supportability is put in place before aviation systems are fielded to units. The Army's supportability criteria, derived from Military Standard 1388, Support Analysis, result in the buildup of massive stocks of repair parts and the fielding of support capability before actual usage figures are computed. An emerging approach to support analysis being used in industry involves placing systems in the hands of users before supportability is put in place. Manufacturers then sustain the system until actual maintenance parameters are computed. Since a large percentage of provisioned stocks is not used, there is a potential to save substantial resources. However, this process has to overcome the reluctance of field commanders who want all supportability in place before receiving new systems.

Redesigned force structures. Essential modifications to aviation support structures in the 21st century include the transition to a two-level maintenance support system that mirrors the other services and industry. Designed to move aviation intermediate level maintenance (AVIM) resources to unit and depot-level organizations, this transfer adds depth to certain military occupational specialty (MOS) skills and moves additional test equipment into aviation unit-level maintenance (AVUM) organizations. Two-level maintenance is not designed to give unit-level organizations the ability to perform intermediate-level functions. It is

☐ Army aviation support structures in the 21st century will transition to a two-level maintenance support system that mirrors the other services and industry. Unlike the AH64 Apache helicopter (right), the futuristic RAH-66 Comanche helicopter will be designed for two-level maintenance.

designed to enable unit-level structures to modularize their functions in order to conduct split-based operations. This allows a major portion of the organizations' sustainment management force to remain out of theater during contingencies.

Although the current aviation fleet requires all three levels of maintenance to some extent, future aircraft, such as the RAH-66 Comanche helicopter, will be designed for two-level maintenance. Two-level maintenance is envisioned as more of a capability concept than a set of maintenance facilities. User-level maintenance will be performed by military maintenance personnel assigned to the maneuver aviation unit as well as by depot-level contact teams tailored to the needs of the supported unit.

Conversely, depot-level maintenance will not necessarily mean the type of maintenance that is performed at a fixed-based facility such as Corpus Christi, Texas, or at a manufacturer's location. Instead, depot-level maintenance could be provided at the user's location, in mobile or semimobile facilities, at specialized repair activities, and at continental or outside continental United States-based depot sites. Depot maintenance, defined by maintenance allocation charts, will be performed mostly by contract and DOD and Department of the Army civilian personnel.

Increased support efficiencies. Two-level maintenance relies on a dedicated battlefield distribution network similar to commercial enterprises such as Federal Express and United Parcel Service. Just-in-time repair parts distribution avoids the necessity of in-theater "just-in-case" supply stockages. The battlefield distribution network is enhanced further by the total asset visibility program to provide real-time logistics information about the status and movement of supplies from industry to the field. These two innovations will allow support activities to exchange a cumbersome supply support system for an efficient distribution network.

Realigned MOS's. Force structures in the 21st century will contain fewer soldiers, thus increasing the premium on highly skilled individuals who are thoroughly trained in diagnostic and troubleshooting procedures. A smaller force also requires the consolidation of selected MOS skills. Some low-density MOS functions will be outsourced or eliminated altogether by automated systems in newer aircraft. The U.S. Army Aviation Logistics School (USAALS), Fort Eustis, Virginia, currently is developing plans for realigning specific MOS skills.

Updated training methods. Cutbacks throughout the Army are affecting its school system by reducing the number of course hours, instructors, and courseware developers. Yet, student loads are remaining the same, or increasing, and the tasks being taught are increasingly more sophisticated and complex. To overcome these challenges and reduce overall costs to the Army, USAALS is developing training technologies such as

computer-based training, live televideo instruction, extensive hands-on training using realistic training devices and simulators, and electronic diagnostics systems that lead students through fault isolation procedures.

To meet the needs of the active component, Army National Guard, and Army Reserve, USAALS is implementing the Total Army School System (TASS). TASS meshes active component training sites with National Guard and Army Reserve locations. TASS also brings together various technologies, including classroom XXI, distance learning initiatives, multimedia training, and hands-on training. The next century will see more lower-cost training delivered through distance learning formats as sustainment training and the demand for just-in-time training increases.

Incorporating Innovative Technologies

The second underlying concept for reducing aviation logistics O&S costs involves taking advantage of technologies to increase efficiencies and lower resource requirements. There are four categories where the application of technology is essential to aviation support: automating and digitizing logistics functions, improving diagnostic and prognostic troubleshooting, developing appropriate embedded technologies, and enhancing the reliability and maintainability of aviation systems.

In the 21st century, automation will be necessary to exploit fully the complexity of future aviation logistics functions. Full automation means converting technical manuals, logbooks, aviation status reports, component usage reports, and diagnostic procedures to electronic format. This digitization effort begins with a man-portable computer system that incorporates all aircraft technical manuals, repair procedures, and parts status in one standardized piece of equipment. Lightweight and small enough to be worn while working on aircraft, this equipment will communicate interactively with unit production control computers by downloading maintenance work orders and parts requests electronically from embedded aircraft diagnostic and prognostic systems.

An integrated family of diagnostic and prognostic test equipment is another important component of the two-level maintenance concept. The Army needs simplified test equipment that improves user-level maintenance capability by reducing the practice of changing line replaceable units as a method of troubleshooting. Diagnostic test equipment must be lighter, less bulky, designed to reduce training requirements, and compatible for use on every aircraft type so fewer sets are required.

The 1553 Data Bus is the fundamental technology for digitizing modernized aircraft. (A data bus is a bundle of wiring that interconnects all of the onboard computers and sensors.) In the 21st century, aircraft will use embedded diagnostic and prognostic equipment to integrate onboard aircraft systems, such as the flight data recorder and health usage monitoring system, into a centralized computer. These onboard sensing and recording systems will isolate faults and battle damage, then provide repair and replacement cues to aircraft repairers. Other embedded technologies will measure vibrations, stresses, pressures, and temperatures and relate those parameters to the functional status of the system. After integrating with other sensors, these data will be presented to the user via electronic and infrared technologies.

Technological improvements continue to make aviation systems more reliable and maintainable through advances in engineering design. Improvements include lighter, more efficient engines and transmissions; fewer hydraulic components and moving parts; smaller integrated circuitry; and increased use of stealth technologies. By necessity, future aviation systems will be designed to two-level maintenance criteria to reduce O&S costs.

Risks

Changing time-proven methods of conducting aviation support does have inherent risks. For one thing, any strategy that relies on commercialization of any military function may find that some civilians may be unwilling to accompany units during lengthy deployments. Also, as the number of military-industrial corporations diminishes, the Army could find itself negotiating for supplies and services without the benefit of healthy competition.

Another real danger is that technology may not live up to expectations. Some technologies, such as built-in tests, have been oversold. This is a critical point because certain key enablers are heavily dependent on various technologies to help reduce O&S costs. Additionally, costs associated with fielding systems fully capable of two-level maintenance may be more than the Army is willing to resource, even with substantial O&S cost reductions.

On the personnel side, there are concerns that significant personnel cuts may occur before necessary training and automation systems are put in place to compensate for the loss of manpower. Even if the functions of eliminated military spaces are outsourced, concerns remain over the commitment of various activities (some unionized) that will perform these functions to support the Army in contingencies.

Resistance to change by various proponent agencies is probably the greatest obstacle to streamlining the infrastructure. The issue here is an unwillingness to give up unwieldy supply and distribution systems in favor of superior-performing commercial providers. The problem is not so much parochialism, although this is a factor, as concern over the risk of giving up force structure and being unable to regain outsourced functions should a provider become unable, or unwilling, to perform. Either way, if Army aviation cannot remain affordable, it runs the risk of unwanted restructuring, or worse, replacement by less expensive, less resource-intensive alternatives. In the end, there are no guarantees that savings attributed to O&S cost reductions will even be put into aviation modernization programs.

Recommendations

The following recommendations form the basis of the O&S cost-reduction strategy and must be considered carefully. These recommendations are regarded as key enablers and provide the foundation for streamlining the infrastructure and incorporating innovative technologies into future aviation systems—

- Build lower life cycle costs into the acquisition process using PBS criteria.
- Field new systems before support arrangements are final so actual support requirements can be computed based on realistic field use.
- Modify force structures to provide for modularized logistics organizations capable of supporting split-based operations and enhanced throughput.
- Implement a two-level maintenance concept for Army aviation support.
- Consolidate aviation support activities and high-tech training centers at selected sites.
- Implement the MOS redesign initiatives developed by USAALS.
- Replace the current cumbersome supply system (and its accompanying inventory levels) with a responsive distribution network based on more efficient commercial models.
- Incorporate the national industrial capability as a part of the Army's logistics strategy by seeking long-term relationships after carefully analyzing the political and military risks.
- Digitize and automate all aviation logistics functions, including paper-based processes.
- Design automated and embedded training capabilities into all future aviation systems.
- Develop and field a multifunctional, integrated family of diagnostic equipment.
- Embark on a major effort to change the thinking at all levels from a focus on force structure to a concentration on combat capabilities that is in line with current missions and budget
- Eliminate nonmodernized aircraft and field newer systems designed to 21st century two-level support criteria.

Diminishing resources and increasing commitments in the 21st century will encourage Army aviation to shed its Cold War paradigm to reduce costs and increase efficiencies. The old paradigm that places the DOD between the industrial base and fighting organizations will function no longer. The new paradigm will require logistics activities to arrange rather than conduct support to replicate or integrate processes and resources of U.S. world-class commercial structures. The synergistic effect of streamlined logistics infrastructures, supported by reengineered processes and innovative technologies, will ensure that Army aviation remains an affordable and lethal component of national military strategy in the 21st century. **ALOG**

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Logistics in the French Army

by Lieutenant Colonel John Moncure, USA (Ret.)

French logisticians, like their American counterparts, are organized to support oversea deployments, particularly in developing countries But there's another parallel: they're also undergoing a major restructuring.

We Americans are accustomed to finding, under newspaper headlines announcing the latest intervention in Africa, tales of French derring-do—perhaps the story of a parachute company of the Foreign Legion, or of French Marines, accompanied by photos of bronzed men with jauntily canted berets that offer testimony of combat. Behind such famous regiments of the French Army is a logistics system that is well organized to support overseas deployments. While the French Army organizes support in a different way than the U.S. Army does, it has all the necessary components of a modern logistics system.

Logistics Branches and Services

Logistics in the French Army is performed by several joint-level service support organizations (known in French as "services"), by two logistics branches (transportation and ordnance), and by several Army-level services. The French distinction between a "branch" and a "service" is both historical and functional. A branch is a corporate body with a functional specialty, a professional code, a recognizable head, a flag, and a branch school, such as armor, aviation, and transportation. A service is a combat service support organization that includes the majority of these elements. However, it was created recently, has differing regulations for promotion and career longevity in the Army, and lacks a flag to symbolize its status. Implicit in the difference is prestige, which naturally accrues to the older, more tradition-rich branches. As in the U.S. Army, a number of officers and noncommissioned officers (NCO's) of other Army branches hold a specialty in one of the logistics branches and services and alternate assignments in a logistics branch or service with assignments in their basic branch.

Some logistics functions are assigned to branches of the Army, and others are performed at the joint level. But the core of the French Army logistics system is the Transportation Corps, which furnishes the structure into which the other parts of the system fit. The Transportation Corps exercises responsibility for road movements, over-the-shore cargo handling, and traffic control in division and corps rear areas. With its branch school at Tours, in the heart of the Loire River Valley, the Transportation Corps, or L'Arme du Train, serves as the gig line for a number of branches and services. Each of these arms and services provides expertise in its own domain, but they all unite in command and support regiments under the banner of the transporters to provide support to the forces. The Transportation School trains officers and NCO's in general logistics, transportation, traffic control, and deployment functions. The Transportation School also offers a course that prepares all French (and some Allied) logisticians for deployment on NATO or United Nations operations.

The Ordnance Corps recently increased its stature by being named a branch. Its school is located in the city of Bourges, in the center of France, where it trains officers and NCO's in a variety of maintenance specialties and offers an array of ground and aviation maintenance special courses. The branch provides organizational, direct, and general support maintenance assets to logistics battalions.

The Commissariat is a service rather than a branch. It is concerned with all planning and execution issues affecting the troops, including pay, rations, clothing and individual equipment, and construction and barrier materials; it functions something like a combination of the U.S. Army's Quartermaster, Finance, and Adjutant General's Corps. The Commissariat operates from two basic organizations: the Commissariat Resupply Establishment, which serves as the warehouse and supply organization, and the 1st Commissariat-Logistics Group, stationed at Bretigny-sur-Orge. This latter unit was created in 1994 to bring together in a single military organization these diverse support functions. Its 100 personnel are mostly active-duty military who provide soldier support to combat and support units deployed on operations overseas. Commissariat officers and NCO's can be found in all organizations, down to the battalion S4.

The Corps of Engineers is divided into two separate organizations. One is a branch that is not a component of the logistics system. The other is the Engineer Service, which is equivalent to the U.S. Army's facilities engineers; they are responsible for maintaining the infrastructure of the French Army. These engineers are integrated with the logistics staff on military bases.

In addition to these logistics components of the Army, several joint-level organizations complete the range of assets that support the force. The Defense Fuels Service (Service Essences des Armées) procures, stores, and provides all fuels for the French defense establishment, dispensing 340 million gallons of fuel per year in the Armed Forces. This organization serves as a direct interface between the French defense establishment and the petroleum industry. The Defense Health Service (Service de Santé) trains and provides cadre and supplies all health needs for the Army, Navy, and Air Force, including doctors and medics. The Defense Postal Service also operates in the joint arena and plugs into the Army through the Commissariat. The other services are represented in Army tactical logistics units or in special Army units, such as the recently created 1st Medical Regiment.

Logistics Units

Currently, all logistics assets of the French Army are managed by the 1st Logistics Command, or 1st COMLOG, located in Montigny-les-Metz. This organization has evolved from Operations Base 901, which served as the logistics base for the 1st French Army in 1944-1945. At its last restructuring in 1972, its primary mission became providing logistics support for a deployed mechanized corps. But the 1st COMLOG has evolved further since the fall of the Berlin Wall, and now it provides logistics support for all forces operating overseas, including the substantial French contingent in Bosnia.

A number of operational units serve as executive agents for the 1st COMLOG. One of its subordinate staffs, the Operational Land Transit Center, manages highway and rail movements of personnel and materiel to points of embarkation. It also ensures effective deployment and redeployment overseas and coordinates for both fuel and medical support. Several units assigned to the 1st COMLOG serve as transshipment nodes: The 1st Air Delivery Regiment and the 503d and 515th Transportation Regiments (located respectively at La Rochelle and La Braconne) support movement in all situations.

The primary logistics organization in the French Army is the divisional command and support regiment (le régiment de commandement et de soutien, or RCS), which operates the division base. All RCS's belong to the Transportation Corps and are commanded by Transportation Corps officers. While each division's support regiment differs according to the requirements of the division, they all follow the general outline of the 2d RCS, which supports the 2d Armored Division.

With a wartime strength of 2,500 personnel, the 2d RCS is the largest regiment in that division. The "2," as it is affectionately known, provides resupply, maintenance, and medical support for the 12,000-soldier division. Its two transportation companies (one of which is a reserve unit) are capable of providing 1,500 metric tons of munitions, 400 tons of fuel, and 17 tons of general supplies per day. Maintenance services are provided by three direct-support companies (one of which is from the reserve). The regiment also includes four reserve component medical platoons, two for evacuation of wounded from the battlefield and two for triage and further evacuation to rear-area hospitals. The divisional signal company, which furnishes command and control assets to the division headquarters, is assigned to the RCS. Completing the assets of the logistics regiment is the traffic control company, which manages movement of the division's 3,000 vehicles throughout the division area.

Future of French Logistics

The French Army currently is undergoing a series of revolutionary changes. Simultaneously, it is ending the draft, downsizing from an active-duty strength of 250,000 to 170,000, revamping its higher command structures, and introducing modern technology and equipment that will require the rewriting of its doctrine. French Army headquarters already has outlined new organizational structures, including modular brigades of all existing branches. The logistics component will include three support regiments, five transportation and traffic control regiments, four maintenance groups, and two medical regiments; they will be organized in the two brigades of the future Logistics Command (CFLT), which will replace the 1st COMLOG. This command will fall directly under French Army headquarters but will work closely with the future Forces Command (CFAT) and the joint staff as necessary. These changes were decreed in 1996 and will be completed in 2002.

While the logistics community has yet to present the road map to meet their particular challenges of the next few years, the size of the task is apparent to them. A recent thought paper outlines some of the possibilities. [This paper, by Colonel Philippe Mounier, executive officer of the 1st COMLOG, does not represent official French policy.] The new command will be responsible both for filling domestic logistics requirements and supporting two simultaneous operational deployments, of 30,000 and 5,000 troops. These requirements imply participation of the Army logistics community as the land component of Defense logistics functions, including both movement control and coordination of ground transportation for all services. Likewise, the mission will include conducting logistics studies, training leader cadres, assisting in the training of combat forces in logistics tasks, organizing resources, providing the logistics component of expeditionary forces, and executing logistics support.

The logistics brigades will serve as intermediate command structures for the 15 specialized regiments. In peacetime, the brigades would be responsible for administration, training, and preparation for deployment. According to Colonel Mounier, their operational functions should consist of coordinating and executing logistics portions of deployments. Each brigade should be capable of furnishing a theater-level command post, the command post for the division logistics command, and the command post for the logistics task force of a second, 5,000-man deployment. As the two brigades each contain units of all specialties, they should be both multifunctional and interchangeable.

The division logistics command should be created in a modular fashion; that is to say, it should be organized from specialized logistics regiments and companies specifically to support the force being projected. Thus streamlined, the French Army would realize savings in both infrastructure and deployment costs.

An obvious reservation about such a system is that it risks an initial period of awkwardness as the components learn to work together. However, the French Army is smaller than ours; its officers come from the same slice of society, attend the same schools, participate in the same deployments, and know each other well. Their common, unspoken understanding should compensate for many of the problems typical of ad hoc organizations.

These proposals will have to take into account a number of problems—

- The Logistics Command must become operational simultaneously with the Forces Command.
- During the transition period, which will probably include re-basing of some logistics units, logistics support to deployed forces cannot be allowed to suffer.
- Old logistics regiments (the RCS's) will be dissolved and new ones created.
- Cadre must be trained to function in these new organizations.

The French Army logistics system supports a modern, well-equipped force that is undergoing enormous changes as the French prepare for the challenges of the 21st century. French logisticians thus are confronted with many of the same issues as their American counterparts. Their example may well serve as a guide to us as we prepare for the future. **ALOG**

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Field Exercise Data Collection

by Major Warren O. Greene and Kevin B. Horsley

On today's fluid battlefield, the logistician is faced with myriad challenges that span all aspects of military operations. One of the more puzzling challenges is, "What exactly is required to support and sustain a combat force?" Field exercise data collection makes an important contribution to answering that question.

In 1979, an effort was initiated to standardize the combat prescribed load list (PLL) and combat authorized stock list (ASL) for units with the same table of organization and equipment (TOE). The PLL is a list of repair parts stocked by company- and battalion-sized units to support their maintenance requirements. The ASL is a similar list prepared for supporting maintenance units. Historically, both lists are based on peacetime demands, which might prove to be inadequate during combat. Consequently, the Army Materiel Command (AMC) tasked the Army Materiel Systems Analysis Activity (AMSAA) at Aberdeen Proving Ground, Maryland, to conduct a sample data collection to determine part replacement rates for mission-essential end items.

Sample data collection had been performed previously by AMC's major subordinate commands (MSC's) on selected individual end items over a predetermined period of time. Data were collected during normal peacetime usage as well as during field training exercises (FTX's). FTX's, which were conducted by Army Forces Command, were 2 to 3-week periods of intensive, simulated combat. This environment allowed AMSAA to collect data on mission-essential end items from a battalion-sized group during high operational tempo (OPTEMPO) exercises. AMSAA undertook the task of collecting data on part replacement rates; maintenance manpower requirements; petroleum, oil, and lubricants consumption; and parts and labor costs.

Field exercise data collection (FEDC) began in September 1982 at exercises conducted in Germany. Since then, collection has expanded to sites in Korea and Kuwait; the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana; and the National Training Center (NTC) at Fort Irwin, California. Now, 15 years later, data on more than 200 mission-essential end items used by units that participated in over 500 exercises at these 5 sites have been fed into an FEDC data base.

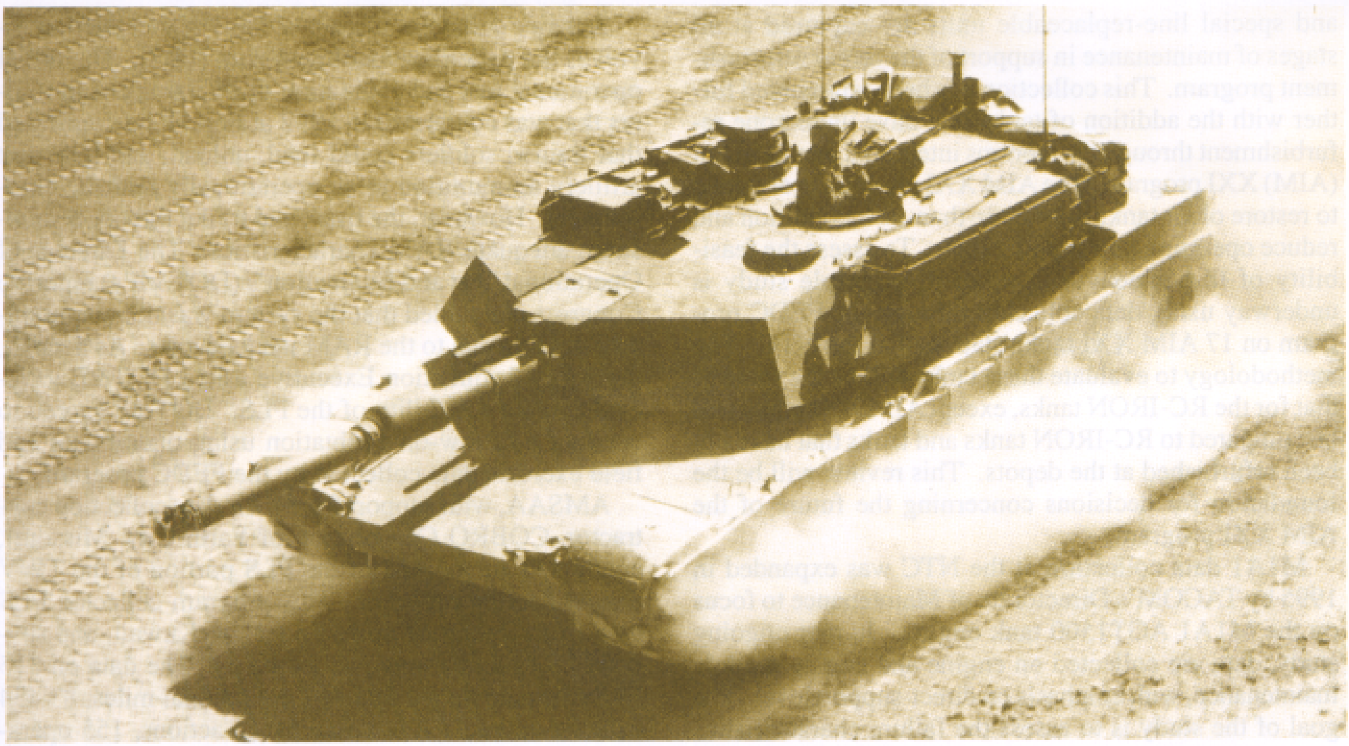
Data Collection Phases

Data are collected in three phases over the course of an exercise. The first phase begins with a briefing to the soldiers involved in the exercise. The briefing explains what is expected of them and how the data collection will affect them. Next, an inventory of all mission-essential end items is taken. Information on the quantity, state of repair, and general condition of these items is recorded. All equipment is inventoried, whether it was brought from the unit's home station or issued at the exercise site.

The start of the exercise marks the beginning of the second phase of the collection. The majority of the data are collected using Department of the Army Forms 2064 (Document Register for Supply Actions), 2404 (Equipment Inspection and Maintenance Worksheet), and 2407 (Maintenance Request).

The final phase of the collection effort involves recording follow-up maintenance and supply requirements generated by the exercise. This information is recorded during the equipment turn-in period of the exercise, both at the site and at the unit's home station.

With data from over 500 exercises worldwide, the FEDC data base is obviously very robust and is used in a variety of ways beyond its original purpose. Every year, a site summary report is produced for each of the five sites in the program. This report provides equipment profiles, man-hour requirements, parts usage profiles, and FTX parts usage planning factors for each end item at a particular site. These reports are distributed to all major Army commands, AMC subordinate commands, Army research and development centers, and operational units worldwide. Although these reports are very thorough, some Army commands need even more in-depth information; they account for the approximately 50 tailored data requests per year for information from the


General Dynamics

□ **To identify trends and possible causes of failure, the NTC is collecting M1A1 AGT 1500 tank engine and engine module maintenance data.**

FEDC data base.

AMSAA has developed an optimum stock requirements analysis program (OSRAP) for use at the direct support/organizational level. OSRAP uses FEDC class IX (repair parts and components) replacement data as a basis for providing a unit with a proposed stockage list based on end item equipment densities, weight and cube of the stocks, cost, desired readiness requirements, length of mission, order and ship time, and OPTEMPO. Each of these variables can be adjusted easily to reflect changes in the conditions of the operation. By improving the stockage requirements for a unit, the combat readiness of that unit is enhanced. OSRAP has been used to prepare contingency packages for Operation Desert Storm and in Somalia, Haiti, and Bosnia.

Expanded Application of FEDC

Although the standard FEDC program output has been extremely useful, efforts to augment the program continue. A number of other data collection programs have used the FEDC data collection effort as a jumping-off point for expanded collections.

The Army Deputy Chief of Staff for Logistics (DCSLOG) tasked AMC to test the reliability centered-inspect and repair only as necessary (RC–IRON) program using the M1 Abrams tank. This program was expected to reduce unit operating and support costs and downtime for repairs during field use. In support of the Army Tank-automotive and Armaments Command's (TACOM's) RC-IRON program, AMSAA conducted the test at NTC to verify whether the RC-IRON program would reduce service life failures and support costs. Sixty randomly selected improved performance M1 tanks were transferred to the NTC from Germany. Fourteen of these tanks were routed through Anniston Army Depot, Alabama, as RC-IRON prototypes for inspection and repair under the RC-IRON program. The remaining 46 tanks were shipped directly from Germany in a condition presumed to meet preventive maintenance checks and services standards. These vehicles had logged an average of 3,000 miles before the NTC operational test. Usage, maintenance, and parts replacement data for all these tanks were analyzed from three FEDC battalion FTX's that had occurred between 1 June and 31 August 1990. The tanks had accumulated an average of 1,000 miles during this period. Analysis of these data indicated that there was a significant improvement in operational performance for the RC-IRON tanks, with increased reliability, availability, and maintainability (RAM) and decreased parts and maintenance costs.

A data-collection program for M1A1 pre-positioned tanks was initiated for the Abrams project manager's office in 1991 at the NTC. Whereas FEDC provides a snapshot of a unit's activities during an exercise, this NTC collection effort is continuous. Data on scheduled and off-item maintenance of engines, transmissions, and

and special line-replaceable units are captured at all stages of maintenance in support of the armor refurbishment program. This collection has been augmented further with the addition of tanks that have undergone refurbishment through the Abrams integrated management (AIM) XXI program. The AIM XXI program is designed to restore older tanks to a better-than-new condition and reduce operating and support costs. To assess the feasibility of this endeavor, a proof-of-principle study is underway using data collected through the FEDC program on 17 AIM XXI tanks stationed at the NTC. The methodology to evaluate these tanks will be the same as that for the RC-IRON tanks, except AIM XXI tanks will be compared to RC-IRON tanks and tanks that have not been refurbished at the depots. This review will be the foundation for decisions concerning the future of the AIM XXI program.

M1A1 data collection at the NTC was expanded in 1995 by TACOM's Directorate of Maintenance to focus on the M1A1 AGT1500 tank engine. In that ongoing study, data are collected on engine and engine module maintenance, with emphasis on direct-support level. The goal of the study is to assess the failure characteristics of the AGT1500 engine to identify trends and possible causes.

In August 1993, the Bradley project manager's office supported the initiation of a study of the Bradley fighting vehicle in Korea. This effort was a continuous collection that captured all levels of maintenance. This study, which concluded in 1996, established a data base of maintenance and parts usage information that will be used in long-range strategic planning for the Army, such as future Bradley upgrades.

Tactical Wheeled Vehicle Study

One of the more ambitious Army efforts conducted through the FEDC program was a study of tactical wheeled vehicles (TWV's) sponsored by TACOM's fleet planning office (FPO). Data collection on TWV's began in September 1994 and concluded in October 1996. Again, this was a continuous collection, capturing scheduled and unscheduled maintenance on more than 60 different models and approximately 5,000 vehicles. This collection also expanded the number of sites at which data were collected. In addition to the NTC and Germany, other sites added to the collection effort were Fort Stewart, Georgia; Fort Hood, Texas; JRTC; Kuwait; and during Operation Joint Endeavor (OJE), the peace enforcement operation in Hungary and Bosnia. The TWV collection provides data for vehicle service-life analyses that will form the basis for future fleet replacement recommendations to Congress by the TACOM FPO. Additionally, these data are used to prepare the FPO's tactical vehicle fleetbook and to develop operating and support life-cycle cost models.

A major collateral impact of the TWV collection involves the palletized loading system (PLS). The initial operational test and evaluation of PLS trucks and trailers that was conducted in 1992 at Fort Hood confirmed that trained soldiers could load, unload, and transport artillery ammunition in an operationally realistic environment. However, the truck and trailer did not demonstrate adequate RAM characteristics. The Director of Operational Test and Evaluation's (DOT&E's) report to Congress concluded that the system was not operationally suitable due to the RAM inadequacies. As a result, the Army Acquisition Executive asked DOT&E to reevaluate the suitability of the PLS. DOT&E agreed to conduct a follow-on evaluation using operational and field exercise data collected by the FEDC program.

AMSAA, with support from their data collection contractor, COBRO Corporation of Earth City, Missouri, conducted an analysis of the PLS portion of the TWV data collection program. This program collected PLS data from Operation Joint Endeavor, Kuwait, and several U.S. training exercise locations. The data on 315 PLS trucks included 505,467 operational miles, 83,434 exercise miles, 1,730 maintenance actions, 155 operational maintenance man-hours, and 3,802 field exercise maintenance man-hours from February 1995 to August 1996. As a result of the Army's field data, DOT&E concluded that the PLS met its RAM requirements and therefore was operationally suitable. The success of field data collection eliminated the need for further operational testing of the PLS.

These various efforts have demonstrated the versatility and adaptability of the FEDC program across a wide range of applications. The FEDC program is expected to continue to provide the high-quality data needed for decision making to support the 21st-century Army.

For more information on field exercise data collection, write to the Director, AMSAA, ATTN: AMXSY-LS, Aberdeen Proving Ground, Maryland 21005-5071, or call (410) 278-4202/3051/3827 or DSN 298-4202/3051/3827. The e-mail addresses are mossa@arl.mil and mgross@arl.mil. **ALOG**

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Using the Web to Improve Sustainment Logistics

by Ramon R. Rivero

Logistics assistance representatives (LAR's) are responsible for troubleshooting and diagnosing problems with equipment that is supplied, repaired, and maintained by the Army Materiel Command (AMC) major support command (MSC) to which they are assigned. Whenever a soldier in the field has equipment problems or cannot obtain parts needed to operate a piece of equipment, he contacts the LAR responsible for maintaining the equipment. Because their jobs are so critical to their customers (maintenance, logistics, and supply personnel in the field), LAR's must be able to communicate quickly and accurately with them as well as with their MSC's. Their continuing search for better ways to communicate led LAR's to the Soldier Support Network (SSN) on the Internet.

Then and Now

LAR's duties include sending field updates to their customers and to and from MSC's. These updates include safety information, maintenance and technical advisories, field alerts, and equipment improvement reports. Early on, LAR's used the postal service to send and receive these updates. Later, they used voice mail and limited their updates to text-only information. From voice mail, LAR's advanced to the military network (MILNET) and then to e-mail. With upgrades in computer technology, pictures and photos could be included in e-mail messages, which greatly improved the value of the relayed information. These additional audiovisual capabilities enabled LAR's to show users how to maintain items, perform repairs, and replace items using diagrams and photos that accompanied written instructions.

LAR's used e-mail to distribute information to their customers and MSC's until the SSN was brought online in January 1995 by the Armament and Chemical Acquisition and Logistics Activity (ACALA), Rock Island, Illinois. ACALA is a business activity of the Army Tank-automotive and Armaments Command, Warren, Michigan. With its ability to incorporate diagrams and photos into formerly text-only pages, the SSN is the best system available to date to help LAR's accomplish their objectives.

Through the Internet, the Soldier Support Network provides reliable, flexible, cost-effective, and prompt logistics support information and services.

SSN Capabilities

The SSN provides continuous access to supply, logistics, technical, and maintenance information, as well as customer service and support, using the Internet's World Wide Web (WWW). A password-protected web site (http://www-ssn.ria.army. mil), the SSN provides soldiers, LAR's, other Department of Defense (DOD) and service personnel, and contractors with 24-hour, year-round access to near-real-time technical information, logistics data, and customer service and support. The site is accessible on any personal computer equipped cessible on any personal computer equipped with Internet access and a web browser such as Netscape Navigator, Microsoft's Internet Explorer, or the National Computer Security Association's Mosaic.

The SSN uses WWW plug-in programs (such as video and animation) to clarify complex maintenance and logistics procedures. The SSN also reduces printing, travel, and mailing costs by providing access to real-time data, operating processes, online training, and real-time processing of requisitions to provide "one-stop" logistics support for customers.

The SSN is the access point for conducting "logistics business." It is the link between the customer and logistics support organizations. TACOM envisions the SSN becoming the Army-wide network for providing logistics support to the field.

SSN Offerings

The major functions of the SSN include distributing logistics supply and support updates to major weapon system managers and providing technical documentation, training information, and monthly readiness charts on weapon items managed by TACOM. The web site contains a search engine; a list of LAR's; priority information pages containing safety messages, field alerts, and maintenance advisory messages; technical manuals; customer assistance bulletins; and logistics support pages. Among the technical documentation available through the SSN are—

• Electronic technical manuals (ETM's). ETM's on the M1A1 Abrams tank, M2/3 Bradley fighting vehicle, and M9 armored combat earthmover are available online. The SSN also has technical bulletins on product shelf and service life, mine-clearing line charges, cannon tubes, and cold weather operations. All of these bulletins are in the Adobe Acrobat portable document format.

• *Equipment Improvement Report and Maintenance Digest*. Published quarterly in January, April, July, and October of each year, the digests provide information about correcting, improving, and eliminating equipment faults, failures, and materials. These actions are summarized in equipment improvement recommendations, also posted on the SSN. In addition, these postings include safety-of-use and -flight messages, minor alterations information, publication changes, advanced information on proposed modification work orders, newsletters, and other technical information to improve maintenance program planning and execution.

• Maintenance pamphlets. These pamphlets supplement existing technical manuals and contain updates on equipment managed by TACOM, such as the Bradley fighting vehicle, AH-64A Apache helicopter, and M1A1 and M1A2 Abrams tanks.

• Safety information. The WWW provides a fast way to distribute safety and maintenance information to field personnel. Safety-of-use messages identify equipment safety problems that have occurred since the last published release of technical manuals and discuss possible solutions to the problems. Ground precautionary messages explain equipment problems and solutions. Maintenance and technology advisory messages discuss actions taken to solve equipment use problems. Field alerts provide rapid notification of accidents involving facilities, equipment, or processes at several locations. Radiation information, such as safety procedures for purging and disposing of radioactive items, is also available on the SSN.

The SSN provides a quick way to distribute automated management, logistics support, and supply information reports to logistics support personnel. The logistics information available on the network is used to support logistics supply operations, plan support of TACOM operations other than war, track backorders, and develop TACOM performance summaries and backorder status reports. The SSN is a source of logistics support information for TACOM, the Chemical and Biological Defense Command, AMC, the Industrial Operations Command, and forces operating in Bosnia. It also helps to provide total asset visibility and supports the Army Report of Discrepancy Tracking System and the Fielded Vehicle Performance Data System.

Supply information posted on the SSN includes TACOM supply catalogs; TACOM–ACALA-managed sets, kits, and outfits pertaining to shop equipment; TACOM supply bulletins; and requisition and materiel return forms.

SSN Marketing

TACOM-ACALA's technology advancement team works with LAR's to market the SSN. For example, in October 1996, one of the SSN web administrators traveled to Fort Stewart, Georgia, to configure a computer in the materiel management center and train item managers to use the SSN to send information to on-post units. The LAR there briefed representatives of the military personnel office and forward maintenance units on how to use the SSN. Interest from other Fort Stewart units and personnel has increased because of the success of onsite SSN access. Currently, offices with Internet access are using their own equipment to access the SSN or are obtaining the necessary computer hardware needed to access it (see the following table).

The Fort Stewart LAR also fielded a computer that was equipped to access the SSN to the Florida Army

SSN Browser Requirements

Any computer capable of running Windows 3.x, Windows '95/NT, or other operating system that has:

- **8 megabytes (MB) random access memory (RAM) for Windows 3.x and 16 MB RAM for Windows '95/NT.**

- **At least 10 MB free hard disk space on computer hard drive. (With add-ons, some browsers require at least 60 MB of space.)**

- **Video graphics array (VGA) or super VGA card with at least 2 MB of video RAM.**

- **Modem (internal/external, 14.4K bits per second or faster), with an integrated services data network line, or local area network (LAN) Internet connection. (A faster modem provides quicker access.)**

- **Pointing device (mouse or touchpad).**

National Guard at Camp Blanding, Florida. The response was positive. Especially pertinent to the Guard's operation were the safety-of-use, maintenance advisory, ammunition, and related technical messages posted on the web site. The Florida Army National Guard and Fort Stewart now have requested that the SSN be made available to Army National Guard units in Puerto Rico and the Virgin Islands, because those two areas are isolated and onsite visits by LAR's usually are not made on a normal schedule.

In an attempt to partner with other commands, TACOM-ACALA's technology advancement team have presented numerous briefings and demonstrations showcasing the SSN during the last 3 years. Team personnel demonstrated the capabilities of the SSN to representatives of the Army Forces Command, the AMC Deputy Chief of Staff for Logistics (DCSLOG), and the Department of the Army DCSLOG. The team also demonstrated SSN's capabilities at several conferences and expositions, including the annual convention of the Association of the United States Army and the American Defense Preparedness Association's advanced planning briefings for industry.

Future Enhancements

Efforts will continue to incorporate new web technologies into the SSN. Some of these improvements include reorganizing the directory structure to accommodate future operating system upgrades, integrating advanced web concepts (such as cascading style sheets and VBScript and JavaScript codes), improving user interfaces, and incorporating features that provide additional security to the SSN. Right now, the major upgrades being developed include data base integration and video teleconferencing.

Personnel working with the SSN plan to integrate existing forms with Oracle and Microsoft Access data bases. These forms will give users the capability to input, query, and delete submissions from these data bases. The technology advancement team plans to use business process reengineering software to identify better ways to implement hypertext mark-up language (HTML)-based forms with new or existing data bases used at a variety of locations.

The SSN also will incorporate video teleconferencing and Internet relay chat capabilities using Microsoft Netmeeting and Creative Labs' Sharevision. Using this software will allow users to discuss equipment problems and procedures and permit video teleconferencing between customers and TACOM personnel.

The SSN offers its customers a way to distribute logistics, maintenance, and supply information quickly to a variety of field and support personnel. Responses from the field indicate that users like the convenience and timeliness of the information posted on the SSN. The technological explosion of the Internet fuels the growth of the SSN by providing opportunities to add customized information services. The new web tools and business processes that make such advances possible must be implemented widely to provide improved benefits to field personnel. **ALOG**

Ramon R. Rivero is an operations research analyst for the Armament and Chemical Acquisition and Logistics Activity at Rock Island Arsenal, Illinois. His current responsibilities include writing and testing web pages, providing web site administration, and designing and implementing web programs and data bases. Mr. Rivero received a bachelor's degree in industrial engineering from Texas A&M University; a bachelor's degree in computer science from Marycrest College, Davenport, Iowa; and a master's degree in business administration from St. Ambrose University in Davenport.

Coping With Obsolete Components

by Gregory Pasikowski and Wesley L. Glasgow

Army program managers (PM's) and item managers face an increasingly difficult task: How to sustain the capabilities of Army equipment at a time when electronics producers and suppliers are responding to rapid changes in the electronics market. Defense systems once constituted a major portion of the high-technology electronics market, but those days are past. Now, electronics companies are scrambling to position themselves in the marketplace by building the newest components and disposing of their older, less capable product lines. The result is that electronic components in military systems rapidly become obsolete. In turn, parts for military hardware often cannot be obtained in sufficient quantities at reasonable costs, if they can be obtained at all.

When parts become difficult or impossible to obtain, PM's face a dilemma: Either they have to procure large stocks of critical components up front and foot the costs of maintaining an increasingly expensive inventory, or they have to devise a complicated and costly strategy for constantly reconfiguring components at the line replaceable unit (LRU) or shop replaceable unit (SRU) level. If components that can be reconfigured are not available from the market and cannot be produced economically, the manager must obtain needed parts from older systems by using a process of controlled cannibalization.

The Abrams tank program deals with this issue daily as it attempts to maintain an array of fielded tank systems, each of which has extensive electronics modules and systems that perform similar tasks but often use quite different LRU and SRU components. How the Abrams program copes with the challenge of component obsolescence has yielded some promising results and an unexpected bonus.

Finding Parts for the Abrams Tank

The Army's main battle tank, fielded in greater numbers than any other, is the M1A1 Abrams. This tank was designed to last approximately 20 years when it was deployed in the middle and late 1980's. Following the normal practice at that time, many of its electronics were designed to meet stringent military standards. These standards typically required that the tank have additional protection from shock and other hazards, such as electromagnetic pulses from nuclear bursts. The additional requirements imposed by military standards made tank parts more expensive than their less ruggedized civilian counterparts, which usually increased procurement costs up front.

With the downsizing of the military and the reduced demand for quantities of high-technology parts, Department of Defense electronics requirements have declined as a percentage of overall high-technology requirements—and that means electronics producers have less incentive to maintain special military production. For example, the military's share of the semiconductor market in 1995 was 0.7 percent, down from more than 17 percent at the height of the Cold War in 1975. Semiconductor sales in 1975 amounted to $4.2 billion, of which the military share was $700 million. By 1995, military semiconductor purchases had grown modestly to $1.1 billion (which actually was a decrease from 1985), but the semiconductor market had exploded to $150 billion. The reality is that fewer manufacturers continue to support electronics requirements that meet military standards. The list of military electronics parts that are becoming increasingly scarce grows daily.

In the case of the M1A1 tank, the tendency toward obsolescence of components, many of which are now 10 or more years old, has made it more and more difficult to provide spare circuit boards for major subsystems. The LRU's that have been affected the most include the miniature electronics unit, thermal receiver unit, line-of-sight electronics unit, computer electronics unit (CEU), computer control panel, image control unit, turret networks box, and power control unit. These LRU's encompass many of the critical fire control systems in the tank.

Three Available Solutions

The tools available to the PM-Abrams for dealing with component obsolescence include reclaiming usable parts, making lifetime and after-market buys of parts, and redesigning subsystems to reconfigure individual components at the SRU level.

The first option, reclamation, is a labor-intensive operation that involves reusing common M1 parts. For example, Anniston Army Depot in Alabama uses M1 tank CEU components to build M1A1 CEU SRU's, which then can reenter the supply system. Unfortunately, it takes an average of four M1 CEU circuit boards to make up one M1A1 board because each M1 board has to be desoldered and its usable components mixed and matched in order to prepare a usable M1A1 board.

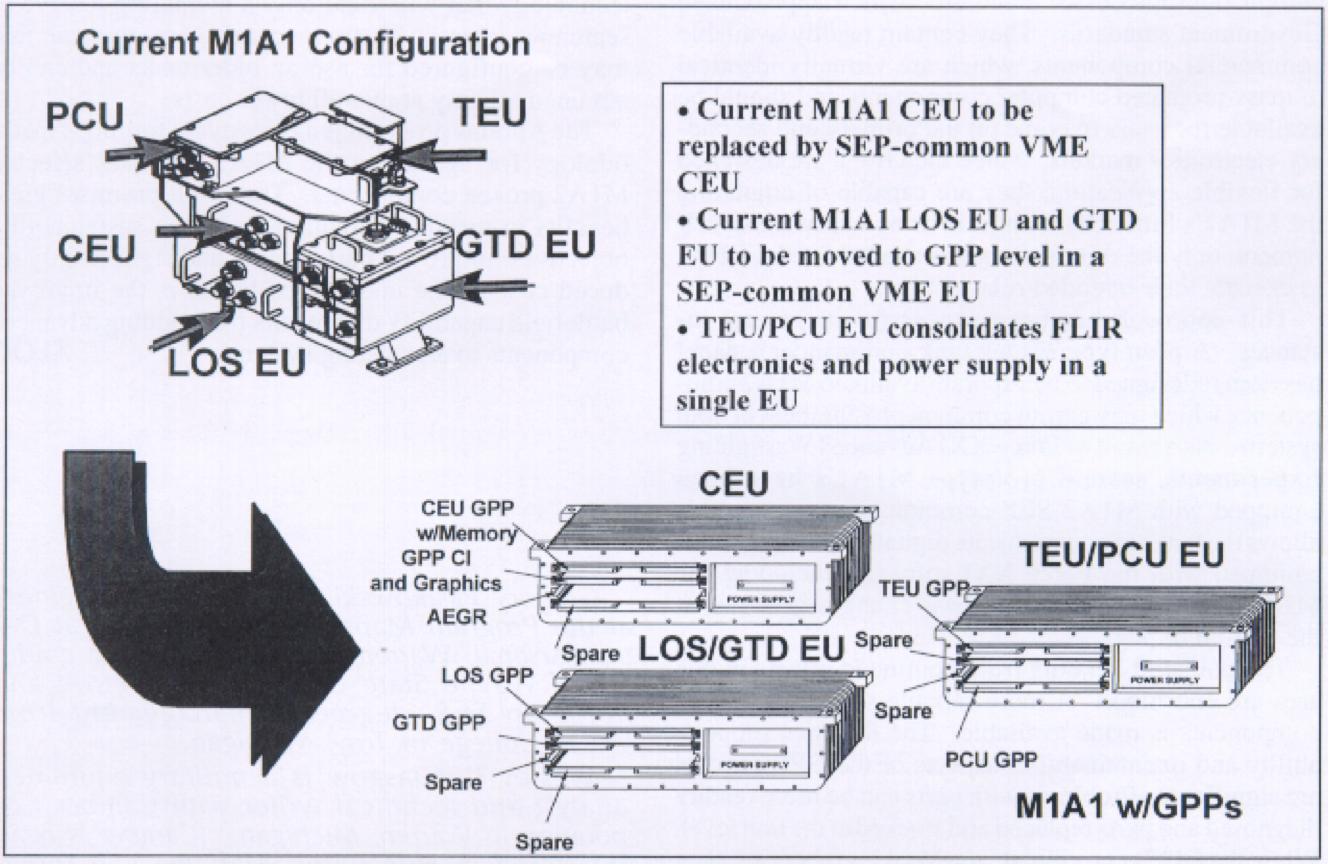
The second option is procurement of the maximum quantity of high-use components from the final production runs of the manufacturer or from the secondary electronics markets. This strategy puts a premium on the Army's ability to predict failures and the subsequent demand for components. Because of the increasing fluctuations in today's electronics market, it is often difficult to match the military procurement cycle with the decision cycles of electronics producers. The net effect of these difficulties is a steady rise in the per-unit cost of aging electronics components. Since 1980, the replacement cost of a notional electronic component has risen more than ten times in price over its initial cost—and that assumes the component is available at any price.

When one computes the dramatically higher replacement costs for critical spare electronics parts, one can see how a tank that originally may have cost $2 million now conceivably could represent a $5 million investment. Worse, this additional cost often comes from operations and maintenance, Army (OMA), funding, which is the pot of readiness money the Army uses in its day-to-day operations.

The Revolutionary M1A2

Because of the shortcomings of the first two options, Army managers have turned to the third option, redesign of subsystems. They have decided that it is cheaper to seek a newer tank, within the cost differential, that incorporates more recent (and correspondingly cheaper) technology and at the same time yields a better, more capable weapon system. The result of their thinking is the M1A2 version of the Abrams, which is now being fielded.

The M1A2 is not simply an upgrade; it's a revolutionary step forward in its radical digitization of the tank's electronic workings and its digital interactions with the force. The Army's first fielded digitized system, the M1A2 is even more dependent on electronic components than the M1A1. The tank's follow-on sys-



☐ **Reconfiguring M1A1 tanks with general purpose processor (GPP) components from the M1A2 system enhancement program (SEP) results in a tank that can communicate digitally on the battlefield.**

tem enhancement program (SEP) takes the concept of modularity a step further by using a series of general purpose processors (GPP's). Essentially, GPP's are modules with limited interchangeability that perform specific functions based on their resident software programs. Unfortunately, while the M1A2 SEP represents an enhanced capability, it will not be fielded in sufficient quantities to fill all units. So the Army will have to rely on the M1A1's capability for the foreseeable future.

Using M1A2 Components

Aspects of GPP use on the M1A2 hold promise for that third option in approaching the problem of obsolescent M1A1 parts—redesign of systems and components that depend on obsolete parts. The answer being explored—and proving to be a cost-effective solution—is to use M1A2 SEP hardware components on the M1A1. Since both tanks have the same fundamental mission, it has been possible to leverage the SEP technology to capitalize on the inherent flexibility of the M1A2's GPP's. The basic idea is to duplicate the functions performed by the M1A1 LRU on GPP's.

The benefits of this approach are significant, both in reducing OMA costs and in adding capability to the M1A1 system. The GPP's have been designed under current microprocessor standards, which approximate Government standards. They contain readily available commercial components, which are virtually identical to mass-produced computer components and should be available for years to come on the primary and secondary electronics markets. Since the GPP's are designed for flexible application, they are capable of emulating the M1A1's functions with little or no hardware development; only the right software is needed for the GPP's to execute their intended role.

This approach has been successful in several instances. A prototype M1A1 tank commander's panel has been redesigned to incorporate available M1A2 components, which may permit common procurement of both systems. As a result of Force XXI Advanced Warfighting Experiments, several prototype M1A1's have been equipped with M1A2 SEP common components; this allows the tanks to communicate digitally with other units equipped with the Force XXI software, including the M1A2 SEP. A schematic of these changes is shown at the bottom of page 31.

The potential benefits from continued efforts in this area are enormous. A more reliable source of critical components is made available. The logistics supportability and maintainability aspects of the GPP concept are significant. Problems with parts can be more readily diagnosed and parts replaced and stocked at the unit level. While the GPP's can emulate the M1A1's functions, they have a large electronic reserve over what is needed for the M1A1, and that reserve can be exploited in selected instances. For example, an aided target recognition and identification system for the M1A1 can be added to improve its fire-control capability. The use of similar components enhances the interoperability of the M1A1 with the digitized battlefield; it also should assist in incorporating the resident Army command and control structure at and below the brigade level when that software is fielded.

Part of the strategy for using GPP's is determining the criticality of the components within the M1A1, the relative demands on those components, and the ease with which the GPP can be used to replicate needed functions. The additional cost of software development also is a consideration. When the software can be developed as part of an external requirement, such as the Army's objective command and control system, or when the only additional requirement is an updated set of display and interface hardware, the GPP strategy for upgrade may be the only feasible solution.

The short-term reality facing the Army is that many M1A1 electronic components are becoming unavailable, and aggressive action must be taken to provide the assets needed to maintain readiness levels. The choice is between paying burdensome OMA costs for obsolete technology that will yield only a dwindling reserve or searching aggressively for modernized components that may be configured for use on older tanks and can be obtained reliably at overall lower costs.

The Abrams program is aggressively forging a methodology for upgrading the M1A1 that uses selected M1A2 proven components. The result promises great benefits in meeting simultaneously two sustainability objectives: improved parts supply and significantly reduced costs. The unexpected bonus is the improved battlefield capability that results from adding advanced components to an existing system. **ALOG**

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The Legacy of Mass Logistics

by Major Michael G. Dana, USMC

The author discusses why the United States historically has embraced a mass logistics system and how it will impact future precision logistics.

> *"If you come with a few,*
> *we will overwhelm you;*
> *if you come with too many,*
> *you will overwhelm yourselves."*
>
> *Mexican Government Proclamation to the United States, 1846*

The American way of war is steeped in the tradition of mass logistics. Since the Civil War, industrial energy has fueled the engines of America's war machines. The industrial revolution gave the United States the logistics resources to wage and win wars of attrition against its enemies. Well-developed rail, river, and sea lines of communication provided corridors for throughput of mass-produced weapons, vehicles, and sustainment. "Mass logistics" reflected the robust production, transportation, and distribution capabilities of capitalist America.

Unfortunately, mass logistics is costly, takes time, and consumes huge amounts of resources. Tomorrow's logisticians will operate in an environment where time is short, assets are scarce, and dollars are few. To meet the demands of future war, we will have to re-engineer today's mass logistics system. But before we reorganize and restructure time-tested principles, procedures, and systems, we must understand the causes, impact, and long-term effects of mass logistics. The purpose of this article is to discuss some of the reasons the United States embraced a mass logistics system and how that legacy will affect our approach to future "precision logistics."

The Quest for Lethality

The traditional American approach to achieving battlefield lethality has been through mass. Increasing the number, volume, and throw-weight of weapon systems offsets the limited accuracy and destructive power of conventional munitions. The employment of artillery in previous conflicts reflected this trend. During the Civil War battle of Gettysburg, the Union Army fired 32,700 rounds in 3 days; 55 years later, during World War I, the American Expeditionary Force fired over a million rounds in 4 days in the St. Mihiel offensive. This increased volume was not without cost. During the Battle of Inje in the Korean War, eight U.S. artillery battalions fired over one million rounds in 2 weeks of combat, at a cost of $33 million. Attrition warfare in Korea was designed to inflict maximum casualties while simultaneously minimizing U.S. losses. Nevertheless, mass logistics, though costly in materiel, was operationally effective and logistically feasible.

Using mass fires to gain lethality was an attainable, sustainable, and time-proven strategy. In this context, "more was better," and "too much was not enough." Redundancy of fire-delivery systems and large quantities of munitions provided operational flexibility. The "Van Fleet day of fire" during the Korean War exemplified this premise. [General James A. Van Fleet launched a successful counteroffensive against Chinese and North Korean forces on 11 April 1951, the same day he assumed command of Eighth U.S. Army in Korea.] That premise was demonstrated again in General H. Norman Schwartzkopf's desire to pummel the Republican Guard with B-52 bomber strikes during Operation Desert Storm. [The Republican Guard Forces Command was an elite force that was organized to protect the Iraqi Government. This force was employed in highly successful offensive operations against the Iranians.] Commanders won't abandon the concept of mass fires until tomorrow's precision systems provide the same lethality as their destructive predecessors. Until then, logisticians will serve the dual masters of mass and precision.

A Requirement for Mobility

Historically, the United States has displayed a unique ability to project combat power at the strategic and operational levels of war. In 1864, the 15,000-man 23d Corps of the Union Army moved by rail from southwest Tennessee to Washington, D.C., in 11 days. Then, in the next 8 days, the soldiers traveled by sea to North Carolina, disembarked, and launched an overland offensive against Confederate soldiers in Wilmington. The Union Army developed extensive rail, wagon, and sea or river lines of communication in order to provide intra- and intertheater connectivity. The operational mobility of Union forces offset tactical deficiencies. Northern industry provided General Ulysses S. Grant the supplies, materiel, and transportation needed to overwhelm a tactically proficient but logistically deficient enemy. Grant's reduction of Vicksburg, General William T. Sherman's march to the sea, and the war of attrition in Virginia in 1864 and 1865 demonstrated the irresistible power of mass and mobility. Grant exploited Confederate manpower and supply deficiencies through strategic mobility and operational attrition. The Civil War experience created an institutional mindset based on the inseparable relationships of mobility, mass, and attrition warfare. These lessons became the guiding principles of America's approach to the major conflicts of the 20th century.

Historically, American trucks, tanks, airplanes, and ships have provided the tactical, operational, and strategic mobility to project manpower and firepower. Mobility has provided the commander the means to concentrate force at the right place at the right time for the right level of "attrition." Helicopter operations in Vietnam expanded this concept, projecting manpower and firepower to areas where geography made overland transportation impractical.

Global Reach

The projection of combat power is a function of mass production, transportation, and distribution. The natural resources of the United States favor production, but our geographical position in North America hinders global projection and sustainment of forces. Sealift—an asset always in short supply during conflict—carries the majority of cargo and equipment for war. The decline of the U.S. maritime industry and enemy action aggravate the sealift shortage, creating conditions where lift requirements exceed capability.

During both world wars, new construction, contracted foreign shipping, and antisubmarine measures solved part of this problem. Over time, naval construction became rapid, efficient, and effective. During World War II, the United States expanded its merchant fleet from 6 ships in 1941 to 5,570 in 1945. Shipyards that required 244 days to build one Liberty transport ship in 1942 had, by December 1943, reduced keel-to-launch periods to an average of 39 days. The resulting ships provided the capability to wage global war, illustrated by the fact that the United States had moved more than 6 million men and their gear overseas by 1945.

Nevertheless, global war created shipping demands that exceeded lift capabilities. Immature ports of debarkation overseas exacerbated this problem, especially in the Pacific. Logisticians tackled this predicament by stockpiling supplies at intermediate throughput bases. Frequently, the Allied rates of advance outpaced establishment of these supply waypoints, creating new demands that were filled by direct shipments from the United States. The mass production of supplies, new shipping, and redundant staging made direct shipments possible. Through the prism of hindsight, these methods seem fiscally inefficient, yet they were strategically effective. The concepts of "just-in-time logistics" and "precision sustainment" run counter to the redundant practices of the past.

Lack of Asset Visibility

During World War II, the mechanics of tracking equipment, supplies, and personnel in the sustainment pipeline were flawed. During the initial movement of materiel to England in 1942, tons of supplies were lost, pilfered, or destroyed. Poor recordkeeping, inefficient warehouse procedures, and an overall lack of supply discipline created chaos and confusion in the supply system. Lack of inventory control in supply depots led to widespread reordering of equipment and materiel—a demand that American industry satisfied, but at great financial cost. The quantity of mass-produced supplies offset inefficient supply procedures; redundancy throughout the system partially rectified poor asset visibility and control. Using units lost faith in the supply system because poor asset visibility degraded response times and fill rates. As a result, consumers worked around "official" supply procedures. Padded requirements, stockpiles of "extra" items, and unconventional "black market" procurements overcame deficiencies.

Combat Power

Historically, combat effectiveness has been a function of the ability to mass superior manpower against an enemy. As the United States entered World War I during the summer of 1917, the Germans assumed it would take the Americans a year to move 500,000 troops to the Western front. In fact, we shipped one million men by July 1918 and two million by October of that year. The Germans outnumbered the Allies by 300,000 in April 1918, but the introduction of U.S. forces gave the Allies a 600,000-man edge by Armistice Day in November. The deployment of manpower was decisive at the strategic and operational levels of war. Mass logistics made it feasible to train, equip, deploy, and maintain a "mass" army.

Mass-Production Economy

The American way of war has mirrored our economic strength. During World War II, the American economy was the heart of the Allied war effort. Money, equipment, and supplies were pumped to every corner of the globe by sea lines of communication. Over 2.4 million vehicles, 88,000 tanks, and 303,000 aircraft were produced during the war. Lend-lease operators exported $57.4 billion worth of equipment to the Allies. American industry was beyond the range of enemy attack, so unmolested factories churned out warfighting equipment and supplies. The output of American industry dwarfed that of the Allies and the enemy combined. Mass logistics reflected the strengths of a democratic, free-enterprise, capitalist nation.

Geographic position, natural resources, and industrial potential made possible America's role as the "arsenal of democracy." Mass logistics was the logical outgrowth of a mass-production economy.

The Comforts of Home

History shows that the American combatant has required more support and rations than his foreign counterpart. After the War of 1812, Secretary of War John C. Calhoun remarked, "Our people, even the poorest, being accustomed to the plentiful mode of living, require, to preserve their health, a continuation of this to a considerable degree (in war). . . An American would starve on what a Tartar would live with comfort."

During the Civil War, the food ration for a Union soldier was 20 percent more than a British combatant and double that of a Russian soldier of that era. A German soldier in World War II carried 3 1/3 pounds of rations for his basic load, and an American carried 6 1/4 pounds.

The American propensity to bring the comforts of home to the combat zone created a requirement for "mass logistics" support. Unfortunately, as witnessed in Vietnam and Southwest Asia, the creature comforts and luxuries of rear areas contrasted with the more spartan conditions experienced by field troops. Demands to make the combat zone "just like home" created a requirement for supplies above and beyond that generated by combat.

Logisticians are often blamed for the sustainment tail that wags the operational dog. In reality, logisticians develop a sustainment infrastructure that meets the demands of the combat organizations they serve. To date, mass logistics has fulfilled the requirements and preconditions for the American way of war. Consequently, the transition from mass to precision logistics will require a fundamental shift in our approach to war. Precision logistics can be possible only if corresponding operational systems and functions embrace similar themes. A pre-condition for the reduction of mass logistics is a battlefield where lethality is a product of precision, instead of mass, in all operational functions. Until then, mass logistics will be the brake on the flywheel of 21st century maneuver warfare. **ALOG**

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LOGPARS '97

by Gary L. McPherson

In today's era of declining defense budgets, program managers must provide productivity-enhancing tools to the integrated product teams. The Logistics Planning and Requirements System is such a tool.

Integrated logistics support (ILS) planning is the Army's process for identifying and implementing the logistics support requirements needed to field a new weapon system or end item with a minimum life-cycle cost.

Supportability Integrated Product Teams (SIPT's) throughout the Army have the daunting task of ensuring detailed, accurate, and comprehensive planning for all ten ILS elements: design interface; maintenance; supply; support equipment; technical data; computer resources support; manpower and personnel; training; facilities; and packaging, handling, storage, and transportation. All ILS elements must be integrated properly and tradeoffs made to ensure selection of support alternatives that produce high readiness rates at low life-cycle costs. Considering each ILS element requires familiarity with many acquisition logistics regulations, expertise in applying the available guidance, and the ability to improvise solutions where guidance is lacking. The interdependence among ILS elements and the need to achieve integration with other system acquisition disciplines further complicate the ILS planning process.

Stretching the Planning Dollar

In today's era of declining defense budgets, the resources available for ILS management are scarce. Downsizing has caused a significant loss in the Army's ILS expertise. Fewer people are available to handle the ILS planning work load. In this constrained environment, program managers must provide productivity-enhancing tools to the integrated product teams.

One such planning tool available within the Department of Defense is the Logistics Planning and Requirements System (LOGPARS). LOGPARS is an expert system designed for ILS managers and other project management support personnel who are responsible for acquisition logistics planning and execution. The current LOGPARS software runs on personal computers using Microsoft Windows 95 or Windows NT. This version, LOGPARS '97, provides a user-friendly environment in which to author and staff the planning documents required during system or end item acquisition.

The Army adaptation of LOGPARS '97 can be used to prepare ILS strategies (formerly called ILS plans), materiel fielding plans, ILS statements of work, provisioning plans, transportability reports, and warranty clauses. It assists individuals who are writing acquisition planning documents and supports a collaborative work environment.

Several subject matter experts may contribute to different portions of the acquisition planning documents. After a document has been drafted, LOGPARS '97 is used to staff the draft document electronically with team members and reviewers. LOGPARS offers an internal commenting capability.

How LOGPARS Works

When using LOGPARS '97, the user is prompted in interactive question-and-answer sessions to address appropriate issues in each section and subsection of the planning documents. Decision logic and business rules embedded within the LOGPARS '97 knowledge base provide the system with the capability to tailor the questions and output text based on a number of different conditions, such as acquisition type, life cycle phase, or requirements that are specific to the system being acquired. This tailoring logic determines when to ask questions. Follow-on questions are based on user responses to previous questions. The resulting documents consist of user-generated text and system-generated conditional text. User text comes from narrative explanations and short answers from the user. Text provided by LOGPARS '97 is based on user responses to specific questions, selections from answer lists, and results of the decision logic that is internal to the system.

Consistency checks are embedded to warn the user of discrepancies in responses in different portions of the plan or those that may impact other planning documents. Responses that depart from accepted policy are also flagged. When the user is revising requirements in one section of a planning document, any impacts on other sections of the same planning document or sections within other modules are brought to the user's attention. This promotes integration within and among all planning documents and the interrelated ILS elements that must be planned and conducted. Assistance in responding to a particular question or in understanding the available options is accessible from anywhere within the system. At the conclusion of the work session, the user can review the planning documents, distribute them for review, print portions of them, or prepare them for import into a word processor.

Although LOGPARS is an expert system, the user should not be misled into believing that ILS planning has been automated and now requires only the push of a button. Users have commented that LOGPARS reveals how comprehensive and multifaceted ILS planning actually is. LOGPARS escorts the user through a maze of ILS-related decision points that must be addressed throughout the acquisition life cycle.

Measuring LOGPARS Success

The best measure of the utility of LOGPARS is the growing number of users and the testimonials of those who claim substantial time savings and increased quality in their ILS planning efforts using LOGPARS. There are over 700 registered users of the Army adaptation of LOGPARS. The Air Force and Navy have their own adaptations, with document-generating modules tailored to their requirements and business processes. The adaptations of LOGPARS include service-unique knowledge bases and logic.

LOGPARS has proven to be an excellent training tool and has been used in instruction at the Army Logistics Management College at Fort Lee, Virginia, and at the Defense Systems Management College at Fort Belvoir, Virginia.

The user is the key component in the LOGPARS development team approach. The past success of LOGPARS can be attributed largely to the willingness of the user community to offer ideas for new software features and suggest new approaches for tailoring logic within the knowledge base. Continued user response is critical to the continuing enhancement of LOGPARS.

Great care has been taken to ensure that the most current acquisition policy and guidance from acquisition reform initiatives have been incorporated within the knowledge base for LOGPARS '97. There is a continuous effort to add more detail to the knowledge base and provide more sophisticated tailoring to the diverse acquisition situations encountered by project managers or ILS managers using LOGPARS.

The versatility of the LOGPARS expert system is being proven through its application to new types of modules. A module for preparing computer resources life-cycle management plans is currently under development. The Assistant Secretary of the Army for Research, Development, and Acquisition used LOGPARS capabilities to develop an acquisition strategy module. There are also plans for developing new modules that will assist in authoring other types of documents, such as test and evaluation master plans and operational requirements documents.

LOGPARS '97 is a powerful and flexible tool for authoring comprehensive acquisition planning documentation. The LOGPARS expert system can be revised readily to reflect any changes in business processes or policy. It easily accommodates the continuous improvement of existing modules and the creation of new ones.

Comments from users are welcome. Write to: USAMC LOGSA, ATTN: AMXLS–AIM, Building 5307, Redstone Arsenal, Alabama 35898–7466. Phone calls should be directed to (205) 955-9883/9884 or DSN 645–9883/9884. The fax number is (205) 955-8551 or DSN 645-8551, and the Internet address is www.logpars.army.mil. **ALOG**

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