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Cover: Civilian contractors perform a wide range of support functions for U.S. military personnel deployed around the world. The Army's Logistics Civil Augmentation Program (LOGCAP) contractor, Halliburton Kellogg Brown & Root (KBR), provides food, water, shelter, hygiene and laundry facilities, air traffic control, crash and fire rescue services, and other logistics support to Army personnel serving in Operations Enduring Freedom and Iraqi Freedom. On the cover, a LOGCAP worker stacks worn tires for transport to Kuwait for disposal in early 2004. The article beginning on page 24 concludes a two-part guide for commanders using LOGCAP.

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PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:


SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
06097

World Wide Web address:
www.almc.army.mil/alog

ALOG NEWS

SINGLE ENTERPRISE CONCEPT SETS "SALE" UNDER NEW CONTRACTS

Creation of the Single Army Logistics Enterprise (SALE) took a significant step forward with the award of two contracts earlier this year. Computer Science Corporation received a \$199-million contract in February for the Product Lifecycle Management Plus (PLM+) program, one of the components of SALE. In April, Enterprise Integration, Inc., of Alexandria, Virginia, and IDS Scheer, Inc., of Berwyn, Pennsylvania, were awarded a follow-on, \$40-million contract to provide management and monitoring support for the SALE project. Their original contract, for \$20 million, was awarded in 2003.

SALE is designed to correct a major deficiency in Army logistics information management: lack of a common operating picture for measuring and analyzing materiel readiness and combat posture. Under SALE, the Army will integrate its national and tactical logistics systems into one fully integrated, end-to-end enterprise. SALE will bring together three component systems: the Global Combat Support System-Army (GCSS-Army) Field Tactical (F/T), the Logistics Modernization Program (LMP), and GCSS-Army PLM+.

LMP is replacing the Commodity Command Standard System (CCSS) and the Standard Depot System (SDS). GCSS-Army F/T is replacing a variety of legacy tactical-level logistics information systems, such as the Standard Army Retail Supply System (SARSS), the Standard Army Maintenance System (SAMS), the Unit Level Logistics System (ULLS), and the Integrated Logistics Analysis Program (ILAP).

GCSS-Army PLM+ will link GCSS-Army F/T—the Army's field-level logistics system—with LMP—the Army's national-level logistics system. GCSS-Army PLM+ also will provide a single access point to SALE for external customers, such as the U.S. Transportation Command, the Defense Logistics Agency, and original equipment manufacturers.

The end state of SALE will be characterized by—

- A single enterprise built around already defined and universally accepted processes that instill confidence through accuracy, reliability, and connectivity.
- Logistics processes that fully interact with operational and financial processes.
- Systems that can significantly improve capabilities to build combat power and manage readiness.

- Performance-based partnerships with industry. The Army projects partial implementation of PLM+ and SALE by fiscal year 2007.

REAL-TIME UPDATES AVAILABLE FOR FED LOG USERS

Beginning with the March 2005 release of FED LOG, users with access to the Internet can link from FED LOG to the Web-based version of the Federal Logistics Information System, WebFLIS, to get the latest item information on more than 7 million national stock numbers. This new capability provides a real-time link that allows users in the field to have confidence that the ordering decisions they make are based on current information.

Through either five compact discs or one DVD, FED LOG provides highly portable logistics information that contains items of supply and supplier data from the Federal Logistics Information System as well as unique data from other sources, including the military services and Defense Logistics Agency supply centers. FED LOG can operate as a standalone product, or it can be used to perform on-line queries via the Internet. As a standalone product, it is an invaluable tool for deployed units that do not have Internet availability. FED LOG disks continue to be delivered to more than 37,000 customers monthly.

FED LOG has many new features, including highlighting of environmentally preferred items and hazardous or radioactive items and providing conversions for U.S. customary measurements to metric measurements and decimals to fractions.

Further information on FED LOG is available at www.dlis.dla.mil/Fedlog.

NEW TECHNOLOGY GIVES MAINTAINERS ACCESS TO EXPERTS

The new Joint Distance Support and Response (JDSR) advanced concept technology demonstration (ACTD) increases the efficiency of maintenance on vital equipment and decreases equipment downtime, benefiting soldiers, sailors, airmen, and marines currently deployed and working in the field.

Using a Web-based network, JDSR provides maintenance personnel in the field access to a collaborative environment that includes information profiling, wireless connectivity, three-dimensional visualization,

(ALOG NEWS continued on page 44)

Developing a Concept for Joint Distribution

BY MARK MCTAGUE AND ROGER HOUCK

Department of Defense logistics experts are developing a concept of how joint logistics distribution will be conducted from 2015 to 2025.

In September 2004, a small team of logistics subject-matter experts representing the U.S. Transportation Command (TRANSCOM), the Defense Logistics Agency, the joint community, and the military services assembled to begin writing a Joint Logistics (Distribution) Joint Integrating Concept (JIC). By design, this concept focuses on distribution, a subset of logistics.

The purpose of the Joint Logistics (Distribution) concept is to support rigorous analysis of gaps and excesses in distribution capabilities through a capabilities-based assessment process. This process will provide appropriate materiel and nonmateriel solutions as part of the broader Department of Defense (DOD) Joint Capabilities Integration and Development System (JCIDS) process. The Joint Logistics (Distribution) concept also is intended to help drive joint and service experimentation and influence science and technology efforts.

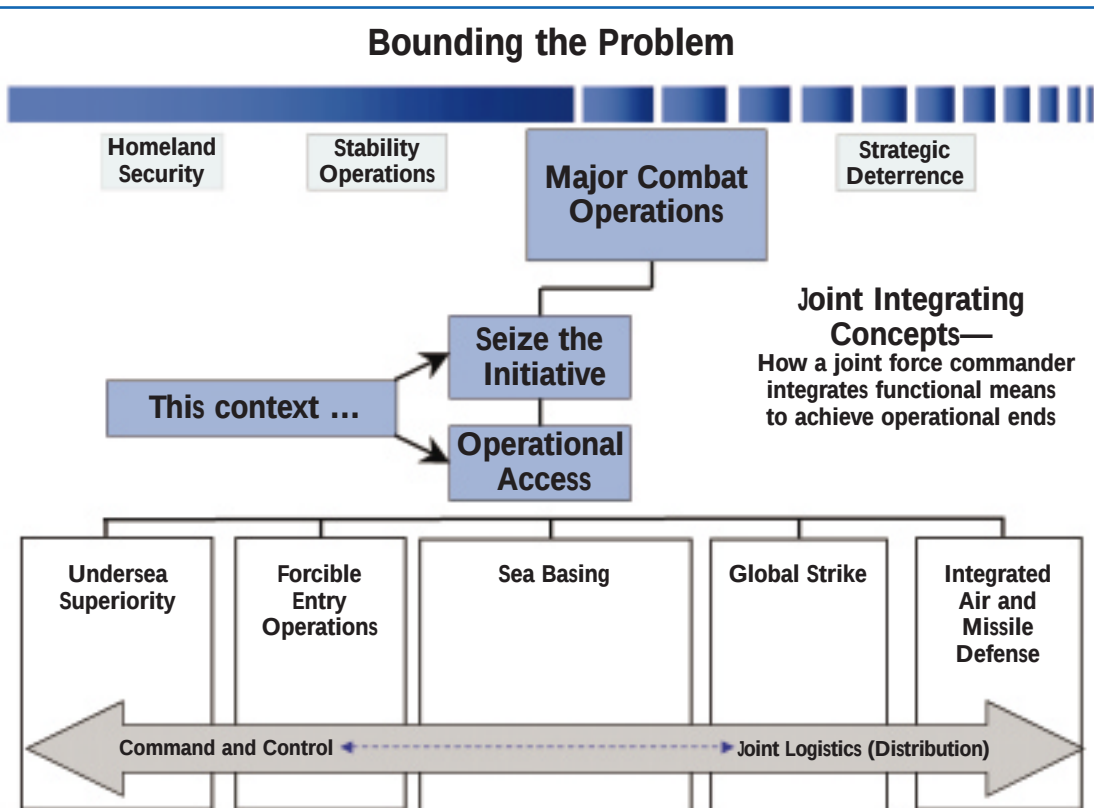
A core team of about 50 representatives from throughout DOD, the joint community, and the services

provided oversight and management guidance to the writing team for the Joint Logistics (Distribution) concept. A fundamental challenge for the members of the core and writing teams in developing the concept was to put aside service, agency, and organizational agendas so all members could contribute to building something that was almost unprecedented in its scope, complexity, and depth: a *shared* view of how joint distribution operations will be conducted in the period from 2015 to 2025. This is the first of several articles that will be published in *Army Logistician* to explain the framework in which the concept is being developed and the concept's major themes, pathway for completion, and effects.

Capabilities-Based Planning and JCIDS

It will be difficult for the reader to understand the Joint Logistics (Distribution) concept without first appreciating the catalysts for its development. Those catalysts were twofold: First, a rapidly changing threat environment that requires new approaches to how the United States closes combat power on a theater of operations and establishes a distribution capability to support the force; second, a fundamental overhaul in the requirements generation process itself, in which future war-fighting capabilities are identified and ultimately resourced.

In 2003, DOD transitioned to what is termed a "capabilities-based planning" (CBP) process, in which a family of new (and still emerging) joint concepts are designed to link strategic guidance to the employment and development of future joint force capabilities. These concepts are



Joint Integrating Concepts describe the means used to achieve the operational ends delineated in Joint Operating Concepts, one of which is Major Combat Operations. The Joint Logistics (Distribution) and Command and Control concepts describe required capabilities that apply to the other five Joint Integrating Concepts.

sometimes referred to as “engines of transformation.” CBP differs from the traditional, or legacy, concept development approach in its emphasis. Where the focus formerly was on platforms and weapons needed to accomplish a specific mission to defeat a specific threat, CBP focuses instead on “portfolios of capabilities” that will hedge against future uncertainty, accentuate enduring U.S. strengths while mitigating weaknesses, and impose disproportionate costs on adversaries.

The primary tool through which CBP is executed is the JCIDS process, which was formally introduced in 2004. The intent of the JCIDS process is to improve and standardize a methodology to identify and describe capability gaps, provide a means of engaging the acquisition community earlier in the process of identifying gaps, better define nonmateriel solutions, prioritize capability gaps and proposals, and improve coordination throughout the services, the joint community, and DOD.

The JCIDS process is composed of a structured, four-step methodology collectively termed “capabilities-based analysis.” The four steps are functional area analysis, functional needs analysis, functional solutions analysis, and post-independent analysis. Based on national defense policy and centered on a common joint warfighting framework, these analyses are used to begin developing integrated, joint capabilities that reflect a common understanding of existing joint force operations and of doctrine, organizations, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) capabilities and deficiencies. The ultimate product of these analyses is a series of requirements documents designed to achieve a required capability. These documents include the Initial Capabilities Document, Capability Development Document, Capability Production Document, and Capstone Requirements Document.

Joint Concepts

Joint concepts provide the primary operational and functional context for analysis that guides service and Defense agency planning, programming, budgeting, and execution decisions. They are organized in a hierarchy that includes the overarching Joint Operations Concepts (JOpsC), subordinate Joint Operating Concepts (JOCs), supporting Joint Functional Concepts (JFCs), and detailed JICs.

The JOpsC is the foundation for all joint concepts. It depicts the relationships among JOCs, JFCs and JICs. JOCs provide the operational context and essential capabilities from which JFCs are derived. JOCs describe operational “ends” (required “effects”); JFCs describe required functional “means” (required “capabilities”). JICs describe specific, fundamental

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tasks derived from a JOC, a set of JOCs, or JFC-derived capabilities. JICs may be operationally (“effects”) or functionally (“means”) focused.

The current portfolio of JOCs includes Homeland Security, Major Combat Operations, Stability Operations, and Strategic Deterrence. Supporting JFCs include Command and Control, Battlespace Awareness, Force Application, Protection, Focused Logistics, Net-Centric Operations, Force Management, and Training. As for JICs, two were developed before April 2004: Joint Forcible Entry Operations and Joint Undersea Superiority. In that month, the Joint Chiefs of Staff directed that five additional JICs be developed: Joint Command and Control (with the U.S. Joint Forces Command taking the lead), Global Strike (Air Force lead), Integrated Air and Missile Defense (Air Force lead), Joint Sea Basing (Navy lead), and Joint Logistics (Army and TRANSCOM co-lead).

Overview of the Joint Logistics (Distribution) JIC

This concept calls for a single joint deployment and distribution enterprise capable of providing prospective joint force commanders with the ability to deploy, reposition, sustain, reconstitute, and redeploy joint forces rapidly and effectively in support of major combat or other joint operations. This joint deployment and distribution enterprise must be capable of operating across the strategic, operational, and tactical continuum with a set of integrated, robust, and responsive physical, information, communications, and financial distribution networks.

The Joint Logistics (Distribution) JIC directly supports the three overarching distribution imperatives cited in the Focused Logistics JFC—namely, the requirement to build the right capacity into the joint distribution pipeline, exercise sufficient control over that pipeline, and provide a high degree of assurance that

forces, equipment, sustainment, and support will arrive where and when needed.

Future joint force commanders may rely on the supporting joint deployment and distribution enterprise to expand existing peacetime distribution networks quickly with a full range of standing, scalable, and expeditionary distribution capabilities. These capabilities will support the joint force commanders in performing their deployment, force assembly and repositioning, sustainment, and redeployment responsibilities.

The joint deployment and distribution enterprise—an integrated system consisting of assets, materiel, leaders, organizations, procedures, tools, training, and doctrine—will provide logistics solutions to the joint force commander to minimize the seams in the pipeline that characterize current strategic and theater distribution segments. It will be designed to erase current doctrinal and procedural distinctions among the functions of deployment, distribution, and sustainment. The joint deployment and distribution enterprise will complement, interact with, and augment—not replace or subsume—service-unique or theater-assigned distribution capabilities and responsibilities.

The central idea behind the Joint Logistics (Distribution) JIC can be summarized in the following hypothesis. If we can—

- Build a single, unified joint deployment and distribution enterprise capable of rapidly delivering and positioning joint forces and sustainment from any point of origin or supply source to any point of need designated by any joint force commander and then returning them;
- Augment any joint force commander with additional ready, scalable, and agile distribution capabilities; and
- Network the entire system in near real-time with common operational views and shared knowledge, intuitive decision-support and modeling tools, and total asset visibility; then the results will be—
 - Enhanced delivery of forces and sustainment to the joint force commander, thereby enabling, not limiting, operational art and employment of forces;
 - Rapid introduction and integration of additional theater distribution capabilities to seamlessly link the joint force with the entire distribution system; and
 - Improved trust and confidence that the entire distribution system will “deliver.”

End-to-End Joint Distribution Operations

Fundamental to developing the Joint Logistics (Distribution) JIC was an appreciation by team members for the leadership intent of the JIC’s general officer sponsors, the TRANSCOM Commander and the Deputy Chief of Staff, G-4, Department of the Army. The terms of reference for developing the JIC identified the

overarching intent as the description, within an operational visualization, or construct, of end-to-end joint distribution operations that ensure support of the operational access needed to seize the initiative in a major combat operation.

The focus of the JIC is identified as distribution to enable rapid joint deployment and distribution in support of the combatant commander’s military campaign. It is based largely on the overarching tenets of the Focused Logistics JFC. At the same time, it serves as an integrating mechanism for required logistics capabilities identified in the other six JICs. The centerpiece is capabilities, tasks, conditions, standards, and effects arrayed in an operational framework that focuses not only on the “what” (tasks and functions) but, more importantly, on the “how” (ways and means) of joint distribution.

Tasks

Identification of key tasks associated with joint distribution operations is central to the JIC. For the purposes of a JIC, a task is defined as an action or activity—based on doctrine, standard procedures, mission analysis, or concepts—that may be assigned to an individual or organization. Eight tasks constitute joint distribution operations—

- Close the joint force.
- Receive, reposition, operationally maneuver, or assemble the joint force in theater.
- Sustain the joint force.
- Enable joint force reconstitution.
- Exercise and employ joint deployment and distribution enterprise command, control, communications, and computer (C4) systems.
- Establish, operate, and maintain joint distribution lift assets, terminals, organizations, and lines of communication.
- Protect the joint deployment and distribution enterprise.
- Conduct joint distribution enterprise force development.

Illustrative Concept of Operations

JICs are required to include an illustrative concept of operations (CONOPS) based on a DOD-approved Defense Planning Scenario. The CONOPS represents the overall picture and broad flow of tasks within a plan by which a commander maps capabilities to effects and effects to an end state for that scenario. It describes, against the framework of a major combat operation, how the concept is put into operation to support a joint force commander.

Key requirements for a CONOPS are that it focus on execution and assessment, identify critical tasks on a campaign timeline, and have a sufficient level of detail

to provide for capabilities-based functional assessments.

The Road Ahead

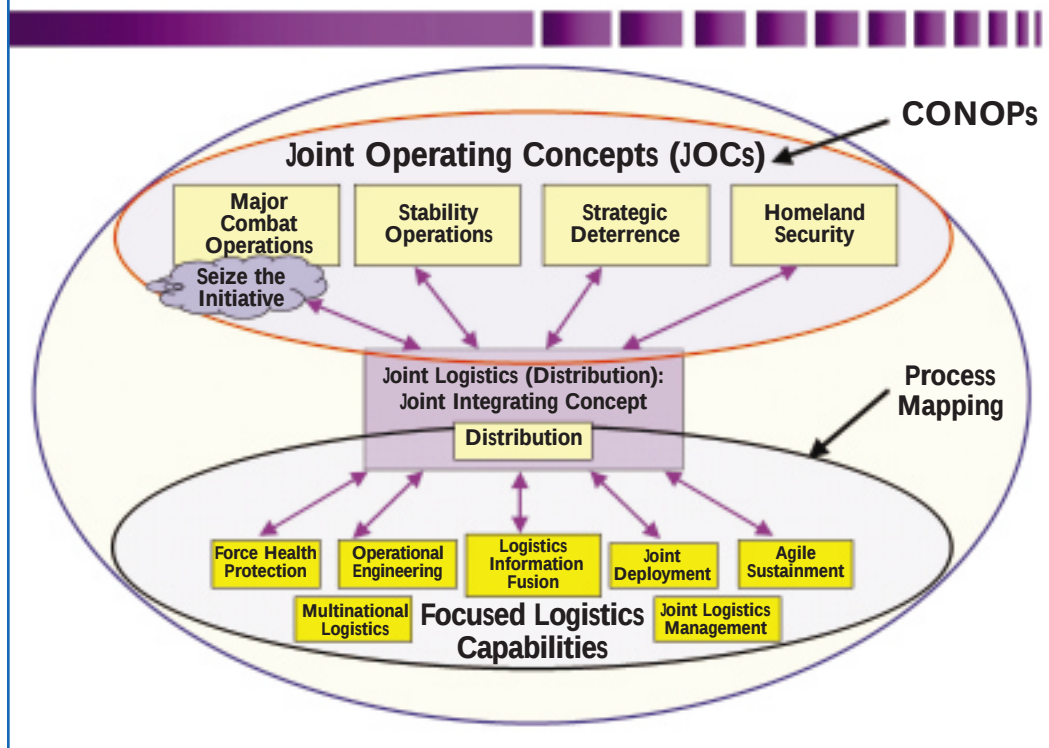
Beginning with the Joint Logistics (Distribution) JIC, the Joint Staff now requires that a war game be conducted as a key step in the JIC developmental process. The war game will provide a means for evaluating a JIC's central idea, tasks, conditions, standards, and effects in a major combat operations scenario. It will ensure that the concept contains the appropriate level of information, scope, clarity, and specificity to be of practical use in follow-on capabilities-based assessments. The war game may identify areas that require further work or generate specific changes that affect the concept's major themes. The war game is expected to show how well the draft concept succeeds in meeting the fundamental requirement of demonstrating how capabilities are integrated at the operational and tactical levels in support of a joint force commander's campaign.

Representatives from DOD, the joint community, and the services will participate in the war game, with former joint task force commanders invited to serve in key mentor and assessor roles. When the war game is completed, the concept will be presented to general and flag officers for comment and review. Following this review, the concept will be forwarded to the Joint Requirements Oversight Council. If the council approves the concept, it then will enter into the capabilities-based analysis process.

The Joint Logistics (Distribution) JIC represents an important milestone in the transformation to network-centric warfighting capabilities. It will have significant implications for force development, acquisition, and investment decisions. More importantly, it will represent a significant step forward in migrating current logistics systems to joint processes and capabilities that are integrated with a joint force commander's battle rhythm across the range of military operations. **ALOG**

MARK McTAGUE IS DEPUTY DIRECTOR OF THE MARINE CORPS JOINT CONCEPT DEVELOPMENT AND EXPERIMENTATION OFFICE IN SUFFOLK, VIRGINIA. A RETIRED MARINE

The Integration Framework



The Joint Logistics (Distribution) concept brings the capabilities of Focused Logistics to bear on providing joint logistics distribution in support of the operational ends described in Joint Operating Concepts.

CORPS COLONEL WITH 28 YEARS OF LOGISTICS EXPERIENCE, HE HOLDS GRADUATE DEGREES IN MANAGEMENT FROM THE NAVAL POSTGRADUATE SCHOOL AND IN NATIONAL SECURITY AND STRATEGIC STUDIES FROM THE NAVAL WAR COLLEGE.

ROGER HOUCK IS AN EMPLOYEE OF THE PACIFIC NORTHWEST NATIONAL LABORATORY AND CURRENTLY IS ASSIGNED TO THE ARMY LOGISTICS TRANSFORMATION AGENCY AS AN INTERGOVERNMENTAL PERSONNEL AUGMENTEE. HE SERVES AS THE TEAM LEAD FOR JOINT INTEGRATION IN THE AGENCY'S FUTURE LOGISTICS DIVISION. HE SERVED IN THE AIR FORCE FOR OVER 20 YEARS WITH ASSIGNMENTS IN BOTH THE OPERATIONS AND INTELLIGENCE FIELDS. HE ATTENDED JOCHI DAIGAKU UNIVERSITY IN JAPAN AND HOLDS A B.S. DEGREE FROM TEXAS CHRISTIAN UNIVERSITY AND AN M.S. DEGREE FROM THE UNIVERSITY OF SOUTHERN CALIFORNIA. HE IS A GRADUATE OF THE AIR COMMAND AND STAFF COLLEGE AND THE AIR WAR COLLEGE.

PRINCIPAL MEMBERS OF THE JOINT LOGISTICS (DISTRIBUTION) WRITING TEAM INCLUDED GERALD JENSEN OF THE U.S. TRANSPORTATION COMMAND; DENNIS MCBRIDE OF THE MARINE CORPS; MAJOR MIKE FITZGERALD, U.S. AIR FORCE; COMMANDER RAY DAUGHERTY, U.S. NAVY; AND ED HOWELL OF THE ARMY COMBINED ARMS SUPPORT COMMAND.

Nanotubes and Antimatter: Energy Resupply for the Future Battlefield

BY ROBERT E. GARRISON AND DAVID E. SCHARETT

In the first of three articles on scientific advances at the atomic, molecular, and photonic levels, the authors discuss the potential for greatly reducing, or even eliminating, the energy supply chain.

The U.S. military is experiencing an unprecedented period of adjustment as it transforms its combat forces for the future while simultaneously executing the Global War on Terrorism. The Army and the other services need to transform the way they model, design, deploy, and sustain their forces. As Army and joint combat forces alter their concepts of deployment and employment, they must modernize the logistics systems that support those concepts. Achieving dominance across the entire range of combat operations—particularly combat operations dealing with asymmetric threats—poses considerable logistics challenges. Army and Department of Defense engineers and scientists must stay abreast of significant discoveries in new technologies and applications that will benefit Army and joint logistics operations. As logisticians, we should stand ready to incorporate these technological advances into our systems and business processes in order to maximize the benefits they offer—reductions in the cost, time, and manpower needed for support and increases in readiness.

This is the first of three articles describing the potential benefits to Army and joint logistics of research and development at the atomic, molecular, and photonic levels—a scientific and technological field known as the Revolution in Atoms, Molecules, and Photons (RAMP). RAMP research significantly affects three areas of utmost importance to Army and joint logisticians—energy, materials, and communications (in the broadest sense). Now, and to an even greater extent in the future, resupply of energy on the battlefield is a pervasive issue that must be addressed. Materials research is another crosscutting scientific area that first and foremost affects the reliability of systems, components, and parts. And the drive toward a global, joint network-centric communications capability requires many advances in communications technologies, such as data source

collection; data collation, storage, and analysis; knowledge management and decision support; and information dissemination.

RAMP Benefits to Logistics

The Army's scientists and engineers are expanding the limits of paradigm shifts by applying transformational technologies that will give soldiers unprecedented capabilities to achieve decisive victories. RAMP is the key that will lead to those victories.

RAMP is pervasive in all areas of research today. The Federal Government, the private sector, academia, and international organizations are increasing funding for RAMP developmental applications. The products of these technologies can and will provide significant benefits to Army and joint logistics in the months and years to come. Army logisticians must be ready to apply the tremendous benefits gained from RAMP as we move forward in the 21st century.

Army and joint logisticians will realize relevant and timely benefits as RAMP research begins to provide nanoscale technologies and products with practical applications. [Nanoscale refers to objects that measure from 1 to 100 nanometers. A nanometer is one-billionth of a meter, so nanoscale objects are far too small for the human eye to observe.] Reducing the demand for resupply of energy on the battlefield; increasing the reliability of equipment at the platform, component, and part levels; and providing global "24/7" communications capabilities at all echelons of logistics, while decreasing the vulnerability of combat and support forces—all can be attained through the products that RAMP research is expected to deliver now and into the future.

Birth of RAMP

In 1985, Dr. Richard Smalley, a research professor at Rice University, discovered "bucky balls." This breakthrough marked the beginning of RAMP. Bucky balls are nanoscale objects that are no larger

Photovoltaics Types	Efficiency	Cost	Flexibility	Weight	Stability	Maturity
Thin film	Medium	High	Rigid	Heavy	High	Medium stage
Crystalline silicon	Medium	High	Rigid	Heavy	High	Late stage
Amorphous silicon	Low	Medium	Moderate	Heavy	High	Late stage
Graetzel cells	Medium	Low	Rigid	Moderate	Low	Medium stage
Nanocomposite Photovoltaics	High	Low	Highly flexible	Light	High	Early stage

A comparison of the different types of photovoltaic materials that have been developed in recent years shows the advantages offered by nanocomposites.

than 1/1,000th the diameter of a single human hair and can be seen only with the aid of a very high-powered microscope. By the late 1980s, three significant pieces of research equipment had been developed that enabled widespread nanoscience research: the scanning tunneling microscope, the atomic force microscope, and the near-field microscope.

In 1991, Japanese scientist Dr. Sumio Iijima discovered carbon nanotubes. The properties displayed by carbon nanotubes were most unexpected. Their strength was 30 to 100 times greater than steel (depending on the purity of the tubes), and they were excellent conductors of electricity.

Continued research into materials designed and manufactured at the nanoscale (essentially at the atomic and molecular level) has uncovered novel properties in strength, conductivity, and porosity. The same materials manufactured with conventional methods do not exhibit these properties. The ability to see and manipulate structure at the atomic scale was enhanced significantly with the discovery and introduction of a new scientific instrument called an “atom tracker,” which allows observation of an atom in motion.

Parallel to this nanoscale atomic and molecular research and development has been scientific research of light and its photons. [Photons are massless elementary particles that are the carriers of radiant energy.] Scientists discovered that photons, like electrons, could be used to transmit and receive messages. Photons, a source of energy, could be captured in materials. Nanostructure, in the form of nanorods, could be manipulated to increase this capture of energy by several orders of magnitude. [Nanorods are formed from multiwall nanotubes.]

The result was nanocomposite photovoltaic material, or solar panels, which had practical application as a source of energy for powering electrical devices. RAMP research exploited these discoveries as scientists gained greater insights into the properties of nanoscale materials and light.

National Policy

Our Nation’s commitment to research and development at the nanoscale is codified in both the 21st Century Nanotechnology Research and Development Act and the National Nanotechnology Initiative (NNI). Supporting this legislation and the NNI are the National Science and Technology Council’s Committee on Technology; the Interagency Working Group on NanoScience, Engineering and Technology; and a comprehensive network of laboratories and research centers across the country. The principal Department of Defense participants in the NNI are the Directorate for Defense Research and Engineering at the Office of the Secretary of Defense level, the Defense Advanced Research Projects Agency, and the Air Force, Army, and Navy.

Energy Applications From RAMP

Technologies resulting from RAMP research include superconducting materials that can be incorporated into batteries to increase their useful energy significantly and thus extend their life; alpha emitter batteries that can provide required energy output for years instead of hours or days; and antimatter that has the potential to deliver all the energy required to move, shoot, and communicate for the life of a combat system. Each of these RAMP technology applications in energy would reduce dramatically the frequency of resupply currently required of logisticians or, in the

case of antimatter, virtually eliminate the need for energy resupply.

Similarly, alternative energy sources such as biomass (vegetation), photovoltaics, and hydrogen have gained viability as applications as a result of RAMP research. These energy sources could reduce the supply chain from thousands of miles to hundreds of miles and, in the case of photovoltaics, provide a renewable energy source at the point of consumption, thus eliminating entirely both the energy supply chain and distribution process.

Energy density, or the amount of usable energy in a given quantity of fuel, is one critical issue in reducing the demand for energy resupply on the battlefield. Alternative sources of energy are critical to shortening, or in some cases eliminating, the supply chain and distribution distances needed to replenish energy on the battlefield. Products developed as a result of RAMP research offer a means of achieving greater energy densities as well as viable alternative energy sources.

Batteries

One needs only to look to the ever-present cell phone to find an increase in usable energy that is the result of nanoscale research and development. The batteries in 60 percent of all cell phones contain carbon nanotubes. These carbon fibers are superconductors of electrical current. The resulting reduction in electrical resistance and the energy needed to overcome resistance make more energy available to power the phone. In everyday terms, the charge in the batteries containing carbon nanotubes lasts longer. Armed with this knowledge, logisticians should ensure that future batteries include this technology, thus driving down the frequency of battery resupply or recharging. This practical application of RAMP research can be implemented today through changes in acquisition policy.

Alpha emitter batteries contain exponentially greater energy than the current state-of-the-art lithium-ion batteries. [An alpha emitter battery uses a very small, nonharmful amount of radioactive material as a power source.] While lithium-ion batteries may last for hours, or at best days, alpha emitters last for years. Logisticians have to resupply literally tons of batteries per day to a brigade-sized unit. Alpha emitter batteries offer the prospect of reducing, if not eliminating, much of the battery resupply or recharging required today. Implementing this supply chain and distribution solution will require making changes in acquisition policies and answering users' questions about working with very small nuclear devices. One way to overcome negative stereotyping of small nuclear devices is to point out the similarity between alpha emitter batteries and the alpha emitters found in the smoke detectors and alarms in our homes.



One button of antimatter contains 123 times the energy generated by the Space Shuttle at liftoff.

Antimatter

In the *Star Trek* television series and movies, antimatter was the energy source the *Starship Enterprise* used to power its warp drive. While *Star Trek* was science fiction, antimatter is science fact. [Antimatter is matter with its electrical charge reversed. Instead of protons, it has antiprotons; instead of electrons, it has positrons.] For many years, leading university research centers at Harvard, Penn State, and other colleges and universities have produced and experimented with antimatter. Antimatter, as an energy source, has such great energy density that one button-sized portion has 123 times more energy than the space shuttle has at liftoff.

Such extreme energy density has far-reaching implications for logisticians and for energy resupply on the battlefield of the future. For example, a combat vehicle commander could be issued a cigar box-sized container filled with buttons of antimatter that would provide 30 to 40 years of energy to move, shoot (with high-energy weapons), and communicate. This capability would virtually eliminate the requirement for energy resupply of combat vehicles in the future.

Scientists have discovered how to levitate antimatter in an electromagnetic field. The practical capture of the energy released from antimatter, in such a way that the energy could be metered out in usable increments, requires further exploration in the laboratory. One day, this dense energy source will make its debut on the battlefield. The tremendous benefits to resupply of energy will be well worth the time and investment.

Alternative Sources of Energy

Biomass. Scientists working at the molecular level have discovered a protein in the spinach leaf that naturally harvests energy from biomass. This discovery offers logisticians an alternative to the long supply lines associated with hydrocarbon (petroleum) energy sources. The tropical areas of the world are rich in land-based biomass, while many arid areas are adjacent to or near the world's oceans, where huge sources of sea-based biomass are present in the form of sea kelp and other vegetation. In fact, 40 percent of all the Earth's biomass is in the oceans. Being able to harvest

the energy from nearby biomasses would vastly shorten the energy supply chain while simultaneously reducing dependency on hydrocarbon-based fuels.

Photovoltaics. The ability to see and manipulate materials at the molecular and atomic levels has allowed the design of new photovoltaic (solar cell) materials. These materials can capture and store greater magnitudes of solar energy (in other words, photons from light). This is achieved by aligning the photovoltaic material's nanorods, thus providing a clearer path for photons to enter the material and be captured and stored as electrical energy. Disordered (unaligned) nanorods require several low-mobility hops for a photon to span the active layer, which reduces overall mobility. Controlling the orientation or shape of nanorods eliminates the need for hopping and thus increases captured energy (photons). The next generation of photovoltaic materials will be capable of producing energy in quantities sufficient to power climate-control equipment for pre-positioned supplies and equipment, embedded prognostics, and autonomous communications equipment without the requirement to refuel generator engines or replace batteries.

Hydrogen. Hydrocarbon-based fuels cannot be used forever because they are a nonrenewable, finite resource. Hydrogen is becoming an increasingly attractive alternative. Heavily funded, worldwide research, development, and prototyping of systems that use hydrogen as an alternative energy source are taking place.

Hydrogen is a colorless, odorless gas that accounts for 75 percent of the entire mass of the universe. On the Earth, it is found only in combination with other elements, such as oxygen, carbon, and nitrogen. Hydrogen must be separated from these other elements before it can be used. One of the key advantages of hydrogen as an energy carrier, which helps to make it

more than economically competitive with hydrocarbon fuels, is the large number of options for its production and delivery. Most of the world's automotive companies have developed prototype vehicles, ranging from small subcompacts to high-performance sports cars, pickup trucks, and delivery trucks, that run on hydrogen using either a hydrogen internal combustion engine (H₂ICE) or a hydrogen fuel cell.

Hydrogen energy could greatly reduce the distances in the energy resupply chain because it could be produced at or near the point of consumption—a very attractive alternative for Army and joint logisticians. The byproducts of hydrogen-powered fuel cells are heat and potable water (another consumable of great interest to Army and joint logisticians). Hydrogen-powered vehicles provide logisticians with an evolutionary means to gain independence from hydrocarbon-based fuels, increase vehicle drive-train reliability, increase vehicle energy efficiency, and reduce life-cycle operations and sustainment costs.

RAMP research clearly holds significant promise for resolving the complex challenges associated with energy resupply on future battlefields. As follow-on *Army Logistician* articles will show, RAMP research activities in the fields of materials science and communications also hold great promise for producing newly derived technologies that logisticians can use.

ALOG

ROBERT E. GARRISON IS A LOGISTICS MANAGEMENT SPECIALIST WITH THE ARMY LOGISTICS TRANSFORMATION AGENCY, FUTURE LOGISTICS DIVISION, SCIENCE AND TECHNOLOGY TEAM, AT FORT BELVOIR, VIRGINIA. A RECENTLY RETIRED CHIEF WARRANT OFFICER (W-5) WITH OVER 32 YEARS OF ACTIVE SERVICE IN THE ARMY, HE HAS AN ASSOCIATE'S DEGREE IN GENERAL STUDIES FROM THE UNIVERSITY OF MARYLAND, A BACHELOR'S DEGREE IN VOCATIONAL EDUCATION FROM SOUTHERN ILLINOIS UNIVERSITY, AND A MASTER'S DEGREE IN GENERAL ADMINISTRATION FROM CENTRAL MICHIGAN UNIVERSITY.

DAVID E. SCHARETT IS A SENIOR RESEARCH SCIENTIST WITH THE PACIFIC NORTHWEST NATIONAL LABORATORY ON ASSIGNMENT FROM THE DEPARTMENT OF ENERGY TO THE ARMY LOGISTICS TRANSFORMATION AGENCY AT FORT BELVOIR, VIRGINIA. A COMMAND PILOT WITH EXPERIENCE IN BOTH FIXED- AND ROTARY-WING AIRCRAFT, HE HAS OVER 37 YEARS OF GOVERNMENT SERVICE. HE HAS A BACHELOR'S DEGREE IN ENGINEERING FROM VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY AND A MASTER'S DEGREE FROM GOLDEN GATE UNIVERSITY AND IS A GRADUATE OF THE AIR WAR COLLEGE.



The potential of photovoltaics in transportation was demonstrated by the Helios prototype airplane, which used solar panels to power its electric motors. It was developed by AeroVironment, Inc., of Monrovia, California, for the National Aeronautics and Space Administration.

MTS: A Success Story for Battlefield Logisticians

BY CAPTAIN HEATHER E. WEIGNER AND JOHN E. LAUDAN

The Movement Tracking System (MTS) is a critical battlefield enabler for combat support and combat service support (CSS) soldiers. MTS is bridging communication gaps that have existed for years within the CSS community. It is making up for the low number of frequency modulation (FM) radios in CSS units and overcoming the limitations of FM radio line-of-site communications caused by long range or mountainous terrain.

MTS is a commercial off-the-shelf product that has been “semiruggedized” to provide vehicle operators and their leaders with digital National Geospatial-Intelligence Agency maps, global positioning system (GPS) location data, and L-band (long band) satellite two-way text messaging. MTS computer systems come

in two configurations: a mobile system that can be mounted in any tactical wheeled vehicle and a laptop control station for use at platoon, company, battalion, or brigade headquarters. The system enables soldiers to see the position of, and communicate with, other MTS-enabled vehicles and control stations. Leaders can pass critical information, route and mission changes, and other information to their soldiers while the soldiers are on the road conducting missions.

A Proven Success

MTS proved its worth early in its initial fielding to the 4th Infantry Division (Mechanized) and 1st Cavalry Division in 2001. At the March 2001 Division Capstone Exercise-1 conducted at the National Training Center



MTS is installed on two M915 truck tractors at Camp Arifjan, Kuwait.

(NTC) at Fort Irwin, California, MTS was used to request medical evacuation of a soldier injured in a vehicle accident in the training area. FM radios in several vehicles at the scene could not be used to contact anyone because they were out of range. However, one vehicle had MTS capability, which enabled the unit to call in a medical evacuation request. In a similar incident during another division capstone exercise at the NTC the following November, personnel used MTS messaging to communicate with medics, who instructed them on how to conduct medical triage and provide stabilizing medical care to the victim until medical personnel arrived.

In countless other MTS success stories during Operation Iraqi Freedom (OIF), lives have been saved on the battlefield. OIF greatly increased the need for MTS. MTS has become a critical link in controlling and monitoring logistics convoys in Iraq; it has been used in ways that are beyond the doctrinal concept for its employment.

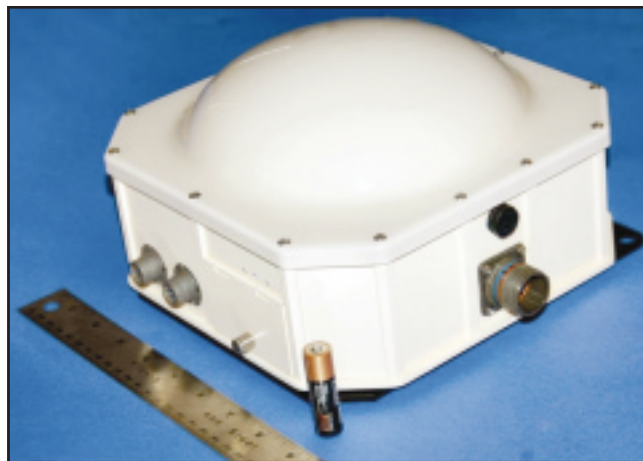
The success of MTS's on-the-move satellite communication capability has had a dramatic and sweeping effect on the combat arms and joint communities. The Project Manager, Force XXI Battle Command Brigade and Below (PM FBCB2), saw the potential for the use of this mobile satellite communications system with FBCB2. Faced with the limitations of line-of-site radio systems and interruptions in command and control communications, he saw the need to incorporate over-the-horizon satellite communications. The PM FBCB2 successfully integrated the L-band satellite technology used by MTS into the FBCB2 suite of equipment to establish the Army's Blue Force Tracking program. Blue Force Tracking and MTS systems allowed Army and Marine Corps units to communicate over vast distances and provide critical command and control during the movement of forces from Kuwait into Iraq.

MTS+

MTS was fielded initially with commercial off-the-shelf hardware and proprietary software. When the program was conceived over 5 years ago, the long-term vision for it included a strategy for preplanned product improvements. Based on increased usage and lessons learned by soldiers during OIF, that preplanned product improvement strategy evolved into a focus on specific changes and improvements to be implemented in MTS by June 2005.

The Phase I significant enhancements to MTS resulted in MTS+, which has successfully passed developmental, technical, and user testing. MTS+ fielding began in June.

MTS+ contains an embedded military GPS card and an embedded radio frequency identification (RFID) interrogator within the new L-band satellite transceiver,



An MT-2012 transceiver with embedded GPS and RFID interrogator takes up less than a square foot of space on top of a vehicle.

model MT-2012. The embedded GPS card in the MT-2012 transceiver improves the system's antijamming characteristics and eliminates the need for a separate, external GPS device (currently the Army's precision lightweight GPS receiver).

The embedded RFID interrogator is the enhancement of most significance to logisticians. The interrogator can read active RF tags placed on cargo or containers loaded onto the back of a vehicle. Active RF tag data are transmitted through the MTS server to MTS control stations and fed to the RF in-transit visibility server. Other control stations can track cargo as it moves across the battlefield, and commanders can redirect shipments on the move as the mission dictates. This capability will revolutionize asset management by providing positive cargo tracking and control and asset visibility to the final destination.

Another Phase I enhancement is a new and more rugged mobile touch-screen computer with version 5.15 MTS software, which incorporates a "911" panic button capability. The 911 panic button feature allows a vehicle operator in distress to push one button on MTS and send a message to all MTS systems that the vehicle is in an emergency situation. The message also provides responders with the vehicle's bumper number and location.

The new computer is more rugged to withstand extremely hot and harsh environments like that in the OIF area of operations. It also is easier for soldiers to use while riding in a moving vehicle. This feature will provide soldiers a more reliable and user-friendly system.

MTS-II

Phase II, known as MTS-II, should be ready for fielding by February 2006. MTS-II will have an



Soldiers receive instruction on the operation of the Movement Tracking System at Camp Arifjan.

more flexible and user-friendly loading and updating of maps. It will better support the ability to display different types of maps. MTS-II also will automatically update the current vehicle location indicator on the map as the vehicle moves and show points of interest, such as checkpoints, automatic information technology chokepoints, obstacles, improvised explosive device locations, and contaminated areas. Proximity notifications will alert the vehicle and control station of predetermined “trigger” conditions.

The MTS-II interface priority will be to implement a two-way position feed with Blue Force Tracking.

enhanced software package that increases the operational capability of the system’s communications, messaging, and mapping functions and interfaces with other key Army systems. To provide more flexibility to users and meet the demands of military standing operating procedures, MTS-II software will increase free text message length beyond the current 100-character capability and include preformatted messages. The preformatted messages that will be added include common military applications, forms, and reports, such as operation orders; logistics situation reports; maintenance support requests; medical evacuation requests; accident reports; mission-delay reports; repair parts requests; vehicle diagnostic problem reports; and dispatch requests.

The MTS-II software enhancements will provide a more flexible messaging capability and allow better command and control over changing missions. These enhancements will include improved email functions such as instant messaging, email prioritization, and email forwarding; more flexible communication functions such as personalized distribution lists; and the capability to provide vehicle dispatching, location tracking, shipment priority, and task list status.

MTS-II mapping function enhancements will include the use of common military symbols and

The future holds some critical and exciting improvements for the Army’s standard MTS. These improvements will empower CSS soldiers on the battlefield in new ways. CSS soldiers will have a highly useful navigation and communication system that also will enable leaders to track cargo on the battlefield.

ALOG

CAPTAIN HEATHER E. WEIGNER IS THE MOVEMENT TRACKING SYSTEM REQUIREMENTS OFFICER AND USER REPRESENTATIVE FOR THE DIRECTORATE OF COMBAT DEVELOPMENTS FOR TRANSPORTATION AT THE ARMY COMBINED ARMS SUPPORT COMMAND AT FORT LEE, VIRGINIA. SHE HAS A B.S. DEGREE IN BIOLOGY FROM ST. BONAVENTURE UNIVERSITY IN NEW YORK. SHE IS A GRADUATE OF THE AVIATION OFFICER BASIC COURSE, THE COMBINED LOGISTICS OFFICERS ADVANCED COURSE, THE COMBINED ARMS AND SERVICES STAFF SCHOOL, AND THE ARMY ACQUISITION OFFICER BASIC COURSE.

JOHN E. LAUDAN IS A SYSTEMS ACQUISITION SPECIALIST IN THE OFFICE OF THE ASSISTANT PRODUCT MANAGER, AUTOMATED LOGISTICS AND INTEGRATED SYSTEMS, AT FORT LEE, VIRGINIA. HE SERVED AS THE PREPLANNED PRODUCT IMPROVEMENTS MANAGER FOR THE PRODUCT MANAGER, MOVEMENT TRACKING SYSTEM, FROM JUNE 2000 TO JANUARY 2005. HE HOLDS A B.A. DEGREE IN HISTORY FROM CANISIUS COLLEGE IN NEW YORK AND AN M.S. DEGREE IN ADMINISTRATION FROM CENTRAL MICHIGAN UNIVERSITY.

Tracking Materiel From Warehouse to Warfighter

BY LIEUTENANT COLONEL JOSEPH P. GRANATA, USMC

New tracking technology enables Marine Corps logisticians to tackle “the last tactical mile.”



A marine uses a mobile reader to scan an active RFID tag attached to a shipment of supplies bound for Iraq. Tracking begins when the shipment leaves the Supply Management Unit at Camp Pendleton, California.

After-action reports of Operation Iraqi Freedom (OIF) issued early in 2003 heralded the success of radio frequency identification (RFID) systems and networks that profoundly enhanced the ability to track in-transit materiel from the continental United States (CONUS) to the theater. According to the reports, the military, especially the Army, benefited from greater visibility of materiel, reduced inventory, and increased speed in locating critical supplies.

However, those reports and OIF operational experience also showed that, once RFID-tagged shipments were broken down at in-theater ports and airfields for forward movement to the warfighter,

accountability for the items in them was soon lost. The truth is that, during both the buildup and execution of OIF, the military did not track supplies to the tip of the spear. The result was the loss of equipment, gear, and other supplies and a lot of reordering. Some units, including Marine Corps units, were not using RFID, which further exacerbated logistics problems.

In the end, Marine Corps logisticians were humbled and embarrassed by some of the “nuts and bolts” logistics problems they encountered. Because of these problems, marines often did not have what they needed. They squandered a great deal of time and treasure

worrying about logistics management problems whose solutions were potentially at their fingertips.

Finding Solutions

My unit, the Marine Corps' Supply Management Unit at Camp Pendleton, California, is the primary supply support unit for the I Marine Expeditionary Force. When we returned from our OIF tour, we understood the imperative to make changes to our supply process—and quickly. We recognized, at least at some level, the role that RFID potentially could play in fundamentally changing the way Marine Corps combat service support groups serve the end users in the foxhole.

We did not waste any time. We knew that tracking materiel to ports or airstrips and then losing it would do little to transform our processes. While we were late in getting into the RFID game, we sought to make up ground quickly by focusing on the so-called “last tactical mile” shortfall still so evident at the far end of the delivery chain. We sought to extend the near-real-time, in-transit visibility (ITV) of the logistics supply chain that we enjoyed at the strategic level down to the tactical level and, in fact, all the way to our final consignees—the warfighters. When the assault on Fallujah, Iraq, took place last fall, we were ready to support the warfighter with what he needed when he needed it.

When the Marine Corps redeployed to Iraq in February 2004 in what might be called “OIF II force sustainment,” we used a new RFID concept that quickly moved the Marine Corps to the forefront of emergent military logistics solutions. The concept involved the following—

- Attaching active, battery-powered RFID tags to materiel so that it could be tracked as it moved through the supply system to the consignee in theater by the lowest possible conveyance level.
- Instituting robust training of personnel before deployment from CONUS.

- Using portable deployment kits to set up checkpoints at each major camp, and eventually at the battalion level, to ensure automatic visibility of shipments throughout the retail supply chain.

Tagging to the Bin Level

To address the issue of inadequate in-depth visibility of materiel, we began comprehensive implementation of RFID tagging down to the pallet or reusable tri-wall container level and even to the bin or SKU (stockkeeping unit) level. When supplies for multiple consignees were on the same pallet, we tagged separate bins of materiel on the pallets for the individual consignees. The individual items inside the bins were bar coded, and the bar code data were uploaded to the active tags, which have a capacity of up to 128 kilobytes of data. During the conflict in Fallujah, we were able to track materiel in near-real-time all the way to the edge of the city.

In contrast to the Army's practices, the Marine Corps tags materiel even if we know it will be passing through areas that do not have interrogators. We do this as a matter of policy to institutionalize the proliferation of interrogators in the future so we will be able to tie the data feeds into existing inventory management reports and systems. Tagging materiel so it can be tracked wherever interrogators are available helps us to keep our supplies where they belong and know “what we have where” with a business-like efficiency.

Training As We Fight

The Marine Corps philosophy of “train as you fight” was central to finding a solution to our logistics challenge. In just a few weeks, we implemented a unit-level training program to ensure that new personnel in the unit were competent users of RFID technology. We believe that training personnel to use RFID technology during support operations in the United States helps to promote its use routinely in all operations rather than only during deployments. Currently, this approach to institutionalizing RFID is unique to the Marine Corps. The approach is so successful that the Corps is now providing assistance and training support to deployed Army supply support activities.

At the Supply Management Unit, collapsible plastic containers are stuffed with supplies. Active RFID tags are affixed to the containers and to the packages and cartons inside them.



In-Theater ITV

Commercial off-the-shelf technology was pivotal to expediting RFID system implementation. Working closely with the Installations and Logistics Department at Headquarters, U.S. Marine Corps, we identified hardware and software early in the process that would help us meet our required nodal visibility objectives.

Within months, we were able to deploy compact, lightweight early-entry deployment support kits and mobile readers in the field along key nodes all the way to the Syrian border. These new mobile RFID stations provided in-theater ITV that showed current events at the container, pallet, and bin levels.

We also extracted “last known location” data from the ITV server and used it to create shipment status information that was posted to the units’ standard supply management reports. This provided an audit trail of shipments as they passed through locations in the distribution pipeline (for example, the containerization and consolidation points at New Cumberland, Pennsylvania; Charleston, South Carolina; and Al Taqaddum, Balad, and Fallujah, Iraq).

Today in Iraq, through the use of a custom interface between the Automated Manifest System-Tactical (for which the Army and the Marine Corps share responsibility) and the Marine Corps supply system, RFID automation allows seamless collection of source data for outbound shipments of reusable tri-wall containers and pallets to marines in the field. With the implementation of the new tracking systems, Marine Corps logisticians are able to use the Joint Deployment and Logistics Model (JDLM), which is also used by the Army, to track shipments as they move forward.

Marines love being “in the know” and never plan to go back to the “good old days.” The new tracking capability enables better planning, reduces unnecessary backup orders, and, most importantly, instills greater confidence in logisticians and warfighters alike.

The Payoff: A Shift in the Logistics Paradigm

Today, our new tracking capability provides us with cradle-to-grave status of supplies with unprecedented accuracy and resolution. We have tagged hundreds of containers and thousands of pallets holding tens of thousands of supply items and experienced better than 90-percent read rates in hostile environments throughout the supply chain.

The new RFID process has enhanced the precision and flexibility of our supply operations, and we have gained the ability to locate or redirect “misroutes” as soon as they happen. We can prioritize shipments like



Marines set up an early-entry deployment support kit at Camp Al Taqaddum, Iraq.

never before; for example, critical repair parts for tanks are shipped ahead of pens and paper.

As a result of these improvements, we have reduced our overall shipments while pushing materiel to the end user more quickly. Supply personnel know what they have ordered, where it is, and when they can expect to receive it. Allowing logisticians to see progress with their own eyes has increased their confidence in the supply system. As a result, “just in-case” ordering has decreased substantially.

The Marine Corps has a long way to go to exploit the maximum potential of RFID technology to enhance supply support operations. Our experiences in supplying the 1st Marine Division, I Marine Expeditionary Force, for the offensive on Fallujah demonstrated that our forward-leaning approach is battle forged and that the payoffs are real.

ALOG

LIEUTENANT COLONEL JOSEPH P. GRANATA, USMC, IS THE COMMANDER OF THE 1ST MAINTENANCE BATTALION, 1ST FORCE SERVICE SUPPORT GROUP, AT CAMP PENDLETON, CALIFORNIA. HE HAS A BACHELOR'S DEGREE FROM THE STATE UNIVERSITY OF NEW YORK AT FREDONIA. HE IS A GRADUATE OF THE GROUND SUPPLY OFFICER COURSE, THE AMPHIBIOUS WARFARE SCHOOL, THE LOGISTICS OFFICER COURSE, THE ADVANCED LOGISTICS OFFICER COURSE, AND THE MARINE CORPS COMMAND AND STAFF COLLEGE.

1st Infantry Division Movement Control Operations in Iraq

BY CAPTAIN HENRY C. BROWN

During Operation Iraqi Freedom II, thousands of vehicles traveled over the dangerous roads of Iraq daily to transport supplies to more than 20,000 soldiers at 28 forward operating bases (FOBs). These FOBs were geographically dispersed over an area of 146,000 square kilometers in the 1st Infantry Division (Mechanized) area of operations (AO). The 1st Infantry Division movement control cell planned and synchronized the movement of thousands of vehicles in one of Iraq's largest division sectors, escorted commercial trucks to FOBs, and gained in-transit visibility of all moving vehicles in its effort to provide efficient transportation. Meticulous planning, the use of automated systems, and the development of effective techniques and procedures resulted in the timely delivery of critical supplies and equipment to the division.

Movement Control Cell Structure

The 1st Infantry Division's movement control cell was located at the division rear command post and was made up of well-trained, experienced soldiers from the division support command (DISCOM) movement control office (MCO) and the G-4 division transportation office (DTO). These soldiers planned and synchronized the daily transport of commodities to their final destinations. They also worked closely with the division rear G-3 and G-2 to adjust missions when they received fragmentary orders and intelligence information that affected movements.

Although the DISCOM support operations office (SPO) was not located with the movement control cell, it oversaw MCO operations and worked directly with MCO personnel to coordinate requirements and sustainment combat logistics patrols (CLPs). [The term "combat logistics patrol" (CLP—pronounced "clip") was used by the 1st Infantry Division to represent all logistics convoys because all convoys on Iraq's nonlinear battlefield of necessity are combat patrols. CLPs are susceptible to attack by improvised explosive devices, small arms fire, and complex ambushes every time they leave their operating bases. Instilling the combat soldier mentality into soldiers conducting logistics movements is the key to survival in the dangerous Iraqi environment.]

The DTO developed and executed highway regulation plans, policies, procedures, and programs and provided route analysis and main and alternate supply

route status within the division AO. DTO personnel advised and provided technical assistance to division commanders and staff. They also assisted in daily MCO operations by tracking, monitoring, and processing movement requests.

The MCO coordinated transportation support and had tasking authority over the transportation assets of the main support battalion's transportation motor transport (TMT) company. MCO analyzed customer transportation requests and balanced them against the TMT company's capabilities. To do this, the MCO had to be aware of the company's maintenance status and mission load. If the company did not have the assets available to conduct a mission, the MCO coordinated with the area movement control team (MCT) to obtain transportation assets from the corps support group (CSG). The MCO linked planners and tactical commanders with the transportation operators, and it monitored all transportation assets in the division AO until each transportation mission was complete.

Movement Planning

On any given day, over a thousand vehicles, managed by several different units, transported essential materiel within the 1st Infantry Division's AO. Concise planning and scheduling were needed to manage

A gun truck conducts overwatch during a convoy.



CLP Tracker

HIGHER HQ	MOVER UNIT	CALL SIGN	CLP #	SPT UNIT	CARGO	ORIGIN	DROP OFF POINT	SP	ARR	DEP	MC	VEH
FRI					24 MAY							
835 CSB	24th TC	Gallo 5	1	1 ID	CL IX	FOB A	FOB B	0030	0230	0500	0730	21
835 CSB	44th TC	Clarence 6	2	2 BCT	BARRIERS	FOB A	FOB F	TBD				
172 CSG	114 TC	Keaton 48	3	3 BCT	CLIII(B) IX	FOB C	FOB D	0430	0530	1030	1130	17
225 FSB	223 TC	Charley F.	4	2-25 IN	ACA PROGRAM	FOB C	FOB A	1000	1420	N/A	1420	16
232 CSB	524 TC	Shabazz 26	5	2-25 IN	CL III(B)	FOB D	FOB A	0900	1200	1500	1800	
232 CSB	616 TC	Zeta	6	STRYKER	CL IX	FOB E	FOB C	0001	0600	N/A	0600	15
44 CSB	414 TC	Joe M.	7	TCN ESCORT	CL I, IV, IX	FOB F	FOB H	1700	2100	0000	0400	

movement control operations and expedite the delivery of critical items.

Transportation movement control meetings were held daily to coordinate commercial truck escorts, transportation movement requests (TMRs), and sustainment CLPs. Representatives from the MCO, CSG, MCT, DISCOM SPO, main support battalion, aviation support battalion, forward support battalions, Halliburton Kellogg Brown & Root (KBR), and PWC Logistics (a commercial provider of warehouse facilities and transportation services) attended each meeting. These meetings were important because they brought all of the movement planners to one place to discuss and plan future movement operations. During the meetings, representatives scheduled all CLPs 96 hours out. The attendees reviewed all open TMRs and discussed when they would be executed. They also discussed how to execute pending missions efficiently with available transportation assets.

A TMR was used to request movement of a vehicle or equipment from one destination to another. The unit had to submit the request through its brigade S-4 or forward support battalion SPO to the MCO 72 hours before the requested movement date so that the transporting units would have enough time to plan and schedule their missions. The TMR also gave the brigade combat teams (BCTs) a projection of what transportation assets would be driven through their AOs so that they could schedule route reconnaissance and route clearance patrols to make travel through the area safer.

After receiving the TMR, the MCO reviewed and validated the request and identified the TMT assets needed to fulfill the mission. If the assets were available, the MCO verified the movement timeline with a company representative and tasked the company to complete the mission. If the TMT company could not provide the needed assets, the request was sent to the MCT, which checked with the CSG to see if the corps could provide them. If the CSG had assets available, it would be tasked to complete the mission; if not, the request was submitted to the corps movement control battalion, which tasked other units from the corps support command. If a TMR was received that had to be executed in less than 72 hours, the process remained

the same; however, after transportation assets had been tasked to complete the mission, the movement had to be approved by a colonel or higher ranking officer.

CLP Tracker

Once coordination and planning were completed in the daily movement control meeting, information from daily TMRs, sustainment CLPs, and the corps CLP tracker or in-transit visibility tracker was compiled to produce a daily CLP tracker—a spreadsheet that tracked CLP assignments. (See chart above.) The CLP tracker was not a tool found in any field manual, but it was very important because it provided visibility on all moving assets in the division sector. This document synchronized movement times and gave BCTs knowledge of CLPs traveling through their sectors.

The CLP tracker displayed names of the transporting units and their higher headquarters, call signs, supported units, cargo, origins and destinations of cargo, and departure and arrival times. Every day, the MCO submitted the CLP tracker to the division rear battle captain, who forwarded it to the division main battle captain for enclosure in the 1st Infantry Division Daily Tactical Update, the division's daily fragmentary order. The CLP tracker also was briefed daily to the assistant division commander (support) and the DISCOM commander.

Contracted Deliveries

KBR and PWC Logistics are contractors that provide civilian trucks to transport commodities from Kuwait and Turkey to Iraq—a difficult task. Three factors that initially impeded the delivery of commodities were insufficient escorts, poor in-transit visibility, and frustrated vehicles. Hundreds of trucks would arrive in the 1st Infantry Division AO every day, and it was very difficult to provide escorts for all of them because there were many more civilian trucks than gun trucks to provide security.

It was difficult to track the number of vehicles and the commodities that were in transit. In some cases, the division did not know what the commodities were or their final destination until the trucks arrived at the DISCOM.

When trucks were delayed, they often arrived at the DISCOM in large numbers, piled up, and became



A 701st Main Support Battalion convoy returns from a mission after reaching 1 million miles on the roads of Iraq without suffering casualties.

frustrated. Perishables such as fresh fruits and vegetables could spoil when trucks were delayed in reaching their destinations.

The MCO overcame these problems by incorporating the contracted trucks into the main support battalion and CSG sustainment CLPs. At the MCO meeting each day, KBR and PWC Logistics representatives provided the MCO with the number of arriving trucks and their final destinations. The MCO prioritized these trucks and tasked units to escort them to the FOBs.

Movement Tracking

The movement control cell used sophisticated equipment and manual systems to track all vehicles supporting the 1st Infantry Division. Automated systems used to maintain in-transit visibility of the vehicles included the Defense Transportation Reporting and Control System (DTRACS), Movement Tracking System (MTS), Joint Deployment Logistics Module (JDLM), and Blue Force Tracker (BFT). DTRACS and MTS are satellite tracking systems that are installed in vehicles. Either system can be used to send and receive text messages to provide important tracking information to the JDLM, which provides visibility of vehicles using DTRACS and MTS. The BFT is a satellite tracking system installed in vehicles to give vehicle commanders real-time imagery of other vehicles on a screen. It also provides base stations and vehicle commanders the ability to send text messages. Together, these systems served as commanders' eyes and ears throughout the division, providing continuous visibility of all assets.

Sometimes the computer systems lost power or broke down. In those cases, FM radio transmissions and

phone calls to MCTs and brigades were used to gain visibility. FM radio range was limited, so the convoy commanders had a list of the frequencies of units in each brigade sector. When a CLP needed to pass information to the MCO, the convoy commander called the brigade in that sector and had it relay the information to the MCO.

When a convoy departed an installation, the convoy commander provided the MCT with a trip ticket—a document that indicated the number of vehicles and personnel

in the convoy, sensitive items that the convoy was transporting, and the convoy destination. The MCT used trip tickets to track all departure and arrival times of CLPs. Once a convoy arrived at another installation, the convoy commander provided the trip ticket to the receiving MCT, which recorded the document to validate the arrival of the CLP.

In the fast-paced, high-stress environment of Operation Iraqi Freedom II, soldiers of the 1st Infantry Division helped provide stability and security to millions of people in Iraq. Detailed planning and tools such as TMRs and CLP trackers provided fast, reliable transportation as far forward as possible. Manual tracking systems and automated systems, such as JDLM, DTRACS, MTS, and BFT, provided commanders situational awareness at all times so that they could make sound decisions that kept forces ready to fight.

On the rapidly changing battlefield, the movement control cell improved response times and transportation asset flexibility daily. With meticulous planning and sophisticated equipment, the movement control cell provided uninterrupted movement of personnel, supplies, and services to U.S. soldiers in Iraq. The movement control cell and the soldiers who executed the transportation missions gave the division the ability to move logistics assets effectively and gave field commanders the ability to mass combat power in the right place at the right time.

ALOG

CAPTAIN HENRY C. BROWN IS THE SUPPLY AND SERVICE OFFICER FOR THE 701ST MAIN SUPPORT BATTALION, 1ST INFANTRY DIVISION (MECHANIZED), IN GERMANY. HE WAS THE DEPUTY SUPPORT OPERATIONS OFFICER FOR HEADQUARTERS AND HEADQUARTERS COMPANY, DIVISION SUPPORT COMMAND, 1ST INFANTRY DIVISION, DURING OPERATION IRAQI FREEDOM II. HE HAS A B.S. DEGREE IN GEOGRAPHY FROM NEW MEXICO STATE UNIVERSITY AND IS A GRADUATE OF THE FIELD ARTILLERY OFFICER BASIC COURSE, THE COMBINED LOGISTICS CAPTAINS CAREER COURSE, AND THE COMBINED ARMS AND SERVICES STAFF SCHOOL.



Combat Service Support in Baghdad

BY CAPTAIN KEVIN M. BAIRD

A forward support company supporting an armor battalion task force in Iraq had to innovate to execute its mission in a challenging urban environment.

Providing combat service support (CSS) for a battalion-sized task force operating as part of Operation Iraqi Freedom requires adaptations and innovations to help ensure mission success. Task Force 2-8 Cavalry (TF 2-8 CAV)—the 2d Battalion, 8th Cavalry Regiment, 1st Brigade, 1st Cavalry Division—learned this truth during 12 months of operations in eastern Baghdad.

TF 2-8 CAV consisted of one tank company with tanks and two tank companies mounted on high-mobility, multipurpose, wheeled vehicles (HMMWVs). Approximately 10 months before its deployment to Iraq, the task force transitioned to the Force XXI redesign with the addition of a forward support company (FSC)—B Company, 115th Forward Support Battalion, 1st Cavalry Division. Confronted with the unique and multifaceted missions and the challenging environment of Iraqi Freedom, the task force and FSC leaders recognized that many plans for CSS operations would have to be revised. Accordingly, the FSC developed a mix of garrison and field techniques to effectively manage maintenance and other logistics functions. What follows are the highlights of the FSC's support of TF 2-8 CAV in Baghdad.

Maintenance Operations

Because the task force's location was static, with all of its companies operating out of a combined motor pool, the maintenance assets of the task force were retained under the control of the FSC and the maintenance control officer. This allowed for cross-leveling of workloads and gave a single company or section additional flexibility to surge in order to meet their mission

timelines. In a normal environment, the combat repair teams in the FSC's maintenance platoon would be attached to the task force's companies. However, the conditions in Baghdad called for different techniques.

The combat repair team for each company remained intact, and its team chief was responsible for all of the vehicles within that company. Those responsibilities included services, unscheduled maintenance, and quality assurance and quality control (QA/QC) of the team's vehicles for dispatch. The maintenance and service section was responsible for maintenance of FSC and headquarters and headquarters company (HHC) vehicles, with the exception of light tracked vehicles. The recovery section was given the mission of maintaining all light tracks and performing all required fabrication. Because of the reduced number of tanks (compared to the task force's normal complement) and the limited number of recovery missions, the recovery section had the manpower and the time to take on the light tracked vehicle maintenance mission.

To support its mission requirements, the task force made the decision to dispatch vehicles for 7-day periods. Before dispatching the vehicles, the maintenance team conducted a detailed QA/QC of the vehicles and identified and corrected any faults. The most common deficiencies found were suspension and drive train faults. The heat and the poor quality of roads in Iraq, combined with the weight of added armor, put additional stress on M998-series HMMWVs and required that they be monitored closely.

Operators were still required to do daily preventive maintenance checks and services (PMCS) on their vehicles to identify emerging problems during the week

M1A2 tanks stage for refueling at a forward logistics element site near Sadr City in eastern Baghdad.



between dispatches. Vehicles also were washed weekly at the washrack available at the forward operating base (FOB). (Units deployed to Iraq should procure portable steam cleaners when a washrack is not available.) As a result of the poor sanitary conditions in Baghdad, thorough cleaning of vehicles was needed to protect soldiers from illnesses caused by exposure to raw sewage.

In addition to daily and weekly maintenance, TF 2–8 CAV implemented an aggressive and rigid service program. Beginning with its first week in Baghdad, the task force conducted services that equaled or exceeded the services performed in a garrison environment. To accomplish this, the service calendar was included in the weekly planning conducted by the task force S–3. Just like combat patrols, services were placed on the daily mission list and were executed at the platoon level. For that period of time, the platoon's sole focus was on services.

When tank services could not be conducted at the platoon level during periods of increased operating tempo, those services were shifted to the section level. This allowed combat forces to remain available for employment by the task force commander while permitting the FSC to maintain the service schedule.

The services performed included all aspects of platoon or section operations. Problems with vehicles, weapons, night-vision devices, and communications equipment, as well as personnel matters, could be resolved during the performance of services. Because of the Force XXI concept reorganization, both organizational and direct support personnel were available at all times to focus on services. Services for a HMMWV-mounted platoon were scheduled for 4 days, while a tank platoon was allocated 7 days.

In addition to normal service items, fluids were changed more frequently than under normal conditions and suspension components were checked and replaced more frequently. These two aspects of preventive maintenance seemed especially effective in avoiding more serious maintenance and repair problems and equipment downtime.

Resupply Operations

The missions assigned to TF 2–8 CAV varied significantly and required the FSC to be prepared to support the complete spectrum of operations. FSC missions ranged from preparing and forwarding the traditional logistics packages (LOGPACs) to distributing humanitarian aid to running a weapons buy-back program.

Through planning and experience, the FSC developed a number of tactics, techniques, and procedures to increase flexibility and timeliness in responding to the changing operational environment. In the

period of an hour, the task force often shifted from full-scale combat to consequence management and distribution of humanitarian assistance to Iraqis. Perhaps the most effective tool in supporting those shifts was the effective use of load-handling systems (LHSs) and flatracks.

To maintain flexibility, the FSC built preconfigured flatracks to support the most frequently performed missions. The FSC maintained the following flatracks at all times to be able to respond quickly to rapidly changing situations—

- Six flatracks of class IV materials, each with 120 rolls of concertina wire, 20 pickets, 2 Jersey barriers, and 2 rolls of barbed wire.
- Two flatracks of packaged class III (petroleum, oils, and lubricants) and class V (ammunition) for small arms.
- Two flatracks of water and meals, ready to eat (MREs).
- One flatrack of portajohns and trash containers.
- One flatrack of humanitarian daily rations.
- One flatrack with a military-owned demountable container (MILVAN) of water.

Based on the mission requirement, the FSC was able to pick up the appropriate flatracks and deliver the required support rather than configure the needed loads after the mission was received.

Resupply operations for the task force varied from providing LOGPACs to operating modified supply point distribution. Because of the smaller number of tanks in the task force and the smaller battlespace (as small as 4 square kilometers for the battalion), in many situations a single refuel point was established for the entire task force. In those cases, the fuelers usually set up on a major road that was blocked off for fueling operations. This allowed for easy defense and accessibility to the fuelers. Class V and packaged class III supplies were pushed forward at the same time to meet requests presented during the daily logistics net call. Depending on the enemy situation, refueling also could be set up at a nearby FOB to allow for 24-hour fuel availability. In such cases, MREs, water, class V, and packaged class III were made available for issue at the FOB.

For extended operations, class I (subsistence) was pushed forward to the companies so they could be fed out of their patrol bases. Typically, the meals were dropped off and the supply sergeants returned immediately to the FOB under the escort of the Supply and Transport Platoon leader; the mermite food containers then were picked up when the next meal was dropped off. This reduced the time pressure on the companies to feed their soldiers as well as the time that the supply trucks, which lacked armor, were exposed to a hostile environment.



Light tracked and wheeled vehicles undergo maintenance at the consolidated motor pool.

Convoy Operations

All units operating in Iraq faced the threat of improvised explosive devices (IEDs) and vehicle-borne IEDs (VBIEDs). To counter those threats, convoys of soft-skin vehicles must rely on two basic principles to facilitate safer movement on the roads. First, speed counters the threat of static IEDs. While safety and traffic conditions must be considered, convoys that can maintain speed are significantly more difficult for insurgents to target. Speed also reduces the likelihood that insurgents will be able to engage convoys with small arms or rocket-propelled grenades (RPGs). Second, traveling away from the edge of the road reduces the effectiveness of IEDs.

During Operation Iraqi Freedom II, multinational-force convoys were increasingly targeted by VBIEDs. Most combat arms convoys had the advantage of using fully armored vehicles, but CSS vehicles typically had only locally fabricated armor. For this reason, keeping potential threats away from convoys was all the more important.

To counter VBIED threats, vehicles had to be positioned appropriately to block access to convoys. To prevent vehicles from approaching a convoy from behind, the two trail vehicles (usually M998 HMMWVs with add-on armor and a crew-served weapon in the back) traveled abreast of each other. The gunners were oriented to the rear and sides. When vehicles approached the rear of the convoy, the gunners stood up and motioned for the vehicles to stop. As soon as the vehicles backed away, the gunners dropped back inside their vehicle in order to protect themselves from static IEDs. If the vehicles continued to approach, the gunners took appropriate measures in accordance with the rules of engagement.

The convoy's lead vehicles served to clear the route and prevent vehicles from entering from side streets,

ramps, and other approaches. As they approached intersecting streets or local vehicles waiting to enter the road, the lead vehicles moved over to block access to the main road. Once the lead vehicles passed the access point and no threats had been identified, they quickly returned to the center of the road. These techniques helped to protect convoys from attack from the rear and sides.

With these techniques in use, the biggest remaining threat was from vehicles that the convoy passed. The personnel in the lead vehicle had to remain vigilant and look for indicators of a potential VBIED. If a threat was identified, convoy personnel had to act aggressively to prevent an attack. Once a vehicle made a threatening move or refused to comply with signals from the gunners, that vehicle had to be stopped using methods that followed the rules of engagement.

An additional measure that had to be considered to counter the IED threat was route selection. While the narrowness of most streets in Baghdad served to channel most military convoys (especially those with large vehicles) into certain wider streets, careful consideration still had to be given to the routes selected for convoys. In many cases, units across the division used the same routes, thereby inadvertently establishing convoy patterns that the units may not have recognized but the insurgents would perceive. Close monitoring of division-level contact reports helped to prevent attacks by avoiding routes that habitually were targeted by insurgents.

Signs of potential VBIEDs included overloaded vehicles, covered items inside the passenger compartment, inappropriately dressed drivers (for instance, a driver wearing a winter coat in the summer in Baghdad), and erratic driving. This last sign was perhaps the most difficult to spot during operations in Baghdad. Since the fall of the Saddam Hussein regime, enforcement of

traffic laws in Iraq had become nearly nonexistent. Some of the behaviors that indicated threatening driving were excessive speed, adjusting speed to match the convoy speed, and attempting to bypass blocking vehicles.

Combat Recovery in Urban Baghdad

During uprisings by the Muqtada Militia, the task force was required to conduct numerous recovery operations deep inside the city in the midst of heavy fighting. The enemy shifted away from direct-fire engagements to the use of IEDs to fight the battalion's tanks. This tactic allowed the insurgents to attack tanks without the risk of exposing themselves.

As the task force moved through the city, the enemy often detonated IEDs near tanks in an effort to disable them. Once a tank was disabled, the insurgents in the area could rally around the immobile vehicle and attack with RPGs and small arms. Although this fire was largely ineffective against tank armor, it did provide a challenge to U.S. personnel attempting to evacuate the crew and recover the damaged vehicle.

On a traditional battlefield, a catastrophic kill likely would be left in place and retrieved following the battle, but this was not an option for TF 2-8 CAV. Because of the possible repercussions from television coverage of insurgents dancing on a U.S. tank, the task force commander put a high priority on recovering damaged vehicles as soon as possible.

To facilitate the recovery of the damaged vehicles as soon as possible, an M88 recovery vehicle was located

with the task force reserve (typically two M7 Bradley fire support team vehicles). In most cases, the task force reserve and the M88 were collocated with the battalion's tactical command post (TAC). When a vehicle was damaged, recovery became the decisive operation for the task force, with all of its efforts focused on recovering the crew and its vehicle.

As with any casualty evacuation or recovery operation, the security of the site was the first priority. Typically, a tank platoon was committed to security. In addition to suppressing any insurgents in the area, the tanks were positioned to prevent the insurgents from having a direct line of fire at the M88 crew as they connected the tank to the recovery vehicle. Once the site was secured, the M88 was brought forward under the escort of the task force reserve. In the event of significant casualties, an M113 ambulance also could be brought forward to evacuate the wounded.

Once the recovery assets arrived at the site, the M7s became additional security assets and also were available to evacuate casualties and crew members of the downed tank. In most instances, the recovery crew used the V chains from the M88 to connect to the damaged vehicle rather than the normal heavy tow bar used in training. Although this was not the preferred method for towing, the speed gained in hooking up to the damaged vehicle was well worth any cosmetic damage done to the vehicle in the initial recovery.

Once the connection was complete, the tank was pulled out of the engagement area to a safer location.

At that point, the FSC delivered another M88 (previously staged out of contact at a forward location). The second M88 and the task force reserve moved back to the TAC in order to prepare for the next mission. At the maintenance exchange point, the crew of the first M88 connected the recovery vehicle to the tank with a tow bar and conducted any battle damage assessment and repair (BDAR) required to permit recovery back to the FOB. The most common issue faced was suspension arms dragging on the ground as a result of tracks and wheels being blown off by IEDs.

An M1A2 tank damaged by an improvised explosive device is lifted by two M88 recovery vehicles for removal to a safer location.



By selecting a safe maintenance exchange point, the M88 and tank crews were able to do BDAR that allowed for ease of recovery. If a proper BDAR was not performed, the risk of doing additional damage to the suspension increased, as did the risk of catching the vehicle on fire because of the heat generated by friction with paved roads. Once the BDAR was complete, the tank and M88 were recovered to the FOB under escort of the FSC. Once it was at the FOB, the tank was turned over to the maintenance team. The M88 with escorts then returned to their forward staging location.

Recovery of wheeled vehicles in an urban fight also provided a challenge. Maneuvering a heavy, expanded-mobility tactical truck (HEMTT) wrecker into position often was a challenge in the crowded streets of an urban environment. Because of the difficulty of getting to a damaged vehicle and evacuating the area, the site of the fight had to be made more secure. In the case of catastrophic kills, an LHS with an empty flatrack was the only viable option for evacuating destroyed vehicles.

In order to place a vehicle on a flatrack, either an M88 had to be on site or locally fabricated ramps had to be used to allow the damaged vehicle to be winched onto the flatrack. On two occasions, the site of a burning vehicle had to be secured overnight to allow the fire to die down so that the recovery could be completed in the morning.

With each recovery mission, security and mission planning were critical. A common operating picture across both maneuver and CSS assets allowed for rapid recovery of damaged vehicles, thereby preventing the further loss of equipment and denying the insurgents the opportunity to celebrate the damage of coalition equipment.

When deployed as part of Operation Iraqi Freedom, TF 2-8 CAV was still adjusting to the CSS changes

M88 recovery vehicles are staged for recovery missions. The task force's recovery vehicles received additional protection, including gunshields and turrets.

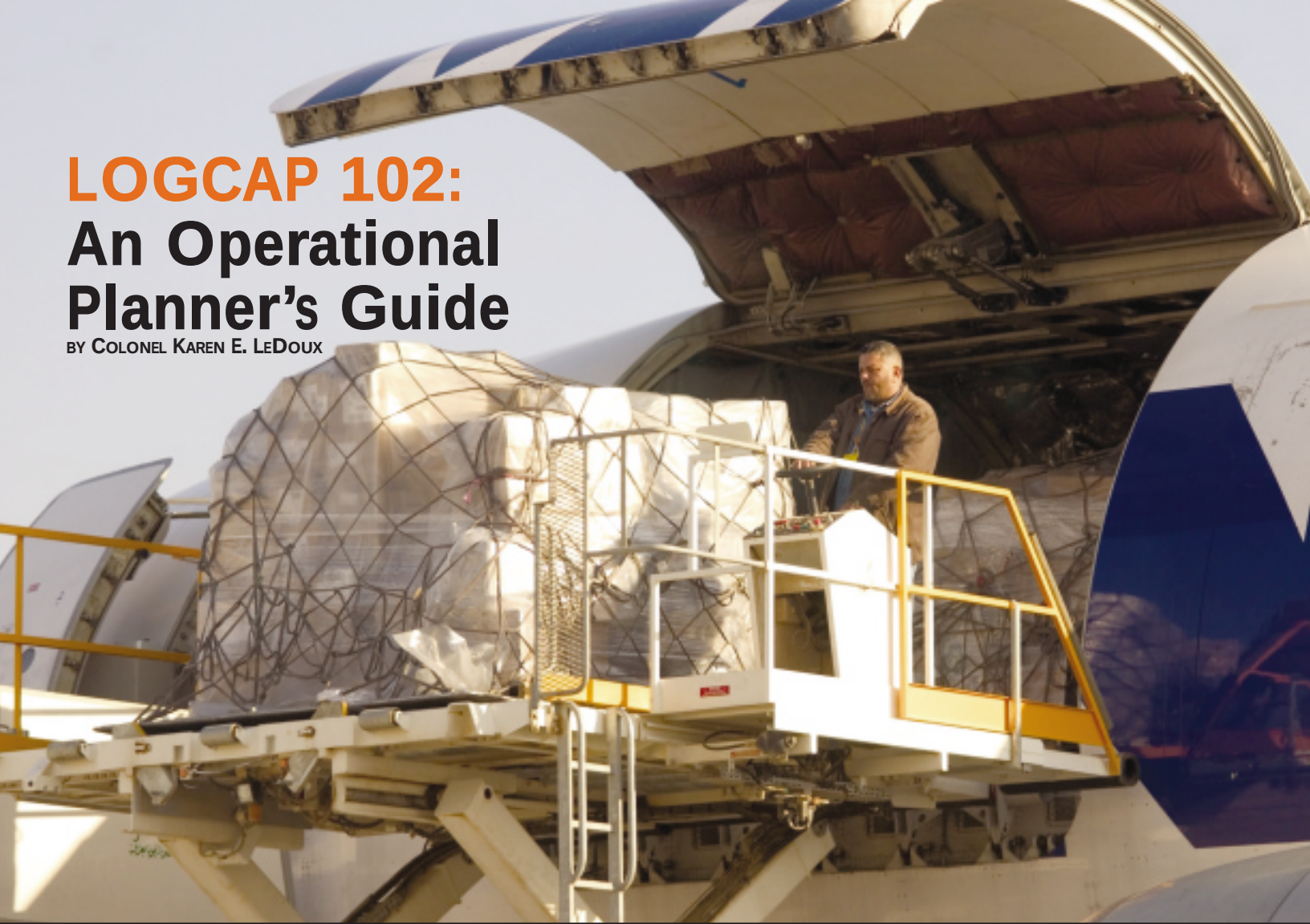


associated with Force XXI redesign. This may have facilitated the operational adaptations and innovations of the task force's Iraq deployment, since the previous paradigms for CSS had already been set aside and leaders at all levels had recently focused on the fundamental relationships between CSS and mission success. Because of the constantly changing environment and tactical situation in Baghdad, logistics functions had to be flexible and responsive. Through full-spectrum operations, the task force's logistics personnel had to meet the logistics needs of the maneuver commander to ensure his freedom of maneuver and maintain pressure on the insurgents.

The experiences of TF 2-8 CAV in eastern Baghdad may not be directly transferable to other situations. However, those experiences illustrate the types of operational adjustments and innovations that can enhance mission success.

ALOG

CAPTAIN KEVIN M. BAIRD IS COMMANDER OF B FORWARD SUPPORT COMPANY, 115TH FORWARD SUPPORT BATTALION (WHICH IS ATTACHED TO THE 2-8 CAVALRY BATTALION), 1ST CAVALRY DIVISION, AT FORT HOOD, TEXAS. HE IS A GRADUATE OF THE ARMOR OFFICER BASIC COURSE AND THE COMBINED LOGISTICS CAPTAINS CAREER COURSE. HE WAS COMMISSIONED FOLLOWING GRADUATION FROM VANDERBILT UNIVERSITY AND HAS A MASTER'S DEGREE FROM THE UNIVERSITY OF MISSOURI AT ROLLA.



LOGCAP 102: An Operational Planner's Guide

BY COLONEL KAREN E. LEDOUX

In the May–June issue of *Army Logistician*, I provided an overview of the Logistics Civil Augmentation Program (LOGCAP) and its goals and enablers. In this article, I will discuss critical operational planning and execution processes that facilitate effective implementation of the program and present information that I believe will help bridge the information gap that exists in current operational-level LOGCAP doctrine.

Preplanning

It should go without saying that developing the concept of support, internal processes, and procedures for a contingency operation is an inherent responsibility of the theater or Army service component command (ASCC) planner. However, planners do not always examine carefully the implications of relying on contractors for support. Whether because of simulation training, during which controllers can use computer technology to move, or “magic,” unrealistic volumes of units and supplies to support a scenario, or a reluctance to train with warfighting scenarios that involve

ambiguous contractor capabilities, the planners have often “waved the magic wand,” indicating that LOGCAP would “handle it.” In doing this, they failed to address fully the responsibilities of supported units and the intricacies involved in replacing organic military capabilities with a third-party contractor.

Preplanning for LOGCAP support begins with the theater joint planning group and, later, the ASCC or combined joint force land component commander (CJFLCC). It involves all staff elements, not just the J-4, and it is a requirements-driven process. These staff elements analyze the mission throughout all phases of the operation and identify engineering and logistics shortfalls that cannot be met with organic forces, existing contracts, or host nation assets.

According to Field Manual 100–10–2, Contracting Support on the Battlefield, the theater joint contracting cell or the Coalition Forces Land Component Command’s (CFLCC’s) principal assistant responsible for contracting (specified in the contracting support plan), determines which contracting vehicle will best mitigate

This article expresses views of the author, not those of the Department of Defense or any of its agencies.



A LOGCAP contractor unloads supplies destined for a military base camp in Iraq.

the identified logistics and engineering shortfalls. His options may include contingency contracting, host nation contracts, the Army Corps of Engineers, or LOGCAP. All contract requirements, including those of the LOGCAP contract, must be approved by a combined or joint acquisition review board (C/JARB).

Although it is an Army program, LOGCAP provided support to all of the services, their coalition partners, and other Government agencies during Operations Enduring Freedom and Iraqi Freedom. Because LOGCAP is so widely employed, the combatant commander (COCOM) should consider including a subannex on LOGCAP in the logistics annex to the operation plan to specify the contractor's priority of effort so that LOGCAP services provided to other branches of the military, coalition partners, and other Government agencies do not conflict with each other. For LOGCAP, the COCOM also should allocate military force protection assets as required. Under the cur-

rent contract, the military forces using LOGCAP services are required to provide force protection.

LOGCAP Funding

Commanders must provide the LOGCAP contractor with sufficient funds to begin operations. They also must monitor the execution of the contract to make sure the funding remains adequate. Authorizing funding and tracking expenditures are the supported unit's responsibilities, not Team LOGCAP's. [Team LOGCAP consists of the Directorate of LOGCAP Operations, the LOGCAP Support Unit (LSU), the Procurement Contracting Officer (PCO), and additional Department of Defense (DOD) and Department of the Army (DA) personnel from the Defense Contract Management Agency (DCMA) and the Army Corps of Engineers.]

In contingency operations, LOGCAP is funded with Operations and Maintenance, Army (OMA), funds. Because of the magnitude of current LOGCAP support to U.S. forces, the Office of Management and Budget is funding LOGCAP efforts on an incremental basis. To remain in compliance with the Antideficiency Act, the

Government can commit only to work for which it has obligated funds. Therefore, incremental funding at the start of a LOGCAP-supported operation restricts the contractor's ability to mobilize personnel, equipment, and supplies and provide rapid support to warfighters. For example, if a statement of work (SOW) is funded at only 20 percent of the expected cost, the contractor can purchase only 20 percent of the necessary supplies and hire less than 20 percent of the personnel needed to execute the contract. Incremental funding limits the contractor's ability to make economic purchases of equipment and supplies or make long-term commitments to potential contractor personnel. When the LOGCAP prime contractor is tasked by an SOW to perform a service, he generally subcontracts that service. The bottom line is that the contractor cannot subcontract or procure equipment without adequate funding. Contractors are in business to make a profit or at least break even; legally, the Government cannot ask a contractor to operate "at risk" by hiring personnel, procuring equipment, or performing services that are not funded.

An SOW that is funded to at least 50 percent of the estimated cost allows the contractor to hire and train the required personnel immediately, procure all materials and equipment, and transport them to the job site. This maximizes economies of effort and scale, so the contractor reaches full performance sooner at a lower overall cost to the Government.

Theater/ASCC LOGCAP Tasks

To standardize implementation processes in his theater of operations, the COCOM develops the theater standing operating procedure (SOP) for using LOGCAP. The SOP should—

- Determine the optimal structural framework, or architecture, for implementing LOGCAP successfully in theater and articulate the decisions to the subordinate commands. Getting this right up front sets the stage for success. (This step was skipped in Operations Enduring Freedom and Iraqi Freedom.)
- Decide if SOWs will be structured by function, location, or combined joint task force (CJTF).
- Reinforce the requirement for acquisition review boards, such as the C/JARB, facilities boards, and integrated staff fusion planning cells—especially as new operational requirements are added.
- Identify approval authorities for the SOW and rough order of magnitude (ROM); the latter is the contractor's ceiling price for costs that he will incur while performing work on an unpriced contractual action.
- Outline processes for identifying and validating the requirements of supported units.
- Establish a budget ceiling and funding processes to track the expenditure of funds and replenish funds as required.

- Establish priorities in the operation plan and issue fragmentary orders prioritizing contractor efforts when LOGCAP supports multiple services, coalition partners, DOD, and other Federal agencies as it has done in Operation Iraqi Freedom. Based on the operation plan and fragmentary orders, DCMA administrative contracting officers will direct contractor priority of efforts.

- Establish “lanes of operation” for organic engineer units, service civil engineers (the Army Corps of Engineers), and service augmentation programs (such as the Air Force Contract Augmentation Program or LOGCAP) to reduce overlap, duplication of efforts, and competition for limited resources, all of which can increase operational costs.

- Determine the desired end state of LOGCAP support. This will facilitate a speedy transition to a theater sustainment contract with stable requirements that are managed by the CFLCC’s principal assistant responsible for contracting.

- Determine Team LOGCAP staffing levels and locations, and submit a request for forces for the LSU and DCMA elements or direct the Army Materiel Command Logistics Support Element Forward to call LSU elements forward as required.

- Establish theater criteria for requesting and using LOGCAP. Create LOGCAP services templates and determine criteria and standards of service for base camps supported by LOGCAP. Planners should answer the following questions: Who will receive LOGCAP services? Will every forward operating base receive the full menu of LOGCAP services, or will those services be available only to enduring bases with a specified population threshold? What criteria determine if LOGCAP will be used at each base camp? The services templates should be similar to U.S. Central Command’s “Sandbook” or U.S. European Command’s “Red Book,” except they should go a step further and specify LOGCAP support criteria and standards of service in order to standardize usage criteria throughout the command for all LOGCAP operations. “Mission creep” is sure to occur without such criteria. Commanders naturally want to increase the level of service and reduce the criteria for receiving support to improve the soldiers’ quality of life. This will result in contract turbulence and additional changes to the SOW, which will delay definitizing the contract and require an increase in the theater’s projected LOGCAP funding ceiling.

In Operation Iraqi Freedom, the CFLCC created its SOWs by function and the Multinational Force-Iraq (MNF–I) by combined joint task force (CJTF). The SOWs developed to support the CJTF contained better developed and more detailed standardized criteria and set standards of service support. These procedures were more efficient and better defined the central

management process. Therefore, even though MNF–I supports 15 times more soldiers at more locations than any previous LOGCAP SOW, there have been fewer changes to its SOW. This may lead to definitizing the LOGCAP contract within 180 days, as required by Defense Federal Acquisition Regulations (DFAR), and allow the commander to transition to a sustainment contract more rapidly.

Pre- and Postaward Tasks

The ASCC or JFLCC first must determine that a requirement to use LOGCAP exists and obtain approval to use the program from the DA G–4. Then, based on the theater LOGCAP SOP and theater contracting support plan, supported units in the communications zone, CJTF, or base camp, with assistance from the LSU, are responsible for these pre- and postaward tasks—

- Integrating the LOGCAP contractor into the planning process early to identify contractor capabilities and required lead times. However, the contractor should not be involved in determining requirements. This is a conflict of interest and is prohibited by regulation. The contractor should be involved only in identifying what it can provide and when it can provide it.

- Identifying and articulating requirements and obtaining C/JARB approval.

- Writing the SOW. LSU officers have template SOWs that are available on request.

- Preparing an independent cost estimate.

- Requesting a ROM and the contractor’s technical execution plan (TEP) through LSU and LOGCAP representatives.

- Reviewing and approving the contractor’s ROM and TEP for adequacy, completeness, and acceptability.

- Requesting a notice to proceed (NTP) through the LSU and Directorate of LOGCAP Operations from the PCO.

- Identifying, validating, and writing changes to the SOW.

- Identifying a single point of contact through which LOGCAP requirements will flow to Team LOGCAP.

Supported units in the communications zone, joint task force, or base camp, with assistance from DCMA, are responsible for these postaward tasks—

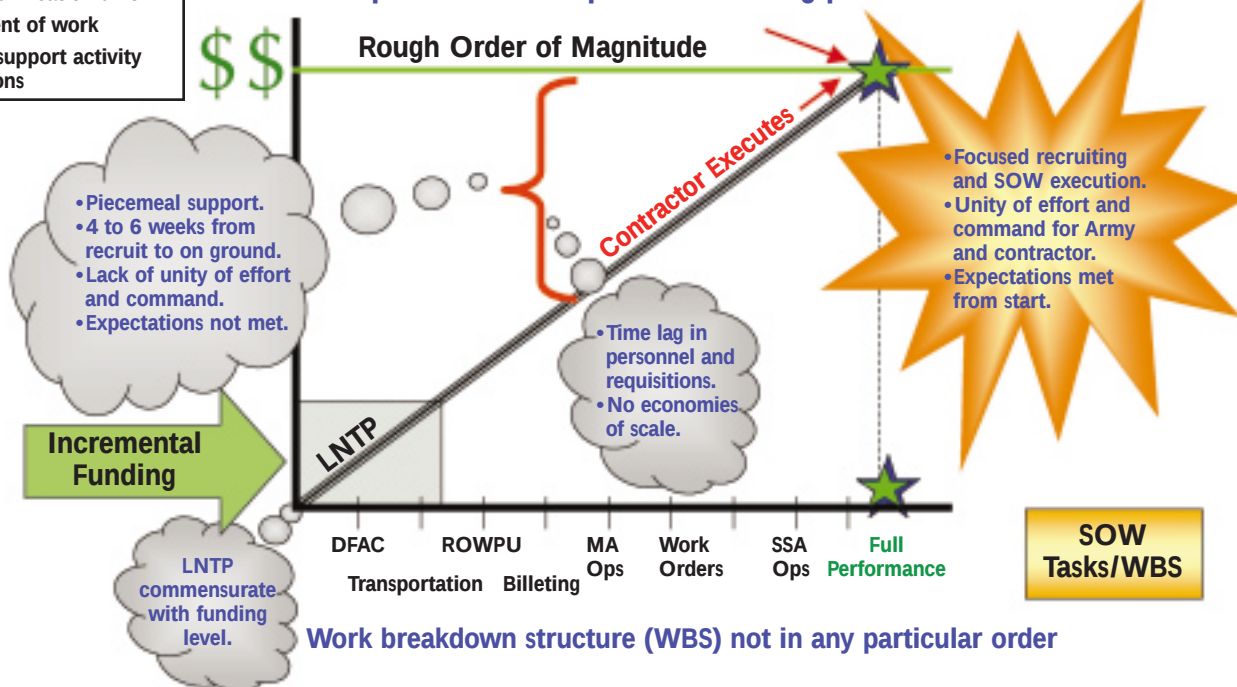
- Attending DCMA start-work meeting.

- Nominating personnel to DCMA to serve as contracting officer’s technical representatives (COTRs) to monitor local contractor execution of the contract. A COTR should be assigned at every location and function where the contract is implemented or interfaces with a military unit or other contract entity, such as a trailer transfer point, food distribution point, or dining facility. DCMA must train these personnel and formally delegate their duties. A COTR provides contractor performance data, execution status, and

Legend:	
DFAC	= Dining facilities
LNTF	= Limited notice to proceed issued by Purchasing and Contracting Officer.
MA Ops	= Mortuary Affairs operations
ROWPU	= Reverse-osmosis water-purification unit
SOW	= Statement of work
SSA Ops	= Supply support activity operations

Funding in Relation to SOW Execution

Complete notice-to-proceed funding provides:



operational updates to both DCMA and the supported unit's chain of command for input to the award fee board and for operational updates.

- Providing lessons learned and observations to Team LOGCAP.

LOGCAP Planning Considerations

In implementing the LOGCAP (or any contract), commanders must balance the desired requirements of quality, speed, and cost of the services provided. In contingency contracting, it is unrealistic to expect to receive more than two of these desired characteristics. In other words, if a needed service has to be good and fast, it will not be cheap. If a service is needed quickly and at a low cost, it is unlikely that it will be good. If a low-cost, quality service is sought, it is not likely to be fast. The bottom line is that preplanning is critical to receiving quality, timely services at a reasonable cost.

Backward planning should factor in the time needed for the contractor to ramp up to perform services. (Backward planning means that milestones are laid out backward beginning with the projected startup date.) Since LOGCAP is not a standby service, the contractor must open subcontracts to competitive bidding, hire and train personnel, lease or buy and transport equipment and materials into the region or theater, and transport the equipment and materials to the site once

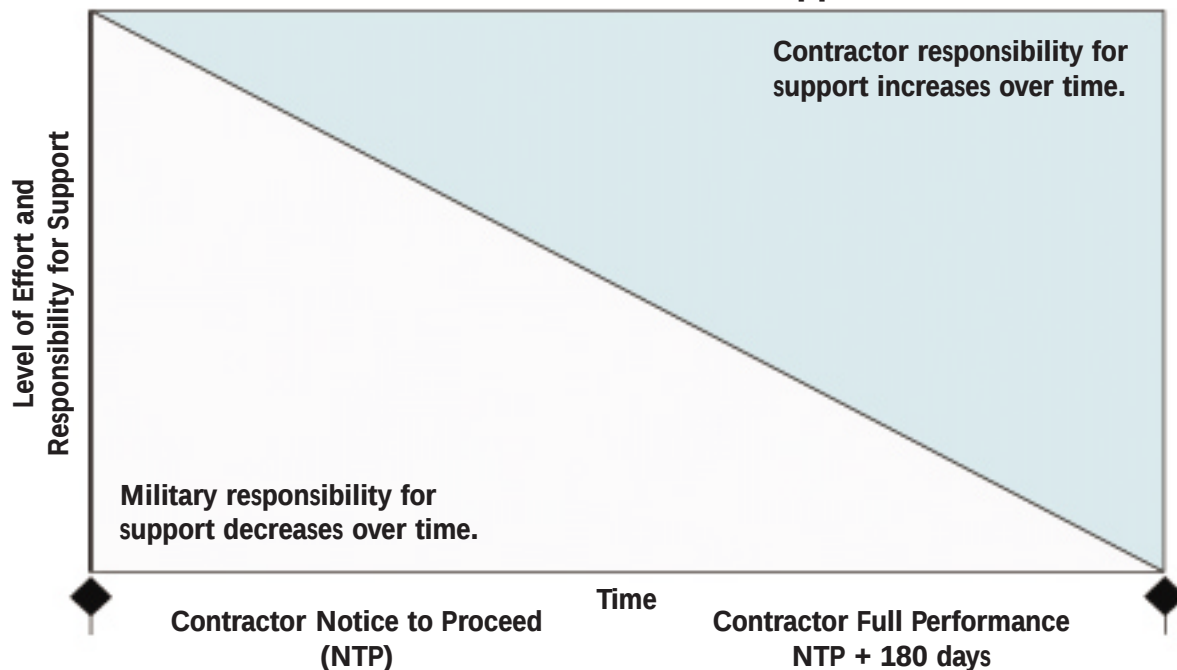
a task order is issued. Recent experience indicates that, depending on the complexity and scope of the requirement, it may take up to 180 days for the contractor to ramp up to full performance. The LOGCAP contract identifies these specific response metrics—

- Receive and support up to 1,500 personnel a day within 15 days of an NTP.
- Receive 3,000 personnel a day and bed down 25,000 within NTP+30.
- Bed down 50,000 personnel within NTP+180.

The ability of LOGCAP to reach full performance depends entirely on the full performance requirement, its complexity and scope, and the conditions under which it is executed. Until the contractor is at full performance, the military must be capable of providing services using organic assets. The contractor's ability to reach full performance is delayed if commanders shift priorities or change requirements or if Government-provided contractor security is not available. These delays are considered to be Government delays, not contractor delays.

Although the LOGCAP contractor can use commercial resources to transport equipment and personnel to the theater and inside the communications zone, contractor onward movement and intratheater movement must be integrated into the intratheater movement plan. As they develop movement plans, commanders must provide adequate force protection for contractor-operated

Transition to Contracted Support



convoys moving forward of the communications zone. Contractors also may need to move personnel and emergency equipment throughout the battlespace on military fixed- and rotary-wing aircraft. If contractor operations are vital to the commander's support, the commander should prioritize contractor movements and allocate force protection assets for safe movement within the battlespace.

Contractors are civilians accompanying the force. The farther forward into the theater or battlespace they are employed, the more military support they require. The military must integrate contractor requirements for force protection, bed down, life support, and emergency medical support into planning and execution processes. Field Manual 3-100.21, *Contractors on the Battlefield*, and Army Regulation 715-9, *Contractors Accompanying the Force*, offer detailed information on civilians accompanying the force.

Before writing an SOW, commanders must determine what equipment the Government will furnish. Requests to transfer unit equipment to the contractor permanently must be approved by the DA G-4, and the provisions of DFAR 45 should be considered.

Transferring Government equipment to the contractor in theater saves time and accelerates contractor progress toward full performance. It also reduces contract costs and lowers the contractor award fee. However, the Army then must replace unit equipment to backfill Government-furnished equipment. This requires the Army to acquire previously unforecasted procurement funding.

Some contractor commercial equipment leases or purchases require a long lead time, regardless of where the equipment is procured. Some equipment, such as

fire engines, large fleets of line-haul and fuel trucks, or rough-terrain cargo handlers, requires up to a year for delivery. Indeed, such vehicles simply may not be available through commercial sources to meet short military timelines.

Individual force protection equipment for contractor operations, such as integrated body armor and ballistic head protection specific to the operation, also may not be available in sufficient commercial quantities. If the Government does not provide this equipment and commercial assets are not available, this shortage may limit the contractor's ability to mobilize rapidly and execute operations forward of the communications zone.

Converting Requirements to Contract Language

Although identifying and planning for requirements are critical, translating those requirements and articulating them clearly in an SOW are equally important. Supported units are responsible for writing the SOW, but too few logistics planners have the background or training to do the job. What is doctrine or intuitive to a military unit must be articulated in an SOW so that a civilian contractor can execute the contract. LSU personnel can assist the supported unit with this task.

The first step in writing an SOW is to conduct a mission analysis. After support requirements are identified, the mission analysis and concept of support should specify critical performance factors and performance metrics and identify other military units or existing contracts that must interface with the contractor in order to perform the mission. This analysis should attempt not only to envision the requirement as it currently exists but also to forecast what the requirements will be for the service in a year or at a specified end state. Such forecasting eliminates

the need to change SOW requirements every 2 weeks in order to accommodate new requirements that were not anticipated. With fewer changes, the PCO can definitize the contingency contract sooner. As a result, transition to a theater sustainment contract may be quicker.

The mission analysis and concept of LOGCAP support should be integrated into the logistics annex to the operation plan. Validated changes in requirements should be sent to supported units on fragmentary orders. A copy of the concept of support also should be forwarded to Team LOGCAP. The concept of support informs the current and future DCMA representatives of the commander's intent to assist them in interpreting the contract and should be archived as a part of the contract audit trail.

An SOW should contain performance-based language, not requirements-based language. Performance-based contract language takes into account the knowledge base and experience of the contractor. It assumes that the contractor understands how to do a certain task and that Army regulations, command SOPs, and other guidance provide sufficient details about the requirements. Performance-based language gives the contractor flexibility to determine the best and least expensive way to execute the mission. The SOW is easier to write using performance-based language, and this expedites contract implementation.

According to the November 2003 LSU Liaison Guide—

Performance-based language provides the supported unit (through . . . [letters of technical direction] from the DCMA . . . [Administrative Contracting Officer]) more flexibility to make changes within the scope of the contract and reduces the number of changes to the SOW. The only time requirements-based language is appropriate is when the task is specific in nature, heavily inspected and measured for compliance, specialized enough and/or there are serious consequences for maneuvering outside of regulations, guidelines and agreements (for example, air traffic controller or physician's assistant).

LSU officers have a database of SOW templates and can advise the commander on translating the requirements and articulating them in an SOW.

The PCO also requires the supported COCOM, CFLCC, JTF, or division to submit an Independent Government Cost Estimate (IGCE) with the SOW before requesting the contractor's ROM. The IGCE details the supported unit's estimate of the costs the contractor is expected to incur while performing the work. The PCO uses the IGCE to determine a reasonable cost for the products and services required by the supported unit. It is not a legally binding document, but it is proprietary and may not be released to the contractor.

The Government uses the contractor's ROM to determine the amount of money that will be set aside in the budget for use against the SOW and the portion that will be provided to the contractor on a Military Interdepartmental Purchase Request for startup. Like the IGCE, the ROM is proprietary to the LOGCAP contractor and the Government and is not releasable to outside parties.

The supported unit is responsible for reviewing the ROM for completeness and acceptability. When the ROM is deemed acceptable, the designated authority forwards a letter of acceptance through the LSU and the Directorate of LOGCAP Operations to the PCO. The PCO issues an NTP after the command accepts the ROM and funds the contract.

The process for approving LOGCAP requirements and changing or updating SOWs in theater is complex, necessarily bureaucratic, and time consuming. Planners should ensure they allow enough time for processing requirements and legal reviews in their backward planning timeline.

The U.S. military is relying increasingly on contractors who operate in the battlespace. Operational planners must update their processes to reflect this reality. All staff elements, not just the logisticians, must integrate contracting considerations and ramifications into their planning processes.

LOGCAP is a force multiplier whose capabilities are maximized when operational planners conduct integrated staff preoperational planning, establish theater SOPs and criteria for requesting and using LOGCAP, create templates for LOGCAP services, and determine criteria and standards of service for base camps supported by LOGCAP. It is essential that commanders ensure that supported units are involved in evaluation and execution of LOGCAP operations in their areas of operations. **ALOG**

COLONEL KAREN E. LEDOUX IS A STUDENT AT THE ARMY WAR COLLEGE. SHE WAS THE COMMANDER OF THE LOGCAP SUPPORT UNIT (FORWARD) IN THE ARMY MATERIEL COMMAND LOGISTICS SUPPORT ELEMENT (AMC LSE) FORWARD-SOUTHWEST ASIA WITH THE COALITION FORCES LAND COMPONENT COMMAND AND THE AMC LSE IRAQ SUPPORTING COMBINED JOINT TASK FORCE 7. SHE IS A GRADUATE OF THE ARMY COMMAND AND GENERAL STAFF COLLEGE AND THE ARMY LOGISTICS MANAGEMENT COLLEGE'S ASSOCIATE LOGISTICS EXECUTIVE DEVELOPMENT COURSE, JOINT COURSE ON LOGISTICS, AND MULTINATIONAL LOGISTICS COURSE.

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When the Air Force Needs a Lift

BY CHIEF WARRANT OFFICER (W-4) ROBERT M. LANNING, MOARNG

The 1107th Aviation Classification and Repair Activity Depot had a problem: how to load AOAP lab vans with low ground clearance onto Air Force transports. The solution was to change the angle of the loading ramp.

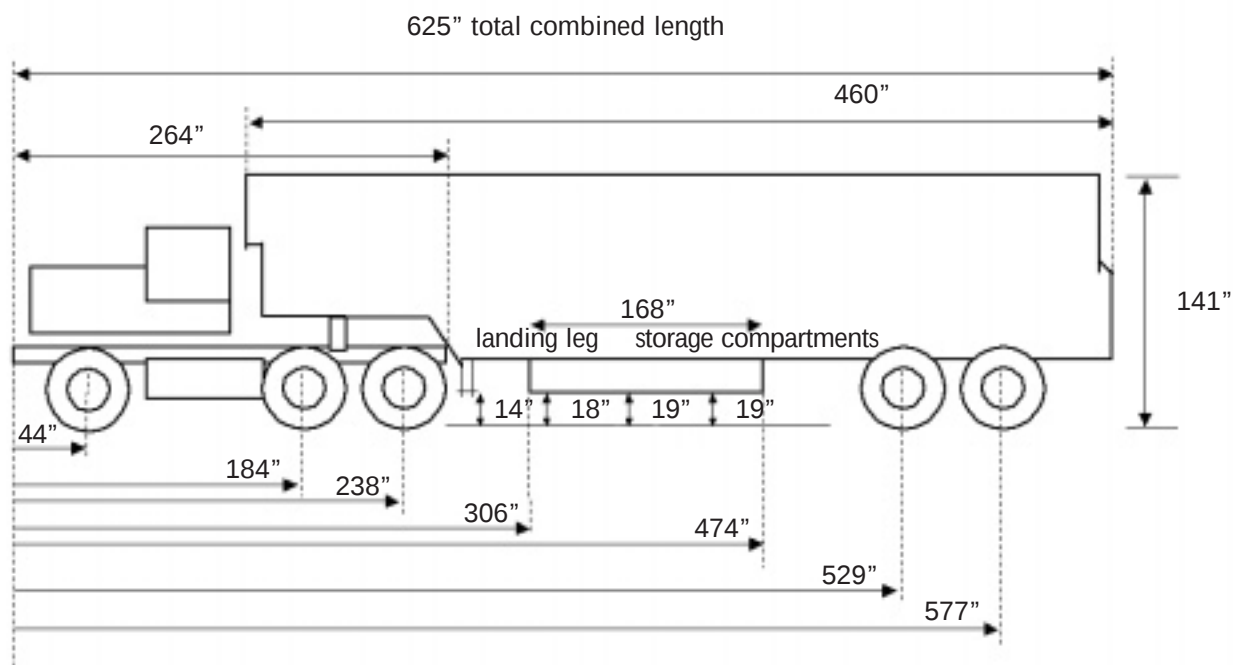


As it backs into a C-17 transport using the supplemental ramp system, the AOAP lab van has an 8-inch clearance at its lowest point.

The Army Oil Analysis Program (AOAP) has been supporting the warfighter for 43 years by analyzing engine and transmission oils and alerting aviation and ground units of potential component failures. Twenty-three fixed and two mobile laboratories perform this mission. The mobile laboratories, built in 1987 at Blue Grass Army Depot, Kentucky, have indeed been mobile. They deployed to Saudi Arabia in 1991, Bosnia and Somalia in 1995, Kosovo in 1999, Qatar in 2001, and Iraq and Kuwait in 2003. The most recent deployment involved moving a mobile lab from Arifjan, Kuwait, to Bagram, Afghanistan, to support Combined Joint Task Force 76.

This was the first time that this key preventive maintenance service was locally available for the heavy combat flight operations supporting Operation Enduring Freedom in Afghanistan.

The Missouri Army National Guard's 1107th Aviation Classification and Repair Activity Depot (AVCRAD), while attached to the Army Materiel Command Logistics Support Element-Southwest Asia in Kuwait, was tasked with coordinating the lab's move. Weighing the load, calculating its center of balance, assigning transportation control numbers, completing hazardous goods declarations, and conducting pre-move processing and inspections were completed



M818 5-Ton Truck Tractor and AOAP Mobile Lab Van

without incident. Precise load planning was critical because the 141-inch-high AOAP lab van was only 1 inch lower than the vertical limit of the C-17 Globemaster that was to transport it. However, the 52,000-pound van's low ground clearance and the angle of the aircraft's loading ramp presented even greater challenges for loading the lab's van and tractor.

The Problem

The AOAP lab van has built-in, underside compartments and landing legs with ground clearances between 14 and 19 inches. These 14-foot long compartments are situated midway between the front and rear axles of the tractor-van wheelbase. (See drawing above.) The standard C-17 ramp consists of a 20-foot-long main ramp with a ground support pedestal and an 8-foot "toe" approach ramp that rests on the ground. The main and approach ramps have angles of 9 and 12 degrees from horizontal, respectively, assuming a loading floor height of 68 inches. The C-17 ramp cannot be adjusted to lessen these angles.

If the AOAP van were to back up this standard ramp configuration, the van's low midsection would "bottom out," or strike, at the apex of the ramp and the C-17 floor because the ramp angles and the van's 24-foot wheel base would not allow enough bottom clearance for the van. It was apparent that a pre-engineered load-and-unload solution would be needed at both departure and arrival airports to overcome this obstacle.

The Solution

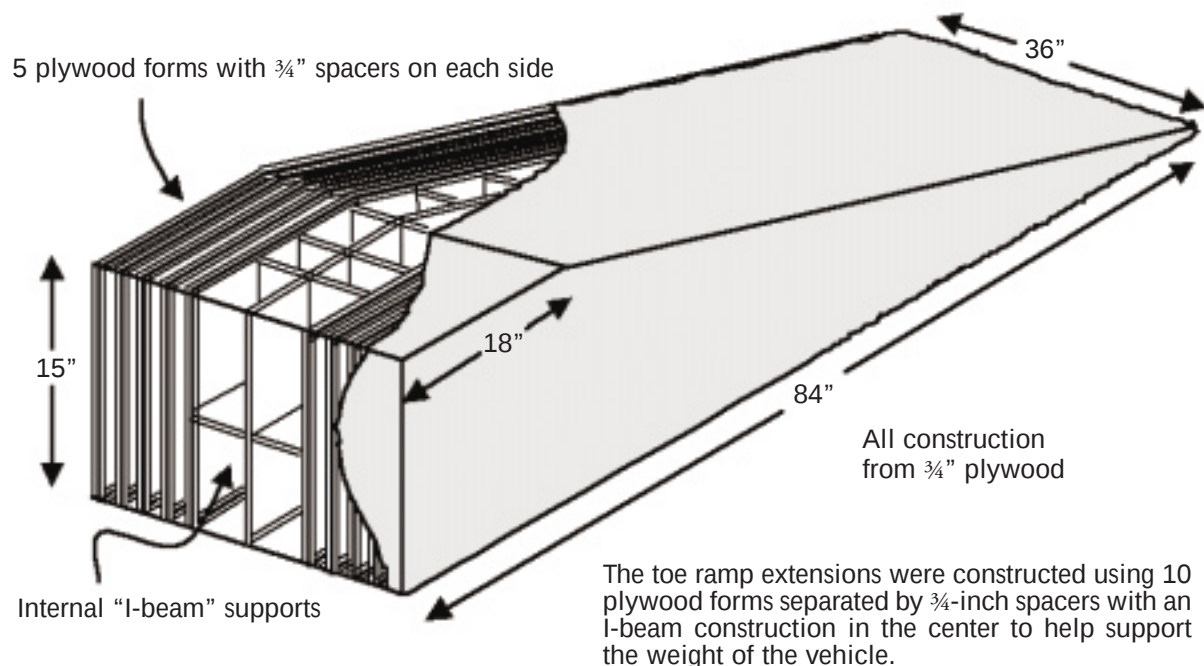
So that the AOAP van would not bottom out during loading, the ramp angles had to be decreased. This required constructing portable supplemental ramps to use with the existing C-17 ramp system. The supplemental ramps could travel with the AOAP lab van and be available for loading and off-loading at any location. The AVCRAD contacted the Air Force Air Transportability Test Loading Agency at Wright-Patterson Air Force Base, Ohio, for assistance in determining the ramp angle needed to load the AOAP lab van.



The main ramp pedestal support and two supplemental approach ramps are placed in position for loading the AOAP van aboard a C-17 transport.



Note the difference in the angle of the ramp once the extension is in place.



Toe Ramp Extension

Design calculations indicated that a change of one degree in the C-17 ramp angles would allow a $1\frac{1}{2}$ -inch clearance by the AOAP van. This prediction was based on a distance of 68 inches from the C-17 floor to the ground. Two devices were needed: a ramp pedestal to raise the main C-17 ramp support pedestal and a pair of toe ramp extensions to raise and extend the approach ramp.

The supplemental devices were built by AVCRAD personnel using $\frac{3}{4}$ -inch plywood lumber, cut into appropriate forms and glued and screwed together. The ramp pedestal was made of five stacked sheets of 18-inch by 30-inch plywood. Each approach ramp extension was built using 10 plywood forms with $\frac{3}{4}$ -inch spacers on each side and an internal "I-beam" construction to ensure support of the van and tractor weight. (See drawing above.)

The proof of a plan is apparent in its execution. The AOAP van equipment and supplemental ramp system deployed to the departure airfield, and the

supplemental ramps were installed. When the AOAP van was slowly backed up the ramp onto the C-17, the ramps provided ample support and the AOAP van cleared the ramp apex by about 8 inches. Following the successful load, the ramps were removed and loaded on the aircraft. On arrival at their destination, the ramps were used again to offload the tractor and AOAP van.

ALOG

CHIEF WARRANT OFFICER (W-4) ROBERT M. LANNING, MISSOURI ARMY NATIONAL GUARD, IS A UH-60 BLACK HAWK HELICOPTER MAINTENANCE OFFICER WITH THE MISSOURI ARMY NATIONAL GUARD'S 1107TH AVIATION CLASSIFICATION AND REPAIR ACTIVITY DEPOT IN SPRINGFIELD, MISSOURI. HE RECENTLY COMPLETED A YEARLONG ACTIVE-DUTY DEPLOYMENT WITH HIS UNIT TO KUWAIT, IRAQ, AND AFGHANISTAN, WHERE HE SERVED AS THE SOUTHWEST ASIA THEATER ARMY OIL ANALYSIS PROGRAM COORDINATOR. HE HAS B.S. AND M.S. DEGREES IN GEOLOGY FROM PENNSYLVANIA STATE UNIVERSITY.



What DOD Logisticians Should Know About the Army

BY LIEUTENANT COLONEL JAMES C. BATES, USA (RET.)

As U.S. military operations become increasingly joint in nature and often include the involvement of other Government agencies and coalition partners, Department of Defense (DOD) logisticians—both military and civilian—need a basic understanding of the organizational structure and logistics-related aspects of all of the services, not just the service to which they are assigned. This article, on the Army, is the fourth in a series surveying all of the armed services.

Sustaining Deployed Army Forces

The Army is the Nation's senior service, founded in 1775. It also has the most personnel of any of the services. From a logistics perspective, it has unique characteristics that present challenges not faced by the other services. For instance, unlike the Navy, Air Force, and Marine Corps amphibious forces, the Army depends wholly on the other services and the civilian sector for strategic transportation.

Moreover, as the primary U.S. land force, Army forces deploy to remote locations and disperse over a wide area. This pattern of operations compounds the difficulties involved in supply chain management. In such a distributed, noncontiguous environment, the Army often confronts multiple transportation stops, potential mode changes (air to land, rail to road, sea to air, sea to land), and transload configuration changes (individual items being moved from 40-foot containers into 20-foot containers, or from 463L pallets to palletized load system [PLS] trucks, or from multipack boxes to parts bins). Moreover, the software, hardware, telecommunications devices, computers, and automatic identification technology that constitute an effective logistics management information network must be linked over extended distances and in austere environments. Thousands of information input sites are distributed over vast, noncontiguous spaces. Frankly, providing cost-effective, responsive, and visible sustainment to such a force is a formidable task.

For instance, for a logistics information network to be able to track the quantity of a certain type of truck tire available within an area of operations like Iraq, all of the on-hand visibility data associated with that type of tire must be transmitted to the network server daily, or preferably twice daily. This means that every unit

and support battalion within the area of operations—and there could be over a thousand units and many support units—that has or needs the tire must transmit this information to a centralized data repository. However, unlike a Navy ship or an Air Force base, forward-deployed Army units do not have telecommunications land lines or habitual satellite links. Providing logistics support and obtaining reliable logistics information in this type of environment, especially when forces frequently relocate, is indeed a Herculean task. With this in mind, let's take a look at how the Army is currently structured and then review the transformational changes underway or planned.

The Total Army

The Army consists of three components: the Active Army, Army National Guard, and Army Reserve. The Army budget for fiscal year 2006 projects that the Active Army will have 482,000 soldiers, the Army National Guard will have 350,000 soldiers, and the Army Reserve 205,000. There also will be about 233,000 Department of the Army civilians.

The Army Reserve is controlled by the Federal Government and serves solely as a Federal reserve to the Active Army. Army National Guard units may be controlled by either a state or the Federal Government, depending on the circumstances. The Army National Guard force structure consists of combat, combat support, and combat service support (CSS) units, while the Army Reserve force is composed primarily of combat support and CSS units.

Army Organization

From smallest to largest, the Army is organized by squad, platoon, company (called a troop by cavalry forces and a battery by artillery forces), battalion (called a squadron by cavalry forces), brigade (called a group by logistics forces or Special Forces), division, corps, and Army service component command (ASCC).

Often called "The Ultimate Weapon," the soldier is the foundation of the Army. A squad is considered the smallest element within the Army. It typically has 9 or 10 soldiers and is led by a sergeant or staff sergeant. Two or more squads make up a platoon, which usually has 16 to 44 soldiers and is led by a lieutenant. Three

to five platoons make up a company, which is commanded by a captain and contains from 62 to 190 soldiers. Currently, companies are the smallest Army elements to be routinely assigned unit identification codes (UICs) and Department of Defense activity address codes (DODAACs).

Four to six companies constitute a battalion, which is commanded by a lieutenant colonel and has from 300 to 1,000 soldiers. Two to five battalions form a brigade, which is commanded by a colonel and has from 3,000 to 5,000 soldiers. Three or more brigades typically constitute a division, which is commanded by a major general and has from 10,000 to 15,000 soldiers. Two or more divisions form a corps, which is commanded by a lieutenant general and has from 20,000 to 45,000 soldiers. The Army's largest suborganization is the ASCC. It typically has 50,000 or more soldiers, is made up of two or more corps, and is commanded by a lieutenant general or general.

The Army currently has 10 active-duty divisions: the 1st Armored Division and the 1st Infantry Division (Mechanized) in Germany; the 2d Infantry Division in Korea; the 25th Infantry Division (Light) at Schofield Barracks, Hawaii; the 10th Mountain Division (Light Infantry) at Fort Drum, New York; the 82d Airborne Division at Fort Bragg, North Carolina; the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky; the 1st Cavalry Division and the 4th Infantry Division (Mechanized) at Fort Hood, Texas; and the 3d Infantry Division (Mechanized) at Fort Stewart, Georgia. Some of these divisions have a brigade based at another location.

Armored and mechanized infantry divisions are equipped with armored vehicles (primarily M1 Abrams tanks, M2/3 Bradley fighting vehicles, and M113 armored personnel carriers). Armored divisions have more tanks than mechanized infantry divisions.

There are four active-duty corps headquarters: the V Corps in Germany, which oversees the 1st Armored and 1st Infantry Divisions; the III Corps at Fort Hood, which oversees the 1st Cavalry and 4th Infantry Divisions; the I Corps at Fort Lewis, Washington, which oversees the 2d and 25th Infantry Divisions; and the XVIII Airborne Corps at Fort Bragg, which oversees the 82d and 101st Airborne Divisions, 10th Mountain Division, and 3d Infantry Division.

The five theater-level ASCCs are U.S. Army Europe (USAREUR), which is headquartered in Germany and covers the U.S. European Command's area of responsibility; U.S. Army Pacific (USARPAC), which is headquartered in Hawaii and covers the U.S. Pacific Command's area of responsibility; U.S. Army South (USARSO), which is headquartered in Texas and covers the U.S. Southern Command's area of responsibility; Third U.S. Army, which is headquartered in

The USNS Pollux is one of the Military Sealift Command's eight fast sealift ships. The Army depends on Navy vessels like this, as well as Air Force cargo transports, for strategic lift to reach its areas of operations.

Georgia and covers U.S. Central Command's area of responsibility; and Eighth U.S. Army (EUSA), which is headquartered in Korea.



Major Army Commands

In addition to the five ASCCs, the Army also includes the following major Army commands (MACOMs): Army Forces Command (FORSCOM), Army Special Operations Command, Army Training and Doctrine Command (TRADOC), Army Materiel Command (AMC), Army Medical Command, Military Surface Deployment and Distribution Command (SDDC)—formerly called the Army Military Traffic Management Command, Army Intelligence and Security Command, Army Space and Missile Defense Command, Army Corps of Engineers, Army Criminal Investigation Command, and Army Military District of Washington. The following describes the MACOMs that play the largest roles in logistics.

Like the Air Force's Air Combat Command, the Navy's Fleet Forces Command, and the Marine Corps' Marine Forces Atlantic, FORSCOM is an integral part of the U.S. Joint Forces Command and provides forces to the unified combatant commands. It is the Army's largest MACOM and is headquartered at Fort McPherson, Georgia. FORSCOM consists of more than 760,000 Active Army, Army National Guard, and Army Reserve soldiers. It trains, mobilizes, deploys, and sustains combat-ready forces that are capable of responding rapidly to crises worldwide.

TRADOC recruits, trains, and educates the Army's soldiers, develops leaders, supports unit training, develops doctrine, establishes standards, and designs the future Army. TRADOC is headquartered at Fort Monroe, Virginia, and has three subordinate commands: the Combined Arms Center at Fort Leavenworth, Kansas; the Combined Arms Support Command (CASCOM) at Fort Lee, Virginia; and the Maneuver Support Center at Fort Leonard Wood, Missouri. CASCOM is the focal point for most of the Army's logistics training and doctrine development, with the notable exceptions of medical- and engineer-related training.

SDDC provides global surface deployment command and control and distribution operations. Similar to the Navy's Military Sealift Command (MSC) and the Air Force's Air Mobility Command, the SDDC is an integral part of the U.S. Transportation Command. Its two critical missions are cargo distribution and port management. SDDC develops transportation contracts and container-leasing agreements and oversees the transportation management of fuel, ammunition, combat vehicles, food, and other commodities destined for locations throughout the world. SDDC serves as the single port manager at 25 locations worldwide and, as such, is responsible for all aspects of ship loading and unloading. SDDC's Transportation Engineering Agency, at Newport News, Virginia, researches and publishes information about worldwide ports, vessel and aircraft loading procedures, and transportation techniques associated with rail, road, air, and sea movement.

Army Materiel Command

Like TRADOC and SDDC, AMC has a significant impact on operational logistics. It is comparable to the Air Force Materiel Command, the Naval Supply Systems Command, and the Marine Corps Logistics Command. AMC is the Army's premier provider of materiel readiness, including technology, acquisition support, materiel development, logistics power projection, and sustainment. AMC operates research, development, and engineering centers, the Army Research Laboratory, depots, arsenals, and ammunition plants. It also maintains the Army's pre-positioned stocks, both on land and afloat.

AMC is headquartered at Fort Belvoir, Virginia. The total AMC workforce, both civilian and military, approaches 50,000. Its major subordinate commands include the Army Field Support Command (AFSC) at Rock Island Arsenal, Illinois; the Army Aviation and Missile Command at Redstone Arsenal, Alabama; the Army Communications-Electronics Command at Fort

Monmouth, New Jersey; the Army Chemical Materials Agency at Aberdeen Proving Ground, Maryland; the Army Tank-automotive and Armaments Command at Detroit Arsenal, Michigan; the Army Research, Development, and Engineering Command at Aberdeen Proving Ground; and the Army Security Assistance Command at Fort Belvoir, Virginia.

One of the newer AMC subordinate commands is AFSC. It provides one component of the strategic mobility triad of airlift, sealift, and global pre-positioning. AFSC manages the pre-positioned brigade sets of materiel, operational projects, and sustainment stocks that are positioned either afloat or in overseas, forward-deployed locations. Army Pre-positioned Stocks (APS)-2 is stored at several Combat Equipment Group-Europe bases. APS-3 is afloat, APS-4 is stored in Korea, and APS-5 is maintained in storage in Kuwait and Qatar. AFSC also manages the Logistics Civil Augmentation Program (LOGCAP) for peacetime preplanning, warfighter exercises, and crisis action support.

Although it is considered a separate reporting activity and not a major subordinate command of AMC, the Logistics Support Activity (LOGSA) at Redstone Arsenal serves as a central repository for critical supply, maintenance, and transportation data. Over the last 10 years, LOGSA has gone from managing multiple logistics information systems to managing a single, Web-based system called the Logistics Integrated Database (LIDB). LIDB is used to access LOGSA's numerous logistics databases and acquisition tools. LOGSA publishes an excellent preventive maintenance magazine geared toward junior soldiers (but actually read at all levels) called *PS, The Preventive Maintenance Monthly*.

Army Equipment

Providing logistics support, especially class IX (repair parts), to Army units worldwide is made ever more challenging by the extensive diversity of the major end items (class VII) that combat, combat support, and CSS units use. Army units must maintain airplanes, helicopters, weapon systems, trucks, generators, ammunition, and signal, engineer, medical, water purification,



An Army Materiel Command logistics assistance representative works with a soldier near Baghdad, Iraq, on a field-deployable environmental control unit. Army civilians and contractors provide expertise and institutional memory in support of Army logistics.

petroleum, and food preparation equipment for units spread across the depth and breadth of the battlefield.

The Army's major combat equipment includes the M1 Abrams tank, M2/3 Bradley fighting vehicle, M109 self-propelled howitzer, M113 armored personnel carrier (all of which use tracks rather than wheels), and AH-64 Apache attack helicopter. Major combat support equipment includes the M9 armored combat earthmover; M104 Patriot air defense missile; M93 Fox nuclear, biological, and chemical reconnaissance vehicle; UH-60 Black Hawk utility helicopter; and CH-47 Chinook heavy lift cargo helicopter. Major CSS equipment includes the family of medium tactical vehicles (FMTV) trucks; M977 heavy, expanded-mobility tactical truck (HEMTT); PLS trucks; and heavy equipment transporter (HET).

Strategic Lift

The Army is the only service that depends on the other services—primarily MSC and the Air Mobility Command—to provide the strategic transportation it needs to deploy overseas. Complicated tradeoffs are involved in determining the type and size of an Army force to be deployed. The heavier the force, the more lift will be needed to deploy that force, the more time will be required to reach the engagement area, and the larger the force's logistics footprint will be. ("Heavy forces" refers to the presence of armored vehicles.) Yet, the heavier the force, the less vulnerable it will be once it is deployed and the more firepower it will have once it arrives. The largest U.S. cargo plane, the C-5 Galaxy, and the C-17 Globemaster can only lift one M1 tank at a time. The C-17 can lift up to four UH-60 Black Hawk helicopters, two AH-64 Apache helicopters, or three Bradley fighting vehicles. To give an idea of the magnitude of airlift the Army requires, an armored division has over 240 M1 tanks, over 240 Bradley fighting vehicles, and 18 AH-64 helicopters, along with thousands of other vehicles (both tracked and wheeled), containers, and other equipment.

The Army's newest fighting vehicle—wheeled but armored—is the 36,000-pound Stryker. It can be transported on the ground using trucks or by air on C-5, C-17 and C-130 Hercules aircraft. The C-5 and C-17 can carry seven and four Strykers, respectively. One large, medium-speed, roll-on-roll-off (LMSR) vessel or two fast sealift ships (FSSs) can lift almost an entire Stryker brigade combat team (SBCT). MSC currently has 8 FSSs and 19 LMSRs in its inventory.

Tactical Logistics

Once the strategic lift deploys Army forces to where they are required, tactical logistics moves to



The UH-60 Black Hawk helicopter has been a mainstay of Army logistics since 1979. This photo shows a Black Hawk air ambulance being refueled at a 101st Airborne Division rapid refuel point in Saudi Arabia during the Persian Gulf War in 1991.

the forefront. From this perspective, there are three types of Army units: combat arms, combat support, and CSS. (The three types also are referred to as maneuver, maneuver support, and maneuver sustainment.) This article concentrates on logistics support to combat arms units.

At the company level, the executive officer (typically a first lieutenant) oversees logistics. He is assisted by a supply sergeant and a maintenance sergeant. At the battalion level, the support, maintenance, and medical platoons of the headquarters and headquarters company (HHC) provide logistics support to the battalion's organic units. At the brigade level, logistics organizations called support battalions provide additional logistics. Though support battalions may include a wide variety of supply, maintenance, transportation, and medical companies, the typical brigade-level support battalion has a supply company, maintenance company, and medical company. (Some supply companies are transitioning to distribution companies as they are fielded transportation assets.)

Forward support battalions (FSBs) provide support to divisional maneuver brigades. Brigade support battalions (BSBs) provide support to SBCTs. Corps support battalions (CSBs) provide reinforcing logistics to maneuver brigades and primary logistics to corps units. CSBs also provide services such as laundry, showers, water purification, airdrop, and mortuary affairs. A division's support battalions are organized within a brigade-level organization known as a division support command (DISCOM). CSBs are organized within a brigade-level organization known as a corps support group (CSG). Two or more CSGs help form a corps support command (COSCOM), which also has a materiel management center (MMC),

a movement control battalion (MCB), and a troop support battalion.

The accounting, visibility, and control functions associated with supplies and maintenance are performed by an MMC at both the division and corps levels. A movement control office and an MCB perform transportation control functions at the division and corps levels, respectively.

The theater support command (TSC) is at a higher level than the COSCOM. Its mission is to maximize throughput and follow-on sustainment of Army forces and other supported elements regardless of the scale of operations. The TSC ensures that unit personnel, unit equipment, and commodities move to their points of employment with a minimum of intervening stops and transfers. For this reason, the TSC establishes command of support operations and controls the distribution system before deploying elements arrive in the area of operations. The TSC provides overall sustainment support to Army forces and may provide interim tactical-level support to early deploying corps and divisional elements.

Authorization Documents

Documents authorizing unit personnel, equipment, and supplies for Army forces include the table of organization and equipment (TOE), modification table of organization and equipment (MTOE), table of distribution and allowances (TDA), common table of allowances (CTA), technical manual (TM), load list, and stockage lists.

A TOE lists all of the personnel slots, required skills, and class VII equipment that the Army has authorized a specific type of unit. TOEs normally are published at the battalion or separate company level and are models. Since different commands within the Army have different needs based on regional threats or environmental considerations, TOEs are used as the basis for MTOEs. For instance, a light infantry battalion in Alaska and a light infantry battalion in Hawaii will be based on the same TOE. However, each one's MTOE will be slightly different. The battalion located in Alaska will be authorized more cold weather gear, for example. By using the Web-based The Army Authorization Documents System (TAADS) software, logisticians can review the MTOEs for most units in the Army.

TDAs contain the same type of information as MTOEs, except that TDAs provide personnel and equipment authorizations for units that generally are considered nondeployable. These units normally are associated with organizations that support fixed facilities like installations or hospitals.

CTAs authorize expendable and durable supplies for both MTOE and TDA units but do not authorize

class VII items. Examples of CTAs are CTA 8–100, Army Medical Department Expendable/Durable Items; CTA 50–900, Clothing and Individual Equipment; and CTA 50–909, Field and Garrison Furnishings and Equipment.

Army TMs describe how to operate and maintain class VII items. They also serve as authorization documents for the expendable, durable, and nonexpendable supplies required to operate or maintain class VII items.

Basic loads, prescribed load lists (PLLs), and authorized stockage lists (ASLs) also authorize durable and expendable items. Determining how much sustainment units will be allowed to stock is one of the biggest logistics challenges of the Army. On the one hand, the more sustainment a unit brings with it to the fight, the longer it can operate without external support and the greater the chance it will have what it needs to accomplish its mission. On the other hand, the more sustainment a unit carries with it, the more strategic and tactical lift assets are required to move it. Greater unit-level sustainment also requires additional storage assets and ties up more funds in inventory. For these reasons, units and support battalions are authorized to store and deploy with only a limited quantity of sustainment stocks.

Sustainment stocks that accompany units during deployments are known as combat loads. The PLL is the inventory associated with unit-level class IX combat loads. This inventory at the support battalion level is known as the ASL and provides additional sustainment to units. ASLs are established for specific classes of supply, although bulk class III (fuel), class V (ammunition), and class VIII (medical supplies) are stored and accounted for separately from classes I (subsistence), II (clothing and individual equipment), packaged III, IV (construction and barrier materials), VI (personal demand items), and IX. (A detailed discussion of medical logistics, major end items, and ammunition is outside the scope of this article.) Although PLLs are intended only for the owning unit, ASLs are intended for all of the “customer” units of the support battalion.

Typically, a unit deploys with a 3-day combat load of class I and bottled water, a 15-day combat load of packaged class III, little or perhaps no class IV barrier materials, a basic load of class V (normally a day of supply if actively engaged with an enemy), a 15-day supply of class VI, no excess class VII items, a small amount of class VIII, and about 100 PLL lines of class IX (most with a depth of only two or three items). Supply support activities (SSAs) will deploy with as much as they can, given their limited transportation and storage assets. Once deployed, SSAs themselves have to be resupplied, sometimes in 3 days or less, depending on the class of supply and the availability

of host nation support. Bulk fuel, bulk and packaged water, rations, and ammunition are quickly consumed.

Transformation

Improving logistics support is one of the focuses of the planning for the Army's Future Force. A key part of that force will be a new, networked suite of vehicles called the Future Combat Systems (FCS). The FCS vehicle will have many of the features of an M1 tank or M2 Bradley fighting vehicle, except that it is envisioned to be much lighter. Current specifications state that it must be light enough to be moved on a C-130 transport.

While the FCS will be part of the Future Force, the Stryker—an armored, wheeled vehicle—has been fielded already and is a key component of the SBCT (formerly called the interim brigade combat team). An SBCT has 327 Stryker vehicles and is roughly half the weight of an armored brigade and twice the weight of a light infantry brigade. The Army's short-term goal is to be able to deploy one SBCT in 4 days, a division in 5 days, and five divisions within 30 days. With add-on reactive armor, the Stryker vehicle can withstand small arms, heavy machinegun, and handheld rocket-propelled-grenade fire. A Stryker's combat-capable weight does not exceed 19 tons. All of the vehicles and equipment of an entire SBCT weigh about 13,000 tons. Excluding fuel and water, 3 days of sustainment for an SBCT weighs about 2,500 tons.

The Army's traditional brigade, division, corps, and ASCC structure also is being reviewed. The number of higher headquarters will be reduced. Brigades and portions of divisions will be organized into a modular force of BCTs (originally called units of action [UAs]). Each BCT will contain traditional maneuver battalions, along with some combat support and CSS traditionally provided by divisional or corps units. The Army envisions three types of maneuver BCTs. Armored BCTs will have about 3,800 personnel and 1,000 vehicles, infantry BCTs will have about 3,000 soldiers, and Stryker BCTs will have about 4,000 personnel. There also will be aviation BCTs and sustainment BCTs. All told, there will be 21 infantry BCTs, 22 armored BCTs, and 5 SBCTs. The Army goal is to have 48 active component BCTs and 32 National Guard BCTs.

The higher level command and support organization for the UAs currently is called a unit of employment x (UEx). This one level of command will be able to conduct many of the same command and

Additional Army Logistics Resources

Army Knowledge Online (AKO)	https://www.us.army.mil/portal/portal_home.jhtml (password required)
Combined Arms Support Command (CASCOC)	www.cascom.army.mil
SDDC Transportation Engineering Agency	www.tea.army.mil/index.htm
Logistics Integrated Database (LIDB)	https://www.logsa.army.mil/pubs.htm (password required)
PS Magazine	https://www.logsa.army.mil/psmag/psonline.htm
The Army Authorization Documents System (TAADS)	https://webtaads.belvoir.army.mil/usafmsa (password required)
Technical manuals (TMs)	https://www.logsa.army.mil/etms/online.htm

control missions currently being performed by the two levels of command associated with a division and a corps. A UEx will be capable of commanding at least six BCTs, including all or part of a Marine expeditionary brigade. A different type of unit of employment, the UEy, will serve at a higher level than the UEx and will conduct many of the command and control missions formerly provided by the two levels associated with a corps and an ASCC.

These ongoing transformational changes are meant to ensure that the Army is structured to deploy to remote locations worldwide as part of a joint force. Although providing logistics support to Army forces is especially challenging because of the diversity of equipment and the dispersal of forces, new organizational designs and the introduction of lighter, land vehicles will enable the Army to deploy large forces much more rapidly than in the past and sustain them in noncontiguous environments.

ALOG

LIEUTENANT COLONEL JAMES C. BATES, USA (RET.), IS A FORMER ARMY LOGISTICS OFFICER WHO WORKS FOR ALION SCIENCE AND TECHNOLOGY AND CURRENTLY SERVES AS A SUSTAINMENT PLANNER FOR THE U.S. JOINT FORCES COMMAND, J-9 TRANSFORMATION, AT SUFFOLK, VIRGINIA. HE IS DESIGNATED A CERTIFIED PROFESSIONAL LOGISTICIAN BY SOLE—THE INTERNATIONAL SOCIETY OF LOGISTICS AND HOLDS AN M.B.A. DEGREE FROM THE UNIVERSITY OF HAWAII. HE CAN BE REACHED BY EMAIL AT JAMES.BATES@JE.JFCOM.MIL.

The Support Leader Digital Assistant

BY MAJOR HOLLY F. WEST AND MAJOR ELIZABETH W. SCHOTT

Future battalion S-4s and support platoon leaders in maneuver units may have a new tool to help them make detailed, quantifiable, and efficient logistics estimates.

Planning for future events is critical at every level of command in the Army. Combat units plan for future contingencies based on intelligence gathered about enemy operations, and logisticians plan for supply operations based on the plans of combat units. Typically, logistics planning for an operation is conducted by school-trained logisticians (officers in positions identified as functional area 90 [multifunctional logistics]) who work on Army-, theater-, corps-, division-, and sometimes brigade-level staffs. This planning usually results in logistics estimates or concepts of support and includes detailed plans on how, where, and sometimes when units will be resupplied.

When a "pull" system of resupply is used (supplies are delivered by truck or rail to a central point and redistributed according to known requests), some of the most important planning occurs at the maneuver battalion level. There are no trained logisticians at this

level, and seldom is there a system in place to assist the battalion S-4 and support platoon leaders in forecasting and requesting daily supplies. As a result, inaccurate forecasts from supported units create problems for the logistics units throughout the supply chain.

The experiences of support platoon leaders in maneuver battalions and company commanders in divisional forward support battalions have brought to light the challenges that maneuver units face when forecasting daily supplies. Usually, the officers making the forecasts are the support platoon leaders or battalion S-4s. Forecasts are submitted on a daily standard logistics report that is called various names, such as the Yellow 1 Report, Amber 1 Report, or logistics status (LOGSTAT) report. Despite the different names, the reports usually provide 24- to 48-hour forecasts and on-hand balances of classes

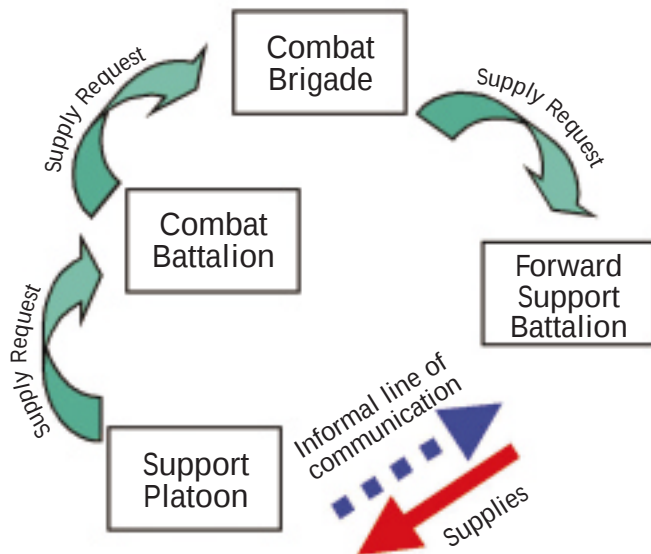
of supply, focusing on classes I (subsistence), III (petroleum, oils, and lubricants), and V (ammunition).

Since both the support platoon leaders and the battalion S-4s are combat arms officers, they have only minimal formal training in logistics planning. This training shortfall sometimes causes them to overestimate or underestimate their requirements,

Microsoft Excel - Yellow1.xls													
File Edit View Insert Format Tools Data Window Help													
A1 UNIT: AS OF:													
SECTION A - CLASS I													
LINE	ITEM	unit	O/H	Next 24	Next 48	LINE	ITEM	DODIC	O/H	Next 24	Next 48	CONTINUED	
1	UNIT:					2							
3						3							
4	REPORT BY		CURRENT ON HAND			4							
5	MEALS ONLY		REG VEG MULTI			5							
6	A1 WRES					6							
7	A2 T-UGR					7							
8	A3 A/RATS					8							
9	A4 B/RATS					9							
10	A5 FOS Bulk					10							
11	A6 FOS Rts					11							
12						12							
13						13							
14						14							
15						15							
16	B1 JP-8	gal				16	C21 Gren Incendary	G990					
17	B2 MOGAS	gal				17	C22 Gren RKT LAW	H657					
18	B3 T90	qt				18	C23 Smoke Pat	K867					
19	B4 OE-19	qt				19	C24 Sig Ill Green Star	L365					
20	B5 OE-39	qt				20	C25 Sig Ill Red Star	L311					

A screen capture of user inputs and logistics forecasts on an armored division's "Yellow 1" report.

Supply Requirements Reporting Procedures



The current focus of the SLDA is on the following primary classes of supply that feed into the supply chain.

I (Subsistence)
III (Petroleum)
V (Ammunition)

Numbers are developed by the support platoon leaders and maneuver battalion S-4s.

Requests are submitted on the daily logistics status (LOGSTAT) report.

which can have huge “domino” effects on the supply chain. Obviously, if the forecasts are underestimated, the entire maneuver mission may be in jeopardy. If the forecasts are overestimated, the support troops and vehicles bringing unneeded supplies forward are exposed to risk unnecessarily. As we have seen in Operation Iraqi Freedom, supply convoys are often the targets of enemy ambushes.

To help logisticians to forecast requirements more accurately, the Operations Research Center at the U.S. Military Academy is developing a valuable tool called the Support Leader Digital Assistant (SLDA).

LOGSTAT Report

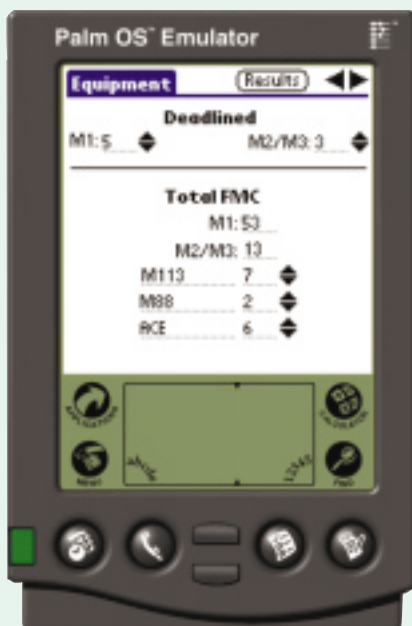
In developing the SLDA, first consideration was given to the origin of the LOGSTAT reports. The daily forecast of required supplies is a semistructured decision that frequently is made under stressful conditions. Since no two missions are ever identical, no two forecasts are exactly the same. The platoon leader and battalion S-4 operate in a field environment that affords them insufficient sleep and too little time to do everything that needs to be done. The support platoon leader provides a forecast, or request for supplies, to the battalion S-4, who reviews the request

and makes necessary changes. He submits the request to the brigade S-4, who combines all of the brigade’s requests and forwards a consolidated request to the divisional forward support battalion’s support operations officer. The support operations officer forwards the consolidated request to the company that will actually resupply the brigade’s maneuver battalions.

Although formal lines of communication are necessary, the experienced supply company commander in the forward support battalion typically helps the support platoon leader in the maneuver battalion to make educated supply forecasts. This informal contact often is the only help the support platoon leader receives, and the operational tempo and location of the decisionmaker often make this assistance sporadic. Although many tools have been developed to assist in forecasting supply requirements, they were designed for brigade-sized and larger units—until now.

How the SLDA Works

The SLDA is designed specifically for logistics estimates at the battalion level and below. Its primary focus is to enable the battalion S-4 in a maneuver unit to make detailed, quantifiable, and efficient logistics estimates of the classes of supply usually



A personal digital assistant screen capture.

requested through a LOGSTAT report: classes I, III, and V.

The SLDA prototype produces a Microsoft Excel spreadsheet and generates logistics estimates based on user input, built-in planning factors, and macros. Using buttons, drop-down menus, and scroll bars, the SLDA user can easily input required data, such as current unit on-hand balances, unit task organization (either by unit type or numbers of each type of vehicle and their status), unit strength, and projected missions for the next 24 and 48 hours. The program then calculates logistics forecasts based on the user input and built-in planning factors. For example, the program incorporates the numbers and types of vehicles in the unit, the upcoming mission type, and the estimated mission length. The fuel-consumption planning factors estimate the gallons of fuel the vehicles will require over both 24- and 48-hour periods.

After the estimates are calculated, the SLDA fills in the LOGSTAT report with the logistics estimates and on-hand balances, and the report is ready for submission to higher headquarters. The SLDA also can be used to consolidate reports from battalions at the brigade level or higher for submission to the appropriate forward support battalion.

A valuable tool programmed into the SLDA is the capability to archive reports. By saving historical data, the SLDA can use a unit's actual historical consumption rates and information about mission types and durations to provide future logistics estimates. A unit's historical data often can provide its

most accurate logistics estimate. Unfortunately, this historical information is not captured adequately by most units and often is not used effectively in the logistics estimation process.

Currently, the SLDA is tailored specifically for armored or mechanized units and focuses on classes I, III, and V; however, the SLDA can be adapted easily to any unit's specific forecasting and reporting requirements. It can be tailored to run on a Microsoft Excel personal digital assistant (PDA) application, or it can be converted to a Palm application written in Palm operating system code (.prc). The first Palm application prototype, SLDA-PDA, is written in the Palm operating system code and operates on a Palm PDA. This version of SLDA is similar to the Excel version. Buttons and drop-down menus facilitate input, and logistics estimates are calculated based on built-in planning factors.

Now that the first prototype of the SLDA has been developed, the next step is to tailor it to specific unit reporting procedures and add connectivity. This will allow maneuver units to make better estimates and automate routine submission procedures, including rollup of subordinate unit reports, which will result in faster, more detailed, and more accurate logistics estimates. Future synchronization of the SLDA with existing brigade-level and higher logistics information systems will help units make more accurate logistics forecasts. This will translate into better and more efficient resupply and, ultimately, lead to improved readiness of maneuver units.

Questions or comments about the system should be sent by email to holly.west@us.army.mil or elizabeth.schott@us.army.mil.

ALOG

MAJOR HOLLY F. WEST IS AN ASSISTANT PROFESSOR OF SYSTEMS ENGINEERING AT THE U.S. MILITARY ACADEMY (USMA). SHE HAS A BACHELOR'S DEGREE IN ECONOMICS FROM THE USMA AND A MASTER'S DEGREE IN BUSINESS ADMINISTRATION FROM THE UNIVERSITY OF KENTUCKY. SHE IS A GRADUATE OF THE QUARTERMASTER OFFICER BASIC COURSE AND THE COMBINED LOGISTICS OFFICERS ADVANCED COURSE.

MAJOR ELIZABETH W. SCHOTT IS ASSIGNED TO THE ARMY TRAINING AND DOCTRINE COMMAND ANALYSIS CENTER-WHITE SANDS MISSILE RANGE, NEW MEXICO. SHE HAS A BACHELOR'S DEGREE IN MATHEMATICS FROM THE USMA AND A MASTER'S DEGREE IN INDUSTRIAL ENGINEERING FROM THE GEORGIA INSTITUTE OF TECHNOLOGY. SHE IS A GRADUATE OF THE QUARTERMASTER OFFICER BASIC COURSE, THE COMBINED LOGISTICS OFFICERS ADVANCED COURSE, AND THE ARMY COMMAND AND GENERAL STAFF OFFICER'S COURSE.

The LEW: It Keeps Getting Better

BY CAPTAIN CARL E. BALLINGER

Originally designed as a classroom tool, the Logistics Estimation Workbook continues to help tactical logisticians accurately estimate logistics requirements in combat.

Since 1998, logisticians have been using the Logistics Estimation Workbook (LEW) as an important part of their mission analysis and logistics planning. The LEW was developed by an instructor in the Army Logistics Management College's Support Operations Course at Fort Lee, Virginia, as a logistics requirements forecasting tool. Based on a Microsoft Excel application, the LEW is designed to support rapid logistics planning, primarily at the brigade level and below.

The LEW uses planning factors from the Army Command and General Staff College's Combat Service Support Battle Book Student Text 101-6 and the Army's Operations Logistics (OPLOG) Planner, Version 2.20. Since its inception, the LEW has been updated many times. The updates often were spurred by the input of users. Their suggestions for improvements to the application have led, over time, to a significantly improved product.

The latest update to the LEW, published in February, is version 9.1, which follows version 9.0 by only a few months. LEW 9.1 maintains all of the functionality of previous versions and adds useful new features. The new version adds many more Army unit types to the system and makes them available for selection. Users are more likely than before to find a unit that fits the characteristics of their own units in the "OPTEMPO" (operating tempo) drop-down menu. This means that few or no adjustments will have to be made to personnel and equipment numbers.

In earlier versions of the LEW, most calculations were based on the assumption that the periods of time designated on the first user input page were 24-hour days. However, time periods, or phases, are actually driven by the type of mission, such as attack, defense, or uncommitted. LEW 9.1 allows the user to designate the length of each period in hours. The LEW then automatically adjusts all calculations of personnel losses, medical evacuation, general supply, ammunition, equipment maintenance, and evacuation requirements to the periods of time entered by the user. Operators still can use the LEW in the traditional manner by

entering "24" for each period of time. This makes each mission a whole day, which is how previous versions of LEW treated all missions.

Another significant change to the LEW occurs on the "Personnel Losses" page. Previously, users of this portion of the LEW clicked on a drop-down menu to select one period at a time to determine medical evacuation requirements and shortfalls. LEW 9.1 allows users to do this for all time periods at once and see the results on one page. The new Personnel Losses page requires more user input, but the user only needs to identify time periods requiring medical evacuation information and complete the corresponding portions of the page. For instance, a user does not have to fill out a column that corresponds to a period with an uncommitted mission.

LEW 9.1 also allows users to choose where air ambulances pick up patients. Previous versions assumed that all air ambulances would fly to the forward support medical company to pick up patients. With LEW 9.1, users can choose to have air ambulances pick up patients at ambulance exchange points.

Improvements will continue to be incorporated into the LEW as they are developed. For example, modular force units will be preloaded into the Excel applications in future versions of the LEW.

The LEW is accessible through Army Knowledge Online (AKO) by clicking on the "files" icon at the top of the AKO page and searching for "LEW 9.1." New users must click on the "Subscribe Now" button before they can access the "Team LEW" folder containing LEW 9.1 and the newly updated User's Guide.

Questions about the LEW should be directed to david.sales@us.army.mil.

A LOG

CAPTAIN CARL E. BALLINGER IS A STUDENT IN THE EXPLOSIVE ORDNANCE DISPOSAL SCHOOL AT EGLIN AIR FORCE BASE, FLORIDA. HE HAS A BACHELOR'S DEGREE IN POLITICAL SCIENCE FROM THE UNIVERSITY OF MISSOURI-COLUMBIA AND IS A GRADUATE OF THE ORDNANCE OFFICER BASIC COURSE, THE MOVEMENT CONTROL PLANNER COURSE, AND THE COMBINED LOGISTICS CAPTAINS CAREER COURSE.

ALOG NEWS

(continued from page 1)

and other capabilities. It brings intermediate- or depot-level maintenance support to the organizational level. With the help of JDSR, a maintainer trained at the basic organizational level can receive assistance from depot support personnel or an engineer and, in some cases, from the original equipment manufacturer that produced the equipment.

"One key benefit of the system is it helps maintainers diagnose and ultimately fix difficult or unusual maintenance problems quicker than in the past," said Elijah Brown, deputy operational manager for JDSR. "If a maintainer is out in the field and he has a problem, he can show an SME [subject-matter expert] the problem by putting a video camera on it and the SME can then use voice, chat, and streaming video to provide a diagnosis and solution to the problem." Without the capabilities the JDSR provides, organizational-level maintainers could wait days or weeks for help to solve intermediate- or depot-level problems.

Brown said that the Navy, the lead service for the ACTD, will retrofit all of its ships with JDSR capabilities within the next 2 years. He expects all of the JDSR's products to be fully transitioned and in the hands of warfighters in the 2008 or 2009 timeframe.

JFCOM'S LIMITED ACQUISITION AUTHORITY HELPS SPEED EQUIPMENT TO WARFIGHTERS

The U.S. Joint Forces Command (JFCOM) has a new tool to help get new capabilities to joint warfighters sooner. The National Defense Authorization Act of 2004 granted JFCOM limited acquisition authority (LAA), subject to delegation by the Secretary of Defense. In a subsequent memorandum, Secretary of Defense Donald H. Rumsfeld acknowledged the authority and directed the armed services and Defense agencies to help JFCOM identify LAA requirements. The authority expires on 30 September 2006.

According to JFCOM officials, LAA is designed to accelerate the acquisition process so that new technologies will be available to frontline warfighters years sooner than with the normal process. So far, the command has used the authority to fund four projects and has more under consideration.

The authority is limited to \$10 million for research and development and \$50 million for procurement. LAA funds must be used for the development and acquisition of specific items, such as joint battle management command and control, communications, and intelligence, and other equipment that the JFCOM commander believes can facilitate the use of joint component forces in military operations and enhance the interoperability of their equipment. LAA cannot be used to acquire weapons.

One LAA project was the 2,000-pound Joint Precision Aerial Delivery System (JPADS) used to deliver supplies to forces in remote locations. JFCOM adapted it from an advanced concept technology demonstration for 10,000- to 20,000-pound loads. Delivering large loads to small units operating behind enemy lines was impractical because the units did not have sufficient manpower to handle them. Money was not available to develop the JPADS for small loads, so a combatant commander submitted a request to JFCOM to develop the system. Once the request was approved, it took a little more than a year to get the capability to the field. JFCOM officials estimate that, using normal procurement procedures, the smaller JPADS would not have reached warfighters until 2009.

AABC GRADUATES EARN TRANSFER CREDITS FOR ADVANCED DEGREES

Representatives of the Army Logistics Management College (ALMC) at Fort Lee, Virginia, and Webster University in St. Louis, Missouri, signed an agreement in April to provide graduate degree opportunities to graduates of the Army Acquisition Basic Course (AABC). Graduates of the AABC, which is offered at ALMC's Huntsville, Alabama, campus, will be eligible for automatic admission to Webster University. Students can transfer credits earned in the AABC to Webster and use them to meet requirements for master's degrees in business administration, computer resources and information management, and procurement and acquisition management. The students will save \$4,500 to \$6,000 in tuition costs by transferring AABC credits to Webster.

The cooperative degree program will be offered at several Webster University campuses. Webster provides programs and services at 53 military installations and at professional military schools. More than 6,000 students, or 30 percent of Webster's enrollment, attend classes on military installations.

Information about the cooperative degree program can be found at www.webster.edu/fbleonardwood/Partnerships.htm. For more information on the AABC, refer to the ALMC Web site at www.almc.army.mil/hsv/index.asp.

CS AND CSS SOLDIERS MAY ATTEND RANGER SCHOOL

Soldiers in combat support (CS) and combat service support (CSS) branches of the Army may now attend Ranger School. In the past, attendance at Ranger School was limited to combat arms soldiers and those who were assigned to the 75th Ranger Regiment or the Ranger Training Brigade.

The change came about as a part of Task Force Soldier, a focus area of the Army Campaign Plan. According to Colonel K.K. Chinn, Ranger Training Brigade Commander, Task Force Soldier was looking for ways to build warrior ethos throughout the Army and concluded that more Ranger-qualified leaders would help to accomplish that goal. "Ranger training is important because it teaches soldiers what they need to know about small-unit tactics and how to fight and win in the close-combat, direct-fire battle," said Chinn. He believes that attending Ranger School "is the best life insurance policy you can get for you and your men."

Soldiers attending Ranger School must endure a rigorous 61-day course that pushes them to their physical and mental limits. The course consists of three phases: The Fort Benning (Georgia) Phase, the Mountain Phase, also conducted in Georgia, and the Florida Phase, which is conducted at Eglin Air Force Base.

To apply for Ranger School, a soldier must submit a Department of the Army Form 4187 (Request for Personnel Action) and the results of his Airborne or Ranger physical through the first lieutenant colonel in his chain of command to the installation Director of Plans and Training Management or G-3. Attendance is limited to soldiers for whom the Army's combat exclusion policy does not apply.

FIRST MECHANICS COMPLETE NEW STRYKER MAINTENANCE COURSE

The first soldiers specifically trained to maintain the Army's Stryker vehicles graduated from a new course at the Army Ordnance Mechanical



Technicians apply TankSkin to a fuel tanker at Army Field Support Brigade-Iraq. TankSkin, a product developed by VSE Corporation of Alexandria, Virginia, is a protective coating that is sprayed on vehicles and hardens into a surface tough enough to deflect bullets. It also can expand to plug bullet holes, protecting against fuel fires and spills. Armor plates installed below the fuel tanks protect pumps and hose connectors. Installation of TankSkin began in March, with the first six protected tankers issued to 1st Corps Support Command units in April.

Maintenance School at Aberdeen Proving Ground, Maryland, on 22 March. The 15 graduates received a new additional skill identifier, R4, Interim Armored Vehicle Mechanic.

The course is designed to produce soldiers qualified to fill slots as Stryker maintainers in Stryker brigade combat teams (SBCTs). The students are military occupational specialty 63B10 (Wheeled Vehicle Mechanic)-level advanced individual training graduates en route to an SBCT. In the future, this ASI will be available to select Basic Noncommissioned Officers Course and warrant officer technical training students.

The course, lasting 4 weeks and 2 days, will train 75 soldiers in 4 classes in fiscal year 2005. Up to 20 classes will be offered annually in succeeding years, graduating 120 mechanics in fiscal year 2006 and 240 mechanics each year, beginning in fiscal year 2007. The student-to-instructor and equipment ratios will be maintained at one instructor and one Stryker vehicle for every four students.



The 23-ton Buffalo is the newest piece of equipment Operation Iraqi Freedom soldiers have to identify improvised explosive devices.

NEW VEHICLE AIDS IN IED DETECTION

A new, heavily armored vehicle in use in Iraq is giving Army engineers a closer look at suspected improvised explosive devices (IEDs).

The 23-ton "Buffalo" helps confirm the presence of an IED before an explosive ordnance disposal team is brought to the scene. The Buffalo is equipped with a 30-foot robotic arm, or "iron claw," that is operated from within the vehicle. When a possible IED is spotted by a route clearance team, the claw is used to probe debris and dirt around the questionable device in an effort to identify the object. A video camera in the claw transfers images to a television screen inside the vehicle.

The Buffalo's crew of six sits 10 to 12 feet off the ground and has access to searchlights that are maneuvered from inside the vehicle. With the help of the lights, video camera, and claw, they can search anywhere they feel there is a threat.

The Buffalo saves lives when IEDs explode while being inspected. The Army National Guard's 612th Engineer Battalion has identified 75 IEDs, 16 pieces of unexploded ordnance, and 16 fake devices (planted to study how the coalition forces respond) during its first 3 months in Iraq. Although the Buffalo has been hit several times by small arms fire, grenades, and artillery shells, no one riding inside has been hurt.

UNITS RECOGNIZED AT FIRST COMBINED LOGISTICS EXCELLENCE AWARDS CEREMONY

The Army's top-performing logistics units of the year were recognized at the first annual Chief of Staff of the Army Combined Logistics Excellence Awards Ceremony on 19 May. The awards presented included the Deployment Excellence Award, the Army Award for Maintenance Excellence, and the Army Supply Excellence Award. In previous years, separate ceremonies were held for each award. At the suggestion of the Deputy Chief of Staff, G-4, the three awards ceremonies have been combined. This year's ceremony took place during the Association of the United States Army Logistics Symposium in Washington, D.C. General Richard A. Cody, Vice Chief of Staff of the Army, and Lieutenant General C.V. Christianson, Army Deputy Chief of Staff, G-4, presented the awards.

The **Deployment Excellence Award** recognizes units and installations for outstanding deployment accomplishments. Winners are—

Operational Deployment

Large Unit. 1st Battalion, 38th Field Artillery Regiment, 2d Infantry Division, Camp Stanley, Korea.

Small Unit. F Company, 3d Battalion, 69th Armor Regiment, 3d Infantry Division (Mechanized), Fort Stewart, Georgia.

Active Army

Large Unit. 10th Mountain Division (Light Infantry), Fort Drum, New York.

Small Unit. 96th Transportation Company, 180th Transportation Battalion, 64th Corps Support Group, 13th Corps Support Command, Fort Hood, Texas.

Supporting Unit. 842d Transportation Battalion, Military Surface Deployment and Distribution Command, Beaumont, Texas.

Army National Guard

Large Unit. 2d Battalion, 162d Infantry Regiment, Oregon Army National Guard.

Small Unit. G Troop, 82d Cavalry, Oregon Army National Guard.

Supporting Unit. Camp Atterbury, Indiana.

Army Reserve

Large Unit. 1179th Deployment Support Brigade, Fort Hamilton, New York.

Small Unit. 319th Transportation Detachment, 1176th Transportation Terminal Brigade, Dover, Delaware.

Supporting Unit. 4003d Garrison Support Unit, Norman, Oklahoma.

All Army
Installation. Fort Hood, Texas.

The **Army Award for Maintenance Excellence** winners are—

Active Army Table of Organization and Equipment (TOE)

Small Unit. C Battery, 2d Battalion, 44th Air Defense Artillery Regiment, Fort Campbell, Kentucky.

Medium Unit. 82d Military Police Company, Fort Bragg, North Carolina.

Large Unit. 3d Battalion, 7th Field Artillery Regiment, Schofield Barracks, Hawaii.

Active Army Table of Distribution and Allowances (TDA)

Small Unit. Equipment Concentration Site 66, Fort Leonard Wood, Missouri.

Medium Unit. 58th Transportation Battalion, Fort Leonard Wood, Missouri.

Large Unit. 1st Battalion, 29th Infantry Regiment, Fort Benning, Georgia.

Army National Guard (TOE)

Small Unit. Headquarters and Headquarters Detachment, 690th Maintenance Battalion, Kinston, North Carolina.

Medium Unit. 3647th Maintenance Company, Blackstone, Virginia.

Army Reserve (TOE)

Small Unit. 812th Signal Company, Concord, California.

Medium Unit. 428th Transportation Company, Camp Cooke, Iraq.

Large Unit. 94th General Hospital, Seagoville, Texas.

The **Army Supply Excellence Award** winners are—

Active Army

Company, Battery, Troop, Detachment. 11th Signal Detachment, Mannheim, Germany.

Battalion, Squadron. 205th Military Intelligence Battalion, Camp Zama, Japan.

Small TDA Unit. University of Kansas Reserve Officers' Training Corps Program.

Large TDA Unit. Maintenance Activity Mannheim, Germany.

Property Book. 501st Military Intelligence Brigade, Yongsan, Seoul, Korea.

Small Supply Support Activity (SSA). 25th Aviation Regiment, 25th Infantry Division (Light), Wheeler Army Airfield, Hawaii.

Large SSA. 172d Support Battalion, Fort Wainwright, Alaska.

Army National Guard

Company, Battery, Troop, Detachment. 43d Army Band, Lincoln, Nebraska.

Battalion, Squadron. Headquarters and Headquarters Company, 2d Battalion, 194th Armor Regiment, Duluth, Minnesota.

Small TDA Unit. 209th Regional Training Institute, Lincoln, Nebraska.

Large TDA Unit. Joint Forces Headquarters, Madison, Wisconsin.

Property Book. Headquarters 82d Troop Command, Clackamas, Oregon.

Small SSA. B Company, 193d Aviation Regiment, Schofield Barracks, Hawaii.

Large SSA. Camp Ripley Training Site, Camp Ripley, Minnesota.

Army Reserve

Company, Battery, Troop, Detachment. 329th Quartermaster Company, Riverside, California.

Battalion, Squadron. 94th General Hospital, Seagoville, Texas.

Small TDA Unit. 4th Brigade (Combat Service Support), Grand Prairie, Texas.

Large TDA Unit. Equipment Concentration Site 66, Fort Leonard Wood, Missouri.

Property Book. 320th Ordnance Battalion, Lincoln, Nebraska.

Large SSA. 245th Maintenance Company, St. Louis, Missouri.

**TRANSCOM WINS
SUPPLY CHAIN EXCELLENCE AWARD**

On 7 April, the U.S. Transportation Command (TRANSCOM) received the Award for Excellence in Supply Chain Operations. Alan Estevez, Assistant Deputy Under Secretary of Defense for Supply Chain Integration, presented the award during the Supply Chain World North America Conference in Anaheim, California.

TRANSCOM was nominated for the award based on the success of its U.S. Central Command (CENTCOM) Deployment and Distribution Operations Center (CDDOC). The CDDOC, established in Kuwait under the tactical command of CENTCOM, was TRANSCOM's first major initiative after its designation as the Department of Defense's (DOD's) Distribution Process Owner in September 2003. Reach back

and connectivity with their respective commands enable CDDOC's joint logistics experts to make quick decisions, ultimately providing better support to warfighters. The CDDOC serves as a benchmark for other DDOCs that have been established around the world.

The Award for Excellence in Supply Chain Operations is sponsored by the Office of the Deputy Under Secretary of Defense for Logistics and Materiel Readiness. It salutes world-class DOD organizations that have recognized the critical role that supply chain performance plays in reaching organizational goals, are committed to optimizing their supply chain performance, and have demonstrated this commitment by implementing supply chain improvement projects.

NATO CODIFICATION SYMPOSIUM SLATED

The 10th International Symposium on NATO (North Atlantic Treaty Organization) Codification will be held 10 to 13 October in Edinburgh, Scotland. The theme of this year's symposium is "Codification: The DNA of Modern Logistics."

The NATO Codification System (NCS) provides a common logistics language that makes it easier for allies to share equipment and materials. The symposium is held every few years to review current and future requirements for the NCS and advance NCS as the world's standard language of Government supply chain logistics.

Based on the U.S. cataloging system, the NCS is used by more than 50 countries, and it is becoming a standard for e-commerce. NCS supporters seek to use the NCS as a common language between Government and industry in order to build synergy in the logistics chain from the factory to the foxhole.

Information on the symposium and on-line registration are available on the Internet at www.codification2005.org/en/home-g.asp.

ARMY GETS FIRST FUEL-CELL-POWERED MILITARY TRUCK

The world's first fuel-cell-powered military truck, the GMT800, was turned over to the Army on 1 April at the General Motors Corporation research facility near Rochester, New York.

The GMT800 is actually a modified Chevrolet Silverado that has been equipped with two 94-kilowatt fuel-cell stacks. The fuel cells, which chemically convert hydrogen into electricity and water, generate 188

kilowatts of power and approximately the same torque generated by General Motors' 5.3-liter V-8 engine. The truck is equipped with three 10,000-pounds-per-square-inch compressed hydrogen storage tanks that provide a driving range of 125 miles. The GMT800 accelerates much like the V-8-powered production truck but produces no tailpipe emissions.

The Army will evaluate the experimental truck at Fort Belvoir, Virginia, until July 2006. The truck will undergo rigorous testing in different climates and locations around the United States to assess performance and allow users to gain first-hand experience with the operation of a fuel-cell-powered vehicle.

SOLDIER CENTER LOOKING FOR GOOD IDEAS

The Army Natick Soldier Center (NSC) in Massachusetts is seeking creative equipment ideas from soldiers who have served in Operations Enduring Freedom and Iraqi Freedom.

In January 2004, NSC's Operational Forces Interface Group (OFIG) implemented the Soldier Innovation Initiative to capture equipment modifications made by soldiers in the field and to identify new equipment made by soldiers from materials available to them while deployed.

OFIG members visit installations to gather feedback, often targeting installations with units returning from Afghanistan and Iraq. A survey designed by OFIG psychologists prompts soldiers to submit their innovations, creative modifications, field solutions, and items newly created or improvised while deployed. Soldiers are asked not only to provide information on their ideas but also to provide digital or hard-copy photographs to enhance understanding of their ideas. Soldiers are also asked to provide contact information so that they can be reached for clarification. Project officers conduct a review to determine whether the ideas merit further study. Submitters are sometimes invited to the NSC to aid in the prototyping and evaluation process.

Some ideas that have emerged as a result of the Soldier Innovation Initiative are a map pocket sewn inside a patrol cap, a modified sling that allows the M4 carbine rifle to hang in a ready position, and a commercial earpiece for the handheld Soldier Intercom that permits better integration with the user's helmet.

OFIG continues to solicit new ideas for assessment and possible development and fielding. To submit an idea, visit the group's Web site, <http://nsc.natick.army.mil/ofig/index.htm>, and click on "NSC Innovative Idea Survey."

Writing for *Army Logistician*

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

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

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

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

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

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

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Coming in Future Issues—

- **Revolution in Atoms, Molecules, and Photons**
- **Berlin Airlift**
- **Field Maintenance Shortfalls in BSBs**
- **Future Tactical Truck System**
- **Designing Logistics Activity Improvements**
- **Maintenance Reinvention**
- **Who Will Rule Logistics?**
- **Resetting the FMTV**
- **Joint Modular Intermodal Distribution System**
- **Simultaneous Movement Control Operations**
- **Evolution or Dissolution?**

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