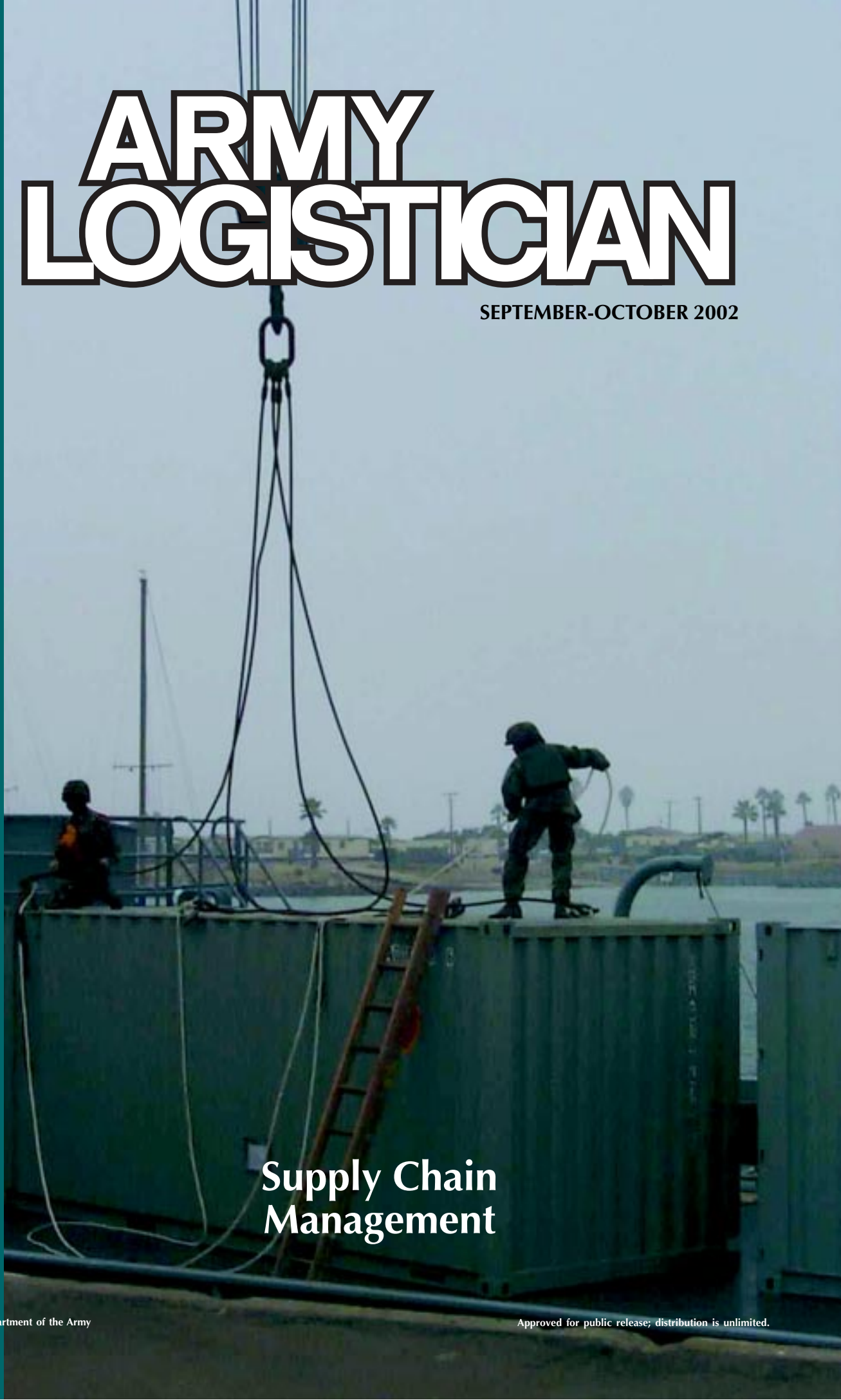
ARMY LOGISTICIAN

SEPTEMBER-OCTOBER 2002



Supply Chain Management

PB 700-02-5 Headquarters, Department of the Army

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COVER

Delivery of supplies to soldiers in the field is the culmination of a chain of management activities reaching back to factories and warehouses in the United States. The chain includes many intermediate actions, such as the movement of containers from an auxiliary crane ship to a landing craft utility shown on the cover. Articles beginning on pages 2, 8, and 11 examine some developments in the ongoing transformation of supply chain management.

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By Order of the Secretary of the Army:

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

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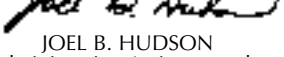

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
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ALOG NEWS

LOGISTICIANS EXAMINE STATE OF TRANSFORMATION

The Army's leading logisticians gathered in Richmond, Virginia, in May for the 2002 Logistics Transformation Symposium and Exhibition sponsored by the Association of the United States Army. Meeting under the theme, "Logistics: Leading the Change for the Army," participants discussed how "to project and sustain the operational force of the future . . . without compromising present support to the" warfighter.

Among the speakers were General Paul J. Kern, commanding general, Army Materiel Command (AMC); Dianne K. Morales, Deputy Under Secretary of Defense for Logistics and Materiel Readiness; Lieutenant General Roy E. Beauchamp, deputy commanding general, AMC; Lieutenant General Larry R. Jordan, deputy commanding general and chief of staff, Army Training and Doctrine Command; Lieutenant General Billy K. Solomon, commanding general, Army Combined Arms Support Command; Major General Hawthorne L. Proctor, director of logistics operations (J3), Defense Logistics Agency; and the commanders of the combat service support schools, Major General Robert T. Dail (Transportation), Major General Terry E. Juskowiak (Quartermaster), Major General Mitchell H. Stevenson (Ordnance), and Brigadier General Edgar E. Stanton III (Soldier Support Institute).

Topics discussed included—

- The reorganization of AMC.
- The need to create an end-to-end, integrated logistics chain, featuring end-to-end weapon systems support, end-to-end combat support, and end-to-end information enterprise integration.

(Continued on page 50)

PENTAGON'S EXTERIOR RESTORATION COMPLETE

When the final piece of limestone was placed on the Pentagon's rebuilt outer facade on 11 June (inset), the exterior work was complete, masking any sign of the terrorist attack on 11 September 2001. At a press conference marking the event, Lee Evey, Pentagon Renovation Program Manager, said: "For 273 days, every single night, we've had spotlights on the outside of the building. In many instances, we had people working up on the side of that building in those spotlights. Tonight, the lights go off. The story outside the building is over. The story now moves to the inside of the building. That's where the challenge is. That's where our story will be told and that's where our success must be achieved." This photo, taken at 0500 on 26 June, shows the lights on inside the building with people already working. The countdown clock in the foreground ticks away the seconds until 0938 on 11 September 2002, the 1-year anniversary of the attack. By that date, the E ring at the point of impact is expected to be reoccupied and operational.

DLA's New Inventory Management Strategy

by Major General Hawthorne L. Proctor
and Captain Aaron J. Cook

A Defense Logistics Agency initiative in partnership with the services will combine consumable inventories into a single national inventory. For the Army, this will mean DLA ownership of Army assets in forward stockage locations.

The Defense Logistics Agency (DLA) is working closely with the Headquarters, Department of the Army (DA), G4 and elements in the other armed services to construct a new inventory management strategy that will revolutionize today's military logistics. This new strategy, called the National Inventory Management Strategy (NIMS), will comply with and enhance the Single Stock Fund (SSF) initiative by eliminating redundant asset management operations and the costs associated with them.

DLA and the Army have partnered to examine the application of this initiative to the Army under the title of Consumable Supply Chain Management-Army (CSCM–A). The partnership's goal is to reduce the amount of Army funding tied up in consumable inventories and enable Army procurement activities to spend money on repair parts and specific mission requirements. With the successful implementation of NIMS and CSCM–A, the Army will gain increased flexibility and expand its opportunities for stock positioning in peacetime and on the battlefield.

DLA and other agencies have worked for several years to create a supply system that will realize the benefits of a single point of management, from the point of acquisition to the point of consumption. The linear concept of the Army SSF—using a single fund to manage money through the entire chain of execution—created the template for NIMS and CSCM–A to follow.

National Inventory Management Strategy

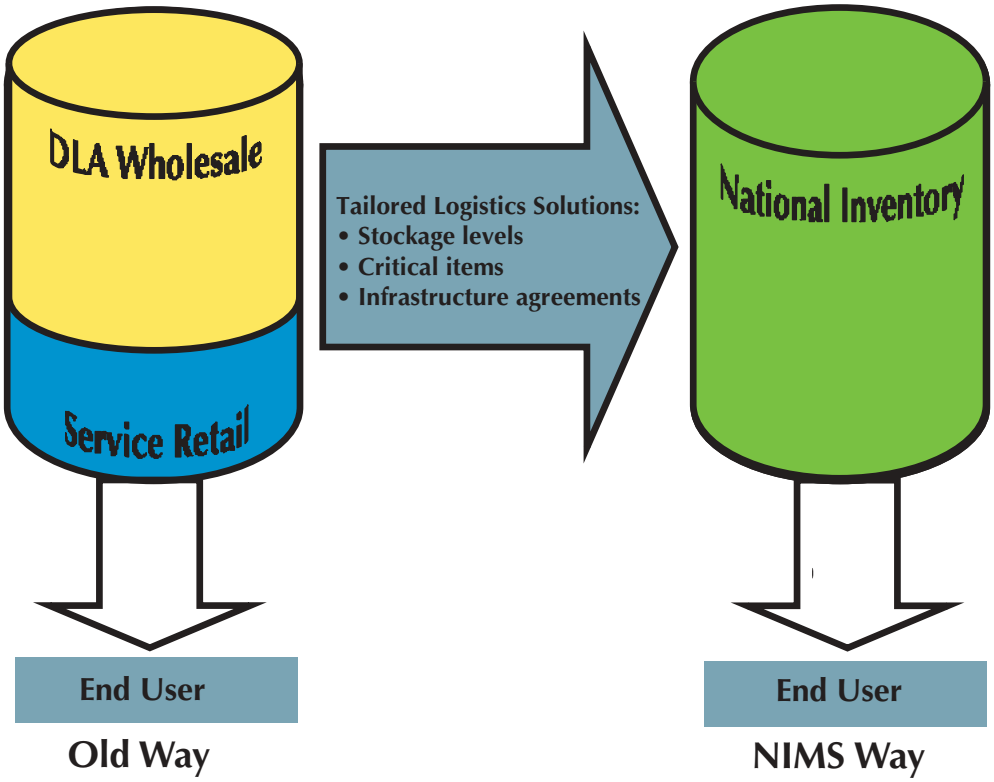
NIMS is DLA's strategy for extending supply chain management of consumable items beyond the wholesale level in order to provide products and services to the point of consumption. This new inventory management approach will combine the consumable inventories of DLA (the wholesale level) and the armed services (the retail level) into a single national inventory that can be managed in a more integrated manner (see chart at right). In coordination with the services, DLA will manage this national inventory to increase the efficiency, productivity, and effectiveness of the entire consumable supply chain.

NIMS will result in DLA owning and having accountability for the national inventory for consumable items, from procurement to the supply support activity. This single owner-manager concept will improve supply efficiencies by reducing inventories, improving the responsiveness of logistics support, and providing complete visibility of the supply chain.

NIMS and Improved Responsiveness

DLA's oversight of a national inventory will enable it to manage a commodity from the point of acquisition to the point of consumption for all of the armed services. Reducing the number of layers of inventory management will improve demand forecasts and stock efficiency.

NIMS will provide a larger total inventory for the Defense community, which will improve cross-leveling of supplies and better meet demands across the services. The consolidation of consumable inventories under a national manager will improve the effectiveness of total



□ NIMS will combine separate DLA and service inventories into one national inventory owned and managed by DLA from the point of procurement to the point of consumption.

asset visibility for all of the services. It will provide the flexibility to customize logistics requirements, thereby achieving tailored support for every type of customer and unit. Stock positioning initiatives also will benefit from this improved visibility, which will increase distribution efficiencies.

Changes at the Unit Level

One of DLA's primary objectives is to make the transition to a national inventory as transparent as possible to the customer so the customer sees minimal changes to legacy systems. A number of information technology options are being reviewed and considered. As these new management strategies transform the current supply system, the end users of the management information systems will see very little change.

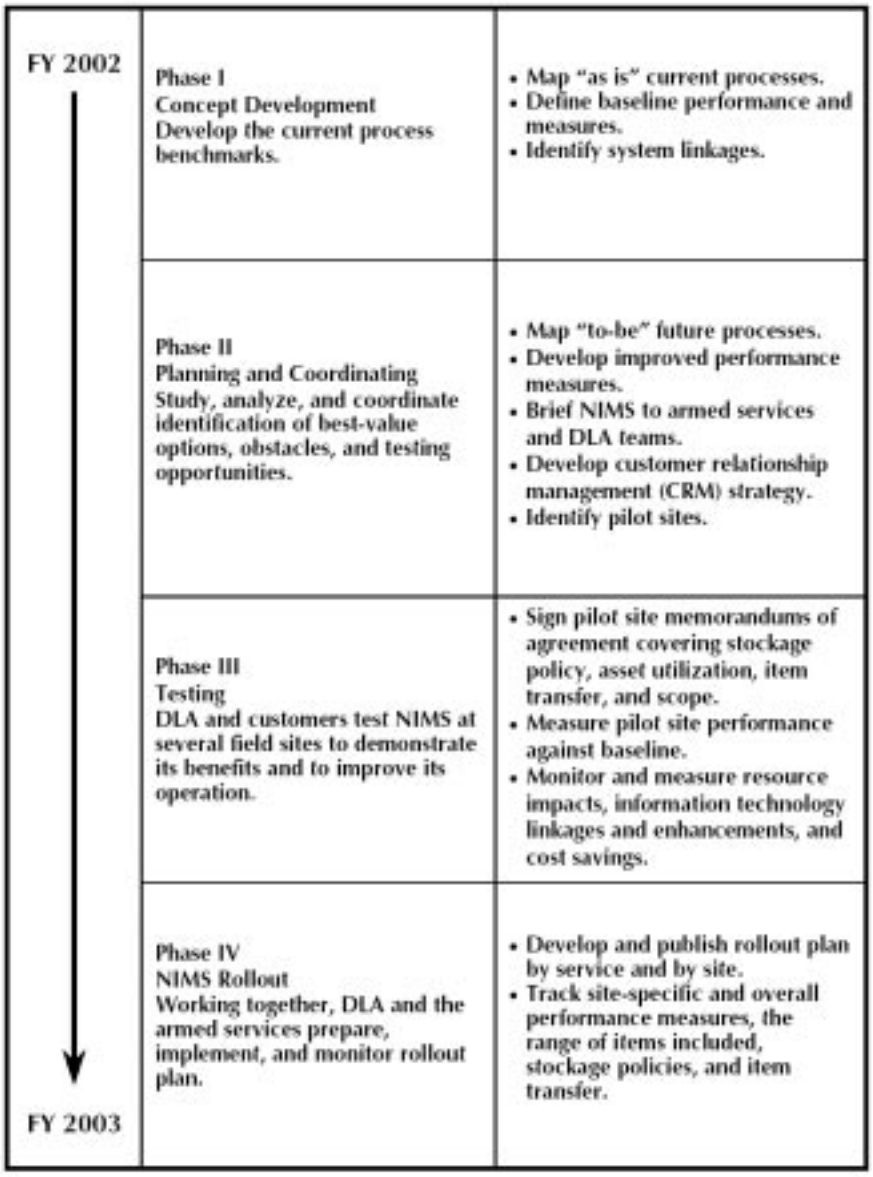
The most significant change end users will see after NIMS implementation is improved efficiency. A considerable benefit of NIMS will be the single point of access it provides for system users and warfighters in place of the multilayered management of the current supply system. Having DLA function as the national manager will allow the services to focus more on warfighting than on submitting requests and inquiries to today's fragmented materiel support system.

NIMS Status and Timeline

Today, DLA has successfully accomplished a national inventory approach for energy, medical, and subsistence commodities and continues to make progress with clothing and textiles. Class IX (repair parts) is the next step, and by far the most challenging, because of the diversity of items and multitude of suppliers involved. The chart on page 4 depicts the phases of NIMS implementation and the timeline for these phases to be completed during fiscal years 2002 and 2003.

The Navy is testing the NIMS concept successfully at Defense Depot Yokosuka, Japan, where DLA has assumed the ownership of intermediate stocks for 11,000 items previously owned by the Navy. Another test program is underway at Naval Air Station Sigonella, Italy. Based on the results so far, the Navy and the other services are pursuing new initiatives to reduce service working capital funds.

The Marine Corps has designated Marine Corps Base Camp Lejeune, North Carolina, as its NIMS test site. Approval of the test site was granted after a series of briefings to the Marine Corps Logistics Advocacy Board at Headquarters, Marine Corps; the commander of Marine Forces Atlantic; and the commanding general of the II Marine Expeditionary Force. The Intermediate



☐ NIMS will be implemented in these phases during fiscal years (FYs) 2002 and 2003.

Supply Support Activity at Camp Lejeune stocks approximately 4,000 line items worth over $10 million. A memorandum of agreement between DLA and the Marine Corps currently is being staffed for signature, and representatives are being identified to form the DLA/Marine Corps NIMS Joint Working Group. DLA is working closely with the Marine Corps to identify and develop information technology to support the NIMS concept that can be integrated into the Marine Corps logistics enterprise. The Marine Corps plans to implement NIMS testing by 1 October.

The Air Force is working to finalize the selection of a pilot site. DLA and Air Force discussions indicate that an air logistics center may be the leading candidate. The Air Force has numerous supply initiatives ongoing at this time but has acknowledged that NIMS may provide additional benefits.

The Army has selected Fort Carson, Colorado, as a pilot site to begin testing by 30 September. CSCM–A, the Army component of NIMS, has undergone intensive planning and coordination among DA headquarters, the Army Materiel Command (AMC), and DLA. After a successful pilot of CSCM–A at Fort Carson, NIMS will be phased in across the Army, transforming the current supply system into a streamlined structure that better supports the future warfighter.

CSCM–A

CSCM–A is a joint Army-DLA initiative to evaluate and implement DLA ownership of assets in Army forward stockage locations. The CSCM–A initiative affects supply class II (personal demand items), packaged class III (petroleum, oils, and lubricants), class IV (construction and barrier materials), and class IX consumables. It will allow business to be conducted directly between the Army customer and DLA, thereby minimizing Department of Defense costs.

The CSCM–A initiative envisions DLA fully implementing supply chain management responsibility for those DLA items in installation, corps, and theater Standard Army Retail Supply System (SARSS)–1 accounts, AMC Installation Supply System (AMCISS) accounts, and non-Army-managed items (NAMI) in all nondeployable, nondivisional operations and maintenance retention stocks. This will achieve the goal of ownership of supplies as far forward as possible under one agency—DLA. After Milestone 3 of the SSF [which basically extends the SSF to division authorized stockage list inventories], DLA will assume ownership and management of those DLA items stocked at the Army division level.

CSCM–A is a logical extension of the Army SSF ini-

tiative because it reduces the number of owners of consumable supplies before those supplies reach the final consumer. The SSF will create a seamless logistics and financial process with nationally owned and managed inventory at worldwide stock locations and fully integrated accounting procedures. CSCM–A will help to meet the goals of the SSF and NIMS by giving DLA ownership of NAMI stocks. DLA will continue to manage these low-cost, high-volume consumable items, which made up 78 percent of total Army demands in fiscal year 2000, in a more integrated manner.

DLA's supply chain management of NAMI stocks will eliminate multiple handling of supplies and dollars, creating a direct line of management of the items from procurement to the final sale to the unit that will consume them. By transferring total management of NAMI supplies to DLA, the Army potentially could avoid nonrecoverable costs such as commodity business unit (CBU) operations, installation handling, transportation redistribution, and information technology costs.

The elimination of redundant systems will save money and increase efficiency by creating a more reliable and effective supply system that meets the financial goals of the SSF. As NIMS and CSCM–A transform supply functions, customers will have centralized access to NAMI information through DLA.

Savings From NIMS and CSCM–A

A business case analysis, completed by Dynamics Research Corporation (DRC) in February 2001, examined the effects of streamlining the supply operations management of all remaining NAMI for which DLA is the national manager. DRC determined that DLA NAMI ownership would not require significant cost adjustments or cause disruptions to existing source-supply-customer activities. DRC therefore recommended transferring ownership of those NAMI for which DLA already is the national manager from the Army to DLA. To put this transfer into perspective, the fiscal year 2000 value of all Army supply classes (Army-managed items and NAMI) was estimated at $15.82 billion, of which NAMI constituted $1.6 billion, or about 10 percent.

Initial estimates indicate that this transfer will result in savings to the Army in a number of areas. In addition to the CBU cost avoidance already mentioned, the number of electronic transactions could be reduced by 45 percent; this reduction would result from DLA's centralized system processes and would save approximately $400,000. Eliminating obsolete NAMI inventory would save approximately $1.9 million, and new NAMI storage operation efficiencies would save $31 million.

DLA's assumption of ownership for these NAMI stocks will not occur without some costs. Information technology for new interface development and financial support costs will be approximately $2 million over the 5 years after DLA assumes ownership of NAMI stocks.

In all, transferring NAMI stocks to DLA could save over $37 million within 5 years. As the new supply chain reaches maturity, savings could reach $10 million per year. Other economies are anticipated from the consolidation of NAMI storage locations. Reductions and efficiencies gained in distribution are estimated at more than $30 million over time but were not included in the business case analysis.

NIMS and CSCM–A are two initiatives that DLA and the Army are working on closely to transform the current supply system into a more efficient system that meets every need of the warfighter as quickly and as cost effectively as possible. The future warfighter will not have time to wait for supplies to move through the supply system of today. Our goal is to revolutionize supply chain acquisition, distribution, and inventory management by creating a single supplier and a single point of sale to better serve the needs of the warfighter. **ALOG**

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Army Maintenance Transformation

by Major General Mitchell H. Stevenson

The Chief of Ordnance discusses a key facet of Army Transformation: the institution of a two-level maintenance system to replace today's four levels.

The Army recently held its annual Army Transformation War Game—the largest ever. The timeframe of the war game was 2019 to 2021, and the scenario found U.S. forces engaged in a series of hostile actions within the homeland and spanning the globe. The purpose of the war game, dubbed "Vigilant Warrior," was to examine the implications of multiple, nearly simultaneous operations, ranging from major combat operations (with multiple division-sized forces engaged) to smaller scale contingencies and homeland defense.

As war games always do, this one provided a large number of insights into the characteristics required of the Objective Force. Once again, we validated that the Army of the future must be able to operate with a much smaller logistics footprint than it does today. Fundamental to being able to achieve a smaller logistics footprint, of course, is a major reduction in *demand* for logistics through advances like significantly improved reliability of our equipment and more fuel efficient vehicles. But we also can improve on how we are structured to do logistics, and in particular on how we do maintenance on the battlefield of the 21st century.

The Army currently uses a four-level maintenance system (above the operator or crew level) for ground materiel. The four levels are—

- Unit/organizational level: all maintenance is repair and return to user.
- Direct support (DS): maintenance is mostly repair and return to user; some is repair and return to supply.
- General support (GS): maintenance is mostly repair and return to supply; some is repair and return to user.
- Depot: maintenance is repair and return to supply.

This four-level maintenance system is characterized by the simplest maintenance tasks being performed at the lowest echelon; when a task is beyond the resources of a given echelon (because of such factors as time, tools, and test equipment), the item requiring maintenance is evacuated to a higher level. This system was created just before World War II and has served us well for over 50 years. However, because capabilities exist only at certain echelons, each echelon (through GS) must be deployed to have the full range of capabilities in an area of operations. This echeloned system of maintenance—

- Contributes to a large logistics footprint.
- Relies on evacuation systems.
- Has a built-in overhead burden at each echelon.
- Requires maintenance support for the units that provide maintenance at each echelon. (For example, each DS and GS maintenance company also has an organic motor pool to do its own organizational-level maintenance.)

Army Transformation will require us to be able to deploy powerful forces quickly without a large logistics footprint. The operating environment of the future also likely will be a noncontiguous area of operations and will have long and often unsecured lines of communication. An echeloned maintenance system that relies on evacuation between echelons will have a larger than necessary logistics footprint, will be inefficient, and will take longer than necessary to repair equipment. Our current four-level system will not work.

So our vision is of a *two-level* maintenance system that essentially will combine the unit and DS levels of maintenance (and be called "field maintenance") and combine the GS and depot levels (and be called "sustainment maintenance"). Field maintenance will be characterized by "on-system maintenance," and sustainment maintenance will be "off-system maintenance." Field maintenance will be repair and return to user; sustainment maintenance will be repair and return to supply.

We actually have been evolving to a two-level maintenance system since the Force XXI concepts began

emerging in the mid-1990s. Many actions already have been taken, and many more are planned, that will get us to a two-level maintenance system with the necessary reduction in our maintenance footprint in the area of operations. For example, as part of the Force XXI design, organizational-level and DS-level maintainers from the mechanized infantry, armor, and engineer battalions were combined into a single unit, called the forward support company. In other words, the Force XXI division already features a merging of organizational-level maintenance and DS-level maintenance into a single unit.

Following in this same manner, in the design of the interim brigade combat team (IBCT), all IBCT organizational-level and DS-level maintenance personnel are combined into the brigade support battalion's forward maintenance company. Objective Force maintenance will be structured similarly.

The creation of the M1 Abrams tank and M2/3 Bradley fighting vehicle multicapable maintainer (MCM) 2 years ago moved what had been simple "on-system" tasks performed at the DS level of maintenance to the MCM's echelon. (The MCM's tasks combine organizational-level turret and hull repair with some selected on-system DS tasks.) Following this same model, we plan to create an M109A6 Paladin 155-millimeter self-propelled howitzer MCM by 1 October 2004 that similarly will combine organizational-level maintenance tasks with selected on-system DS tasks.

A proposal has been submitted, for implementation on 1 October 2004, that will merge the organizational-level tracked vehicle maintainer (military occupational specialty [MOS] 63Y) and DS-level tracked vehicle maintainer (MOS 63H) for all tracked vehicles other than the Abrams, Bradley, and Paladin into a *single tracked vehicle mechanic* capable of performing what we know today as organizational and DS maintenance. Similarly, a proposal has been submitted that will merge all organizational-level wheeled vehicle maintainers (MOSs 63B and 63S) and DS-level wheeled vehicle maintainers (MOS 63W) into *a single wheeled vehicle mechanic*.

Course design work for these MOSs is complete. Increases in course lengths have been offset by reductions made in other courses—there will be no trainees, transients, holdees, and students (TTHS) bill for this merger. Force structure and design work is going on now with the Army Force Management Support Agency.

Our most complex weapon systems are becoming more and more modular, with simple-to-replace components and line replaceable units (LRUs) that have built-in test and built-in test equipment (BIT/BITE). This is exactly what we should be doing. It complements the move to a two-level maintenance system, which features on-system work at the field level of maintenance and off-system, inside-the-box repair of components and LRUs at the sustainment level of maintenance.

In a force design update approved last year, we set the stage for reorganizing our GS maintenance companies (all but four general support units [GSUs] are in the Reserve components) into "component repair companies." These units will be our deployable, inside-the-box component repair capability and will work at the direction of the Army Materiel Command's (AMC's) National Maintenance Program manager (in the same way that GSUs work today through the Army National Guard's National Maintenance Training Center at Camp Dodge, Iowa). In fact, AMC's assumption of responsibility for managing all component repairs done at the installation and depot level fits in very nicely with a "sustainment level" of maintenance.

An integrated concept team has been formed with representation from the Army Training and Doctrine Command; Headquarters, Department of the Army; the program managers; and the major Army commands. This team will lay out an implementation strategy and ensure that we have accounted for the resource implications that could put a two-level maintenance system into place as early as fiscal year 2006. Much work remains to be done, but our work to date informs us that movement to a two-level maintenance system is feasible, not only for the Interim and Objective Forces but also for legacy forces, and that a two-level system will support Army Transformation better than a four-level system would.

In summary, the advantages of a two-level maintenance system are—

- A reduced logistics footprint in the battlespace.
- Faster returns of equipment to the fight.
- Decreased equipment evacuation requirements.
- Increased productivity of maintainers, and therefore increased combat power.
- Possible force structure savings.

A simpler, two-level maintenance system is the right way to go for the future. It will yield the more efficient, rapid maintenance response that the Army of the 21st century requires. **ALOG**

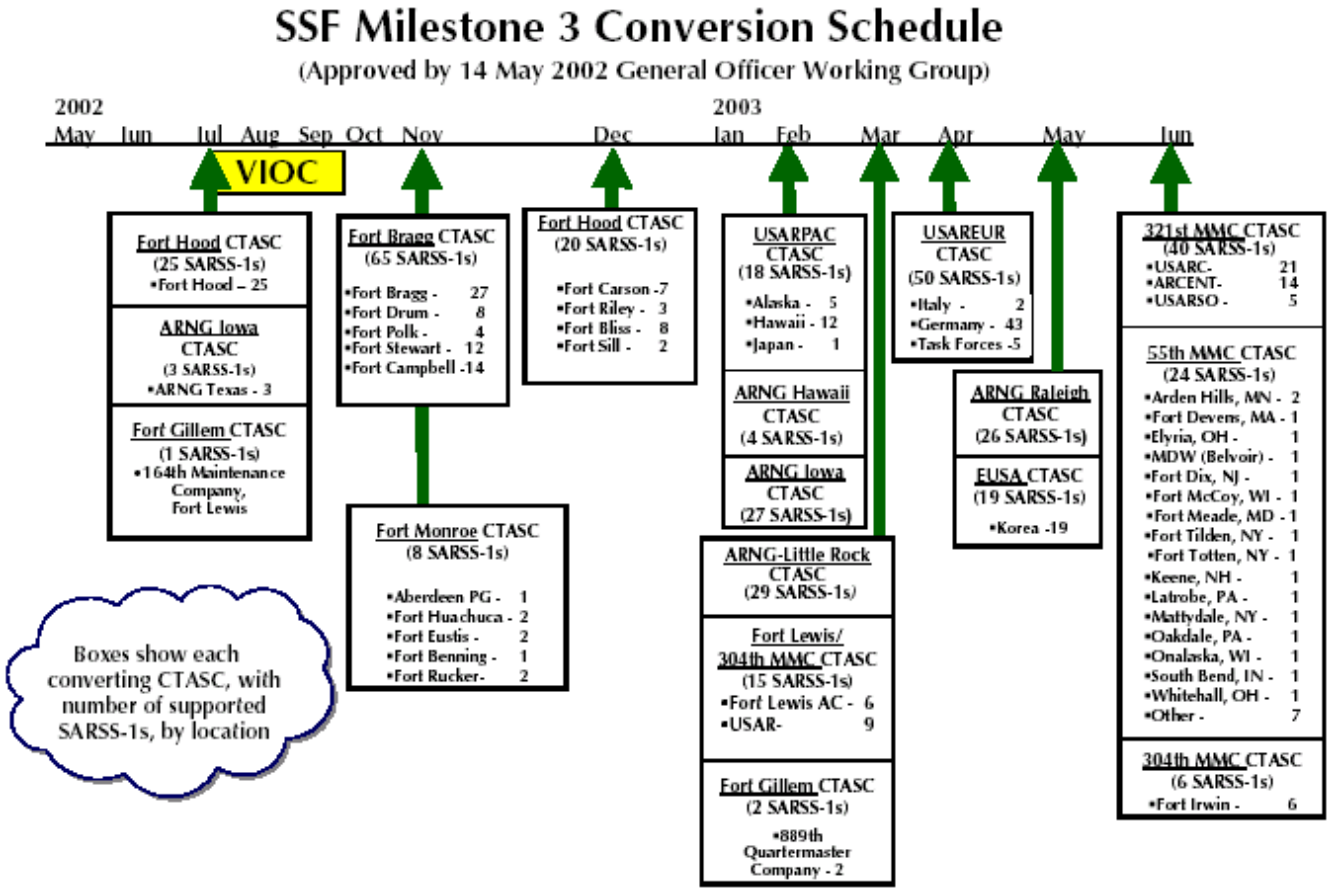
Major General Mitchell H. Stevenson is Chief of Ordnance, commanding general of the Army Ordnance Center and Schools, and deputy commanding general of the Army Combined Arms Support Command. He is a graduate of the Infantry Officer Basic Course, the Ordnance Officer Advanced Course, the Army Command and General Staff College, and the Army War College. He has a bachelor's degree from West Virginia University and an M.S. degree in logistics management from Florida Institute of Technology.

Single Stock Fund Milestone 3

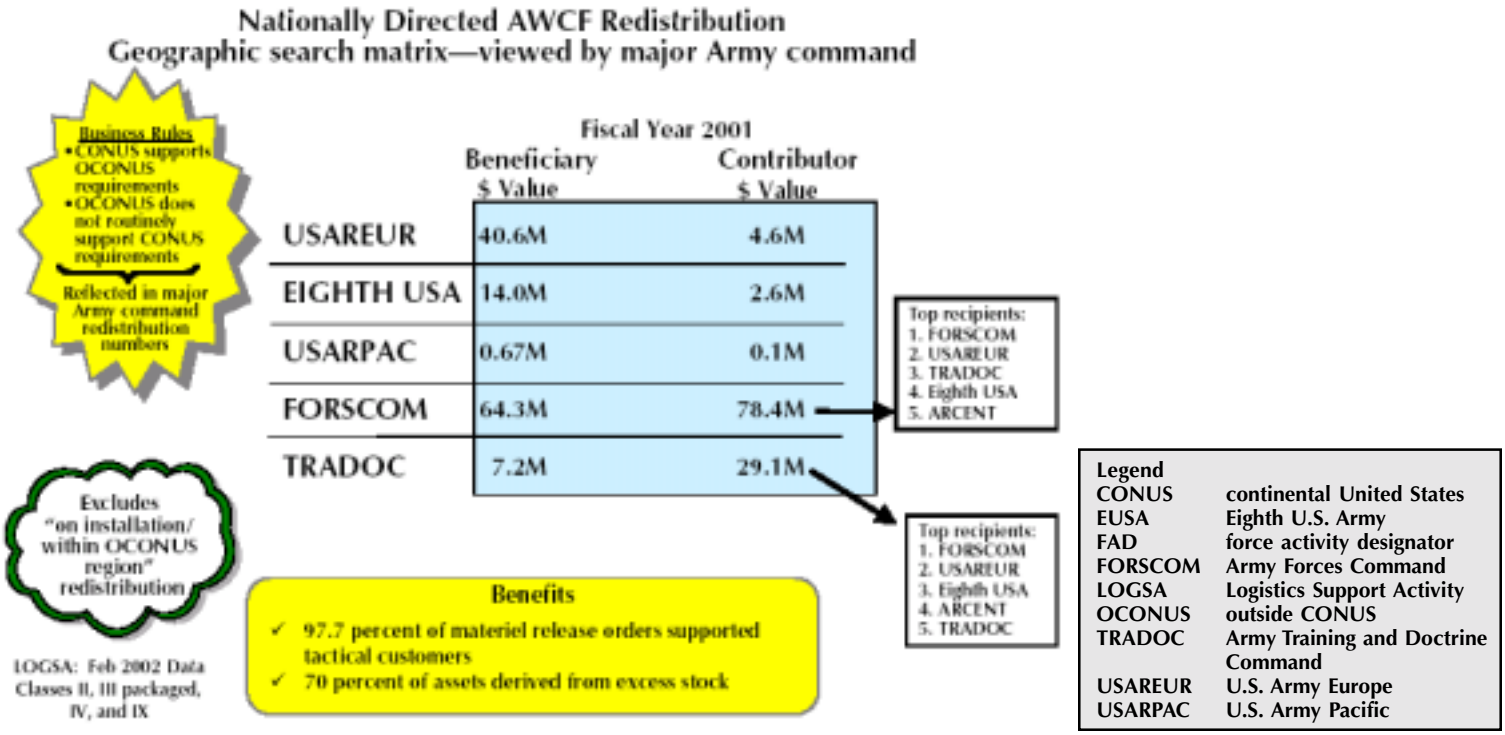
by Donald E. Hartzell

By now, you probably have heard enough talk about the Single Stock Fund (SSF). You even might have worked in a theater or installation supply support activity (SSA) that is operating under SSF Milestone 1 and 2 procedures. If you did, you might have said to yourself, "What's the big deal? I don't do anything different on my SARSS–1 [Standard Army Retail Supply System-1] to request or turn in parts." That observation is true. SSF was designed specifically to be as invisible as possible to the soldier logistician while still reaping major benefits in timeliness and readiness.

Army-wide fielding of SSF Milestone 1 and 2 business practices to 139 installation- and theater-level SSAs—completed in April 2001—brought major changes to these levels of supply. It eliminated an entire level of financial management, the Retail Stock Fund



Legend	
ARNG	Army National Guard
CTASC	corps theater automatic data processing service center
MMC	materiel management center
USARC	U.S. Army Reserve Command
VIOC	verification of initial operating capability

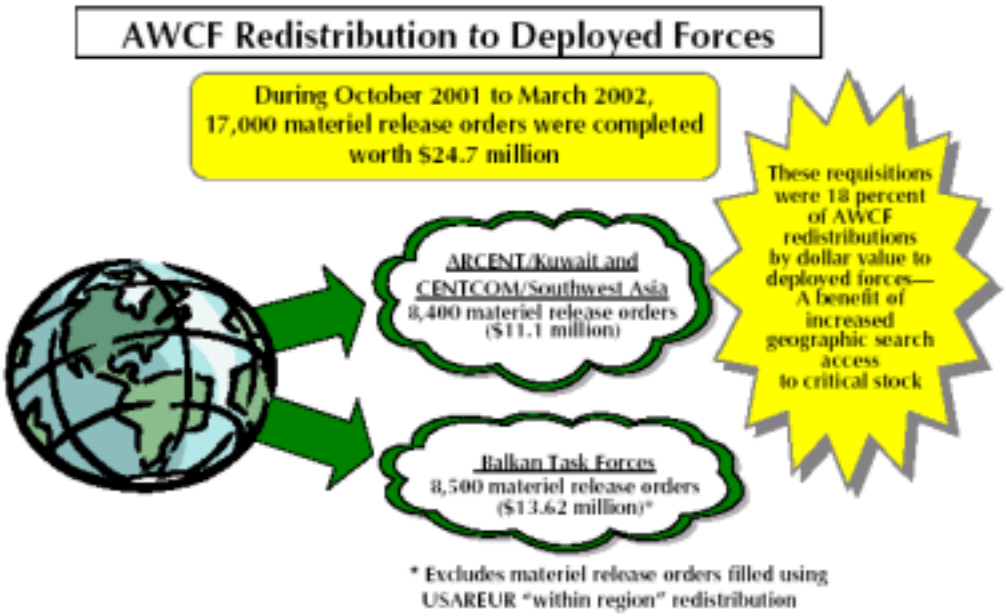


(RSF); closed 49 general ledgers; and eliminated two legacy financial inventory accounting systems, the Standard Army Retail Financial Inventory Accounting Reporting System (STARFIARS) and the Retail Army Stock Fund Inventory Accounting Reporting System (RASFIARS). It stabilized credit rates and accelerated the granting of credit from the Army Materiel Command (AMC) to the Army Working Capital Fund (AWCF) customer. It also permitted the national managers of repair parts to look beyond depot stock to satisfy requirements. The list of benefits from SSF Milestone 1 and 2 goes on and on.

SSF Milestone 3 extends SSF business processes to the tactical SSA level. Milestone 3 began with a 75-day verification of initial operating capability (VIOC) on 1 July 2002. This major test implemented Milestone 3 procedures in the 4th Infantry Division (Mechanized), the 1st Cavalry Division, and the 13th Corps Support Command, all at Fort Hood, Texas; the entire Texas Army National Guard; the 164th Maintenance Company, 70th Regional Support Command, at Fort Lewis, Washington; and the Equipment Concentration Site, 90th Regional Support Command, at Fort Hood. (The last two units are Army Reserve activities.) Fielding of Milestone 3 to the remaining active and Reserve component tactical SSAs begins in November and will end in June 2003. The chart on page 8 illustrates the schedule as of June 2002.

So, what is the big deal with Milestone 3? What does it do for soldier logisticians at tactical SSAs? Here are some of the major benefits to the Army in the field—

- Milestone 3 provides the national item manager with global visibility of all assets in the pipeline above the prescribed load list (PLL) level. At the tactical level, this equates to approximately $1.1 billion. This is the estimated dollar value of the assets over which AMC will have visibility. Actually, AMC not only will have visibility but will own the assets. The Milestone 3 assets will be capitalized to the AWCF and on the Commodity Command Standard System, just as the Milestone 1 and 2 assets are today. With this visibility, the item manager can redistribute excess assets (in other words, those assets above the retention level) to meet customer needs; these assets previously were unavailable to the item manager to use.
- By enabling the national-level managers to redistribute secondary items, Milestone 3 ultimately will reduce customer wait time (CWT), offset the need for procurement and repair actions, and reduce backorders. Already, under milestones 1 and 2, Army-wide CWT dropped by 2.4 days, or 13.1 percent, between the second quarter of fiscal year 2001 and the second quarter of fiscal year 2002.
- An economic analysis prepared in 1999 projected that SSF benefits for the first 12 years would equal $659 million. In fact, the Army is seeing benefits accrue above that level. From May 2000 to March 2002, $371 million in assets were redistributed directly to meet soldier requirements as a result of SSF changes to procedures. The chart above shows the dollar value of assets redistributed by major Army commands in fiscal year 2001 (each acting as a "contributor") and the dollar value of



redistributed assets the commands received (each acting as a "Beneficiary").

- The Army also is seeing a reduction in CWT through real-time processing of all accountable transactions (such as requisitions, receipts, turn-ins, and adjustments) at the national level.
- Milestone 3 allows the system to penetrate any SSA requisition objective (RO) down to a zero balance to fill an Issue Priority Designator 01 requisition. [Issue Priority Designator 01 designates requisitions required by U.S. forces in combat for immediate end use and without which they will be unable to perform assigned operational missions.] This is real support for the warfighter. The chart above shows that, in a 5-month period, the SSF geographic search matrix procedure enabled the national level to redistribute assets to fill 17,000 requisitions from deployed forces that previously would have required procurement or repair of the needed items.
- Milestone 3 permits the field commander additional flexibility to fill his demand-supported authorized stockage list (ASL) ROs. Previously, commanders often were constrained by reduced RSF obligation authority from stocking a full, demand-supported ASL. Since the ASL is AWCF-funded under the SSF, constraints on demand-supported ASLs should be reduced greatly because of the size of the AWCF and its ability to absorb changes.
- Under Milestone 3, Army National Guard and Army Reserve SSAs will be able to turn in excess assets to the nearest installation, whether active or Reserve component, rather than ship them to a central state or Army Reserve receiving point.
- The Army hopes that repair parts prices can be reduced as it reduces CWT and leverages Army-owned assets through redistribution. As the Army makes better decisions on redistribution and reutilization of excess assets and has greater visibility of those assets, AMC's costs associated with repair parts management drop. The surcharge for AMC-managed items already has dropped almost 20 percent, from 18.8 percent in fiscal year 2001 to 15.1 percent in fiscal year 2002. The surcharge is the amount that AMC adds to the cost of the repair part to cover management, storage, and shipping. Reduced surcharges translate into lower repair parts costs for the customer.

The SSF is not a new automated system; it is a new way of doing business that streamlines logistics and integrates the national and tactical levels of logistics support. SSF procedures will be incorporated into emerging systems, such as the Logistics Modernization Program at AMC and the Global Combat Support System-Army Tactical (GCSS–AT) at the tactical level. The SSF goes a long way toward transforming Army logistics and assisting the soldier logistician in doing his job more effectively. To learn more about SSF, log on to the SSF Web site at www.army.mil/ssf. **ALOG**

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Anticipatory Logistics: The Army's Answer to Supply Chain Management

by Major Joshua M. Lenzini

The Army is experimenting with the concept of anticipatory logistics for class III (petroleum, oils, and lubricants), class V (ammunition), and maintenance. Anticipatory logistics uses technologies, information systems, and procedures to predict and prioritize customer requirements and provide appropriate sustainment. Although this sounds simple enough, future logisticians will use current and future technologies as tools to monitor supply levels and equipment conditions for combat units. They also will use decision support software to determine the best use of combat service support assets. How is this concept related to the supply chain management (SCM) technique that corporations use?

Supply Chain Management

In the winter 1988 issue of *Supply Chain Managemet Review,* Peter J. Metz defined SCM is "a process-oriented, integrated approach to producing, procuring, and delivering products and services to customers. SCM has a broad scope that includes subsuppliers, suppliers, internal operations, wholesale customers, retail customers, and end users." It also covers the management of materiel, information, and funds. SCM encompasses the entire process from raw materials to the final customer.

To better understand the concept of SCM, we need to visualize what a supply chain is. A supply chain is made up of all the manufacturers and suppliers who provide the parts that make up a particular product. It includes production, storage, and distribution activities that procure materials, transform the materials into intermediate and finished products, and distribute the finished products to the customer. Supply chains exist in both service and manufacturing industries. However, the complexity and organization of supply chains vary immensely from industry to industry and from organization to organization. In practice, supply chains have multiple products with the potential of many shared components, facilities, and capacities.

While SCM and the supply chain seem to be very similar, the most notable difference is that SCM is a process that integrates and synchronizes the supply chain to meet an organization's goals and objectives. The chart on page 4 illustrates a corporate SCM conceptual model. SCM has seven components and six essential success factors. The seven components are—

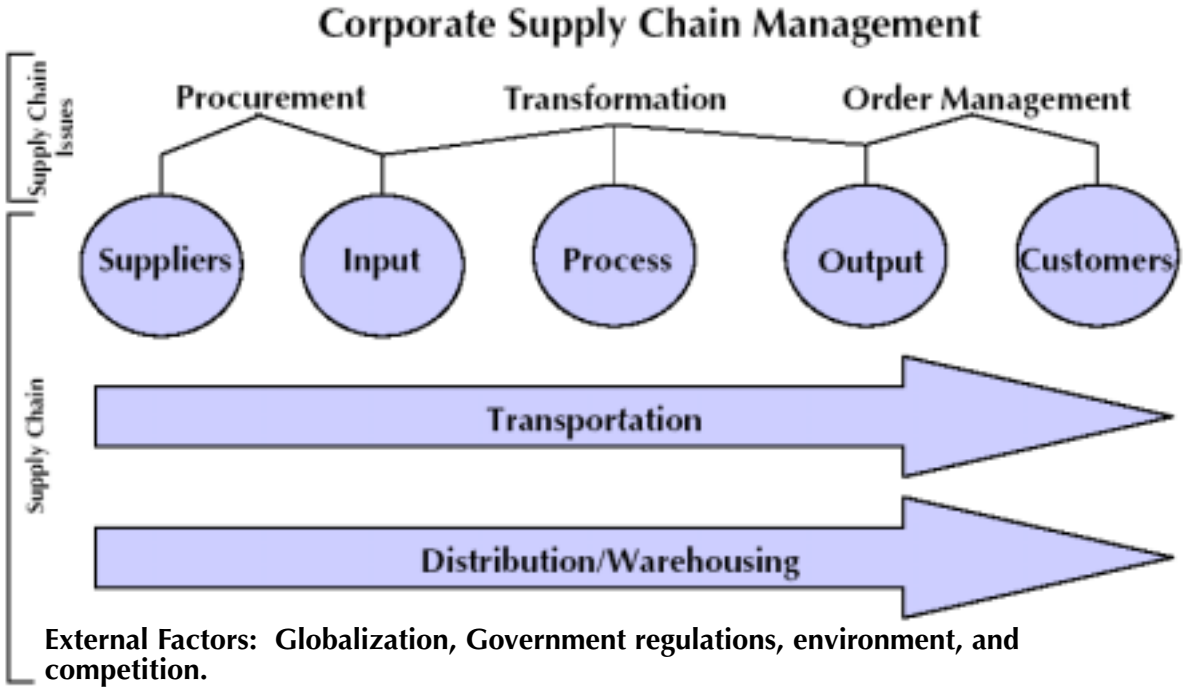
- Suppliers.
- Procurement.
- Manufacturing.
- Order management.
- Transportation.
- Warehousing.
- Customers.

The six essential success factors are—

- Consumer demand.
- Information and communication technologies.
- Globalization.
- Competition.
- Government regulations.
- Environmental concerns.

The dilemma that management in industry faces is how to satisfy two diametrically opposing forces: the customers' demands for better, faster, and less costly products and services and the organization's need for growth and profitability. To meet both requirements, business organizations use SCM.

Consumer expectations concerning service, speed, cost, and choice will continue to rise. The business trend is to provide consumers with what they want faster than any competitors can, at a price lower than the current



☐ Supply chain management is similar for both corporate (shown above) and military (shown right) organizations. However, some significant differences are evident in these models. The first is the absence of maintenance on the corporate model. Another is that transportation, distribution, and warehousing are unidirectional in the corporate model but dual directional in the military model. Note, also, that the external factors differ between the two types of organizations.

market price, and in real time. SCM organizes the overall business process to enable the profitable transformation of raw materials or products into finished goods and their timely distribution to meet customer demands.

Military Version of Supply Chain Management

For military logistics operations, SCM has seven components and seven essential success factors. SCM for the Army is slightly different from SCM for corporate organizations because the Army's focus is on mission requirements rather than on quarterly earnings. The seven components of SCM for the Army are the same as for business—

- Suppliers.
- Procurement.
- Manufacturing.
- Order management.
- Transportation.
- Warehousing.
- Customers (soldiers).

The Army's seven essential success factors are—

- Customer needs.
- Information and communication technologies.
- Deployment within and outside the continental United States.
- Joint interoperability.
- Department of Defense regulations.
- Environmental concerns (to include enemy forces).
- Mission requirements.

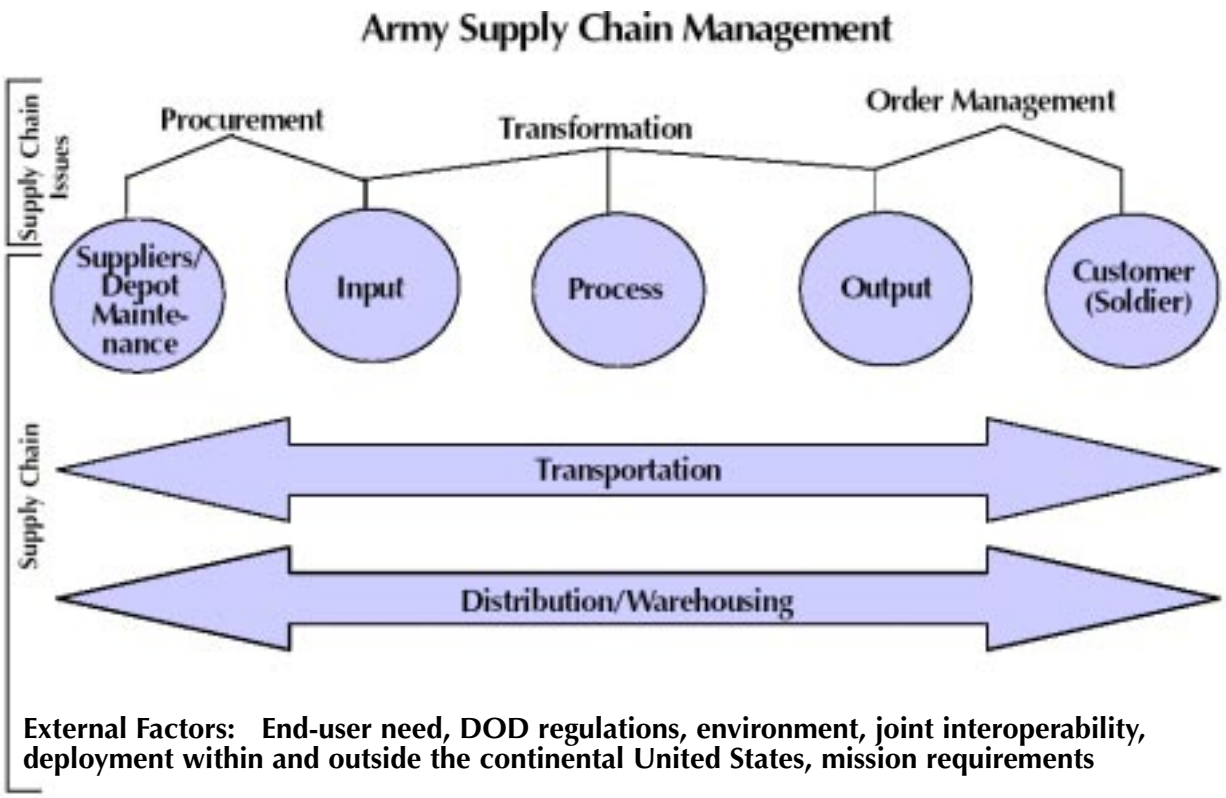
The SCM conceptual models for both business and the Army are remarkably similar; however, there are some significant differences. Most notable are the dual directional arrows on the chart for transportation and for distribution and warehousing in the Army SCM model. These illustrate that the Army may retrograde equipment and components for maintenance or retrograde personnel for medical care. Other differences are in the external factors that affect the supply chain. These factors include—

- Joint interoperability among the services' command, control, communications, computer, and intelligence (C4I) systems.
- Deployment of forces.
- Soldier and mission requirements.

The supply chain reflects the Army's focus on mission accomplishment as opposed to business' focus on profitability.

Anticipatory Logistics

Like the corporate world, the Army faces two diametrically opposing forces: the need to support combat maneuver forces better, more responsively, and at a lower



cost and the need to reduce the logistics footprint of the Army's future forces. The Army is exploring how to better support brigade combat teams (BCTs) by using some underlying SCM concepts, such as information and communication technologies, order management, and transportation using current and new technologies.

By using the "tactical Internet" to achieve situational awareness, future logisticians will be able to track the status of supplies for individual units and better predict the needs of combat units. Systems that provide logistics leaders enhanced situational awareness will provide instantaneous supply status, predict component failures, and even provide two-way messaging. Sensors in both combat and combat service support vehicles will monitor supply levels, unit locations, and equipment status and be able to transmit this information to logistics leaders. Knowing on-hand supply levels will help logistics leaders to better configure "pulsed" logistics resupplies, typically consisting of 3 to 7 days' worth of supplies. Leaders will use this new, enhanced level of situational awareness, provided by decision support tools such as embedded diagnostics, automated testing, and data analysis, to better support combat forces with fewer logistics assets.

In an endeavor to revolutionize anticipatory logistics at the wholesale level, the Army is forming a strategic alliance with SAP to integrate and streamline the wholesale logistics process. This alliance will manage demand, supply availability, distribution, financial control, and data management better and provide more flexible and dynamic logistics at the wholesale level to meet specific customer requirements. The benefits will include a synchronized global supply, distribution, and financial network that will increase weapon system readiness and manage mission-based requirements more responsively.

The Department of Defense also is researching advanced technologies that will bring quantum improvements in joint military logistics, including force deployment, to enhance the readiness of all military forces.

Industry's SCM and the Army's anticipatory logistics for supporting future combat forces are similar. Whereas anticipatory logistics concentrates on the wholesale and tactical (brigade and below levels), which is a small slice of the supply chain that culminates with the customer, SCM takes a holistic approach to the entire supply chain. Both anticipatory logistics and SCM share various fundamental concepts in order to meet their respective goals and objectives. The future of logistics in the Army is evolving toward a holistic approach, much like business' SCM efforts, to improve its logistics capability while reducing its logistics footprint. **ALOG**

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Ground Assault Convoy Techniques

by Captain Michael D. Hofmeister and Lieutenant Colonel Christine M. Gayagas

The ground assault convoy, or GAC, is an integral part of any air assault mission executed by the 101st Airborne Division (Air Assault). The GAC may be an unfamiliar concept because it is not referenced in Field Manual 71–100–3, Air Assault Operations. This article defines the key components of the GAC and highlights its concepts and techniques.

The GAC is a convoy operation into potentially hostile territory, usually to link up with assault forces that have been deployed by air across the forward line of own troops to seize an objective. The convoy consists of vehicles and personnel that cannot be deployed by air, such as heavy team attachments or outsized equipment with secondary loads that cannot be moved easily by slingload.

Phases of Air Assault Operations

Air assault operations are conducted in four phases: setting the condition, seizing the objective, expanding the lodgment, and preparing for future operations.

Setting the conditions. In this phase of the operation, the brigade or division focus is on ensuring that conditions are set to provide the highest probability of success. Prime targets during this phase are enemy air defenses, artillery, armor, and concentrations of infantry.

Seizing the objective. During this phase, combat arms troops seize and secure the objective. A forward logistics element may support the forward task force until the brigade support area can be established.

Expanding the lodgment. In this phase, combat arms troops continue to expand and secure the area surrounding the objective. The GAC moves forward and establishes the forward operating base.

Preparing for future operations. During this phase, the task force, which has closed on the forward operating base, builds combat power for future operations. Then the cycle begins again.

Responsibilities

All assault operations are driven by the mission, enemy, time, troops, and terrain (METT–T). These factors represent a starting point from which the forward support battalion (FSB) develops concepts for commanding and controlling the GAC.

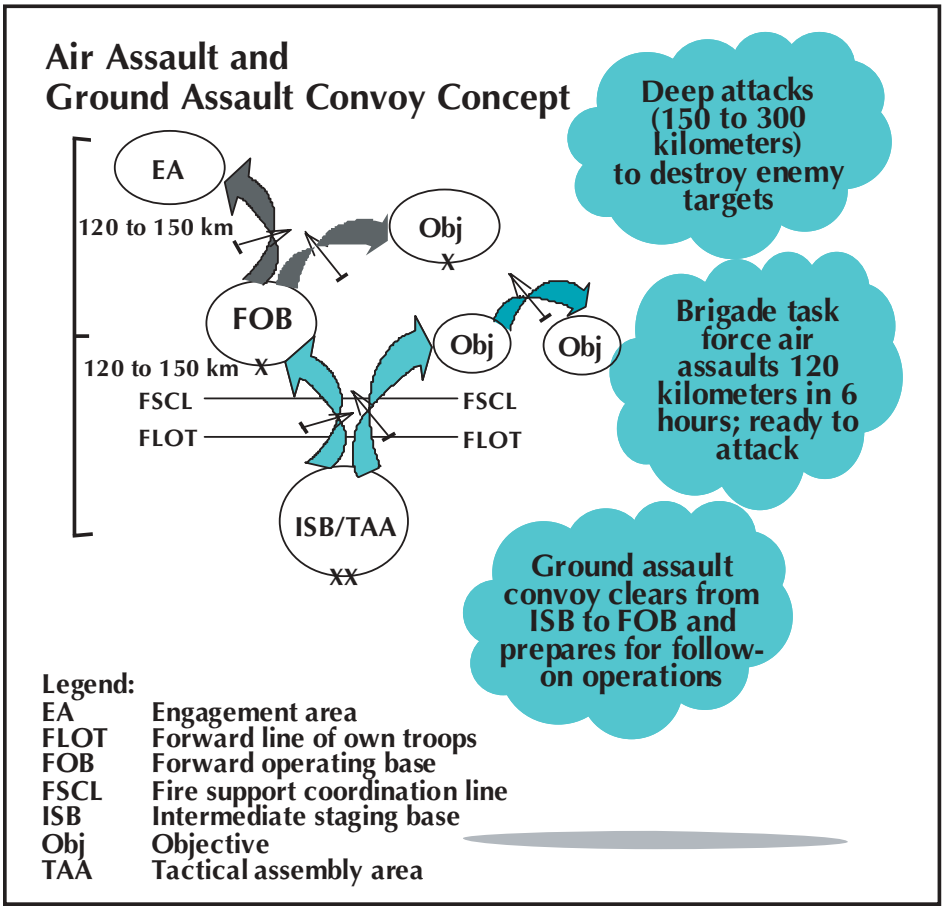
The GAC is a task-force-level combat operation that must be planned by the task force headquarters. Although the brigade headquarters focuses mainly on actions that must be taken to achieve the objective, the commander and staff also must consider the subsequent move of GAC elements to ensure the success of the operation. All task force battle operating systems must be resourced, synchronized, and distributed throughout the GAC. A movement matrix must be constructed that clearly defines which vehicles and units will move, in which serials (convoy subunits), and when. It is critical that this matrix be constructed according to priorities established by the brigade.

The FSB commander may be tasked to organize and control the GAC. If given this responsibility, the FSB commander must ensure that the battalion staff synchronizes planning efforts with the brigade task force staff.

The brigade S2 ensures that the GAC route is included in the intelligence preparation of the battlefield (IPB). The battalion S2 coordinates the GAC route and the brigade support area location with the IPB. The brigade S3 generates a priority listing of vehicles for air-land and GAC movement and tracks the battle throughout the operation. The battalion S3 coordinates with the brigade staff to produce orders and holds meetings and rehearsals in advance of the actual mission. The FSB support operations officer commands and controls the forward logistics element and provides necessary support before, during, and after the operation. The FSB support operations transportation officer builds the movement table in coordination with the brigade S3's priority vehicle listing and oversees the marshaling area.

GAC Composition

The composition of the GAC depends on the nature of the mission and requires time-phased movement and organization to emplace each element at the right place at the right time. Examples of battlefield operating system elements include heavy team attachments; tube-launched, optically tracked, wire-guided (TOW) mis-



siles mounted on high-mobility, multipurpose, wheeled vehicles (HMMWVs); Avenger weapon systems; engineer or military police vehicles; and any other vehicles with crew-served weapons mounted. Units must position their assets in various serials in the GAC to integrate the battlefield operating system concept fully and to mitigate the risk of losing an entire element should the enemy attack the convoy. Most of the combat power may be positioned in the advance guard.

Force Protection

A key component to ensuring the survivability of the GAC is force protection. The eight key elements of force protection are—

- ***Maneuver***. The GAC is a maneuver-based operation, so convoy elements may be required to move through occupied terrain. The advanced guard must be resourced and configured to clear and secure the route for following serials. For instance, dismounted infantry or roving military police must continue to observe cleared obstacles to prevent them from being replaced. To ensure force protection throughout the GAC (which could have over 700 vehicles), follow-on serials should have the ability to clear obstacles to prevent delays.
- ***Intelligence***. The IPB for the GAC route and surrounding areas is an essential element of a successful operation. Key areas of interest are enemy air assaults, enemy threats (levels I through III), terrorist threats, enemy artillery, and the condition of the route. [Enemy threat levels are defined as follows: I–threats that can be defeated by base or base cluster self-defense measures; II–threats that are beyond base or base cluster self-defense capabilities but can be defeated by response forces, normally military police, with supporting fires; III–threats that require a command decision to commit a combined arms tactical combat force to defeat them.] Unmanned aerial vehicles and aviation reconnaissance flight videos are two examples of intelligence used during a GAC operation.
- ***Fire support***. Target reference points must be planned and synchronized along the route to provide fire support to moving convoys. Convoy commanders may call for indirect fire to suppress an enemy ambush.
- ***Mobility, countermobility, and survivability***. Engineer assets are critical in a GAC. Enemy minefields and roadblocks often are key threats to the GAC as it moves to the release point. If these threats are not eliminated quickly, the whole GAC becomes a stationary target for enemy air assaults and indirect fire.
- ***Air defense***. Available air defense assets, such as Avengers and crew-served weapon systems, should be positioned to provide maximum protection against en-

☐ **A soldier from the 526th Forward Support Battalion, 101st Airborne Division (Air Assault), conducts flank security while his convoy is halted.**

☐ **Soldiers watch from a light medium tactical vehicle for any sign of the enemy.**

emy air assaults throughout the GAC.

- ***Combat service support.*** Forward elements in the initial air assault may need support and resupply before the main elements of the GAC arrive and set up. A forward logistics element may be sent with the initial air assault to support the forward task force until the main body of the GAC arrives. The forward logistics element should have the capability to receive slingloaded emergency resupply and to push supplies to the forward elements of the task force.
- ***Medical support***. Medical assets such as field litter ambulances must be identified and spread throughout the whole GAC to treat and evacuate casualties. Primary and alternate litter teams must be identified in nonstandard casualty evacuation vehicles to assist in moving patients. Casualties should be treated and moved to coordinated casualty-collection points. Preplanned landing zones may be used as necessary for evacuating patients to the combat support hospital.

Minefields and Obstacles

One of the greatest threats to the GAC is the presence of enemy minefields and obstacles. An obstacle that cannot be breached or bypassed quickly causes convoys to become sitting targets for enemy air and indirect fire. A trained team of engineers should be placed in lead and subsequent serials of the GAC to breach any enemy obstacles that are encountered. When an obstacle is found, the breach team should report, mark, and clear it while a security team secures it. A portion of the secu-

A soldier prepares to throw a grappling hook to snag and clear an obstacle that stands in the way of his convoy.

rity team should be left in place at the obstacle site to ensure that the enemy cannot reestablish the obstacle for follow-on elements of the GAC. While the obstacle is being cleared, a security vehicle such as a gun truck or military police vehicle should circulate among stopped serials to prevent enemy movement between serials.

Command and Control

Achieving solid command and control of the GAC requires control nodes at three key areas and traffic control points.

The marshaling area controls and operates the intermediate staging base, tactical assembly area, or brigade support area. The marshaling area team supervises the organization of serials and monitors starting times. To do this, the team must have communication with the GAC commander and the call-forward area.

The call-forward area, in coordination with the GAC commander, controls the rate of movement into the forward operating base and halts or alters the movement plan based on enemy activity. This team also communicates with the marshaling area and may assist in battle tracking.

The forward command post is the advance party for the brigade support area or forward operating base and is responsible for preparing those areas to receive the main body of the GAC. The forward command post team can include personnel from the forward logistics element, or it can be a separate advance party led by the S3 or another staff officer. This team maintains communication with the call-forward area in order to control elements as they arrive at the new location and to track the battle in coordination with the brigade tactical operations center.

Military police or other appointed units should provide traffic control points along the route to monitor and control movement and to assist in relaying information. An intricate and well-rehearsed communications network is essential to the success of the GAC. Relays or retransmissions may be necessary to maintain communication if the GAC route is long. A tactical satellite may be used to expedite communications from the call-forward area to the marshaling area.

The release point should be manned by personnel from the call-forward area. It is critical that unit guides be on hand at the release point to lead serials to their final destination in the forward operating base. These guides must know the cleared routes and be prepared to assist in unit advance party tasks. Depending on the length of the GAC route, a refuel point can be set up immediately beyond the release point. Once units reach their final destination, they submit closure reports to the task force headquarters to track combat power.

The possibilities for planning and conducting a GAC are METT–T dependent and therefore are endless. However, the single most important principle that must be remembered in the execution of a GAC is that it is a combat operation. All battlefield operating systems must be considered, synchronized, and planned at the appropriate levels to implement a GAC successfully. **ALOG**

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Lieutenant Colonel Christine M. Gayagas serves as the inspector general for the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky. Previously, she was the commander of the 526th Forward Support Battalion, 101st Airborne Division (Air Assault). She has a master's degree in logistics management from Florida Institute of Technology. She is a graduate of the Transportation Officer Basic and Advanced Courses, the Army Command and General Staff College, and the Army Logistics Management College's Logistics Executive Development Course.

A Statement of Requirements: Ensuring the 'Special' in Special Operations

by Major O. Shawn Cupp

> Let him who desires peace prepare for war.
>
> —Flavius Vegetius Renatus
> Roman military strategist

Preparing for a Special Operations Forces (SOF) mission is a little different from preparing for a conventional mission. However, logistics is as important in an SOF mission as it is for any other military operation. Determining and obtaining what is needed for an operation and delivering it when and where it is needed are even more critical in a time of fiscal constraints such as the Army is experiencing now.

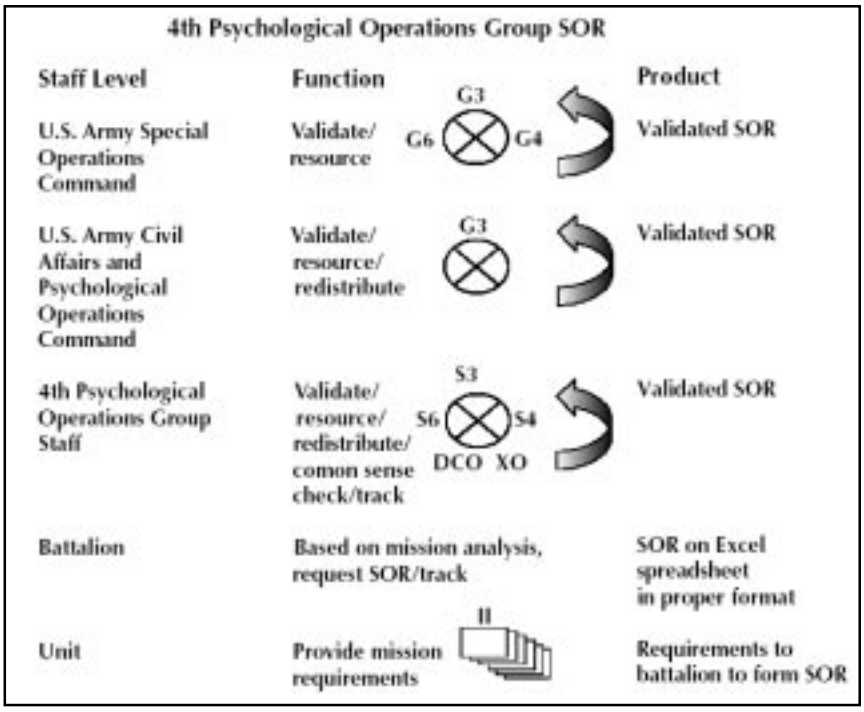
The "special" part of preparing for an SOF mission calls for the development of a statement of requirements (SOR). Each mission is unique and requires a mission-specific analysis to develop a tailored sustainment force. Each SOR identifies, consolidates, and prioritizes all unit requirements that exceed organic capabilities. The intent of the SOR is to ensure that each SOF unit or task force develops and submits a comprehensive and valid list of requirements early in the planning cycle. Planners should not view SORs as wish lists or simple supply requests but as actual unit requirements for a specific mission.

How the SOR Works

To develop an SOR, logistics planners and operators must coordinate closely to forecast the requirements of a mission and outline those that exceed unit organic capabilities. The planners start the process by conducting a logistics preparation of the theater. This requires a review of force requirements and visibility of the assets already in the area of operations. Then organic capabilities must be reconciled against mission requirements and theater assets. The SOR may include major end items that are not authorized or not on hand, consumable supplies, money for Military Interdepartmental Purchase Requests, and additional commercial equipment.

A number of other logistics functions, ranging from facilities to services to security, must be considered when drafting an SOR. A list of these functions could serve as a logistics checklist when planning for an SOF mission. Many are outlined in appendix A of Field Manual (FM) 100–25, Doctrine for Army Special Operations Forces, and those that are mission essential should be included in the SOR.

For a typical SOF mission, operators and logisticians develop an SOR, forward it through S3/G3/J3 channels for validation, and then send it on to the next higher



EXTERNAL SUPPORT REQUIRED AS OF 6 MAY 99

VALIDATED	ITEM	QTY	SPT PAX REQ	UNIT	START DATE	END DATE	REMARKS
X	DNVT	4	No	9POB	1-Mar-99	indef	RECEIVED 10 FROM 112TH SIG BN 22 APR 99
X	SINCGARs Remote Control Units	2	No	9POB	1-Mar-99	indef	RECEIVED 2 FROM 7TH SFG(A) 21 APR 99
X	PLGR w/Vehicl	10	No	9POB	20-Feb-99	indef	RECEIVED 6 FROM JOS RECEIVED 10 FROM 7TH SFG(A) 21 APR 99
X	ISU-90	1	No	3POB	20-Feb-99	indef	Not MTOE (CTA 50)
X	Print Supplies	$187K	No	3POB	12-Apr-99	indef	VALIDATED 15 APR 99
X	TACSAT Parts	$25K	No	3POB	7-Apr-99	indef	VALIDATED 15 APR 99
X	Eagle Claw Tu	5	No	9POB	9-Apr-99	indef	COMPLETED 15 APR 99
X	General Suppli	$77K	No	9POB	13-Apr-99	indef	VALIDATED 15 APR 99
X	General Suppli	$76K	No	3POB	13-Apr-99	indef	VALIDATED 15 APR 99
X	SICCUPS/ARF	2	No	3POB	13-Apr-99	indef	
X	Print Supplies	$294K	No	3POB	3-May-99	indef	SENT UP 4 MAY 99
	Leasing Contracts to support	$184K	No	3POB	3-May-99	indef	SENT UP 4 MAY 99
	MPR increase	$96.5K	No	6POB	5-May-99	indef	

☐ An example of the Excel spreadshseet that shows the rollup of the SOR for support of the Kosovo Peacekeeping Force.

headquarters. The chart at left shows the process used by my former unit, the 4th Psychological Operations Group, to validate an SOR and forward it to the next higher headquarters for resourcing.

The SOR also must be kept up to date. When an SOF unit receives supplies and equipment, the SOR must be reconciled accordingly to ensure that the unit is supported properly. This includes adding durable items to the unit property book, which is important to maintaining property accountability and ensuring the ultimate success of the unit's missions.

There are no specific formatting requirements for an SOR. The nomenclature of a required item, its unit of issue, when it is required, and the number of units requested are some of the mandatory data fields. One handy format for compiling this information is a Microsoft Excel spreadsheet. In this format, information can be maintained easily and transmitted electronically. The spreadsheet also serves as historical documentation of requirements.

The chart above is an example of the Excel spreadsheet that was used to show the rollup of the SOR for support of the Kosovo Peacekeeping Force (KFOR) in 1999. Each battalion's spreadsheet of requirements was under the cover spreadsheet. This format allowed items posted in the property book to be tracked, ensured validation of requested items, and provided an audit trail for resource management purposes.

Current Doctrine

Below the Army Special Operations Command headquarters level, SORs are forwarded, validated, and reconciled according to each unit's standing operating procedures. Many battalion- and brigade-sized SOF units use the SOR for operation and contingency planning. SOF are used more now than ever before in stability and support operations, as outlined in the new FM 3–0, Operations. Military experts agree that, in the future, most conflicts will be characterized by an increase in special operations missions. Therefore, an SOR must be produced, forwarded, and validated during the planning for each mission. When SOF are attached to a supporting major Army command joint task force, an SOR is used to capture costs, and it is a helpful historical document for planning future operations.

Logisticians, especially field grade officers, should know how to plan and execute support of SOF. Although different from support of conventional forces, support of SOF is equally important. Often, SOF are involved with executing both operational- and strategic-level missions, so it is imperative that logisticians understand what an SOR is and how it supports SOF. The SOR is the SOF logistician's primary tracking tool for ensuring mission support. A properly planned, developed, and maintained SOR will help ensure mission accomplishment in all areas of operations. **ALOG**

Major O. Shawn Cupp is a logistics instructor in the Directorate of Logistics and Resource Operations at the Army Command and General Staff College at Fort Leavenworth, Kansas. He has bachelor's and master's degrees in education from Virginia Polytechnic Institute and State University and is a graduate of the Army Command and General Staff College. He previously served as the S4 of the 4th Psychological Operations Group (Airborne) at Fort Bragg, North Carolina, and as the S3 of the 501st Corps Support Group at Camp Red Cloud, Korea.

Deploying Medical Units

by Major Charles H. Strite, Jr.

Deploying medical units into a theater of operations presents an exceptional challenge for any organization. This is especially true for a corps medical brigade since its subordinate units may report directly to the brigade headquarters, with no battalion-level organization in between. Because of the limitations and sizes of the subordinate medical units, many medical brigades have a flat command and control structure and the brigade staff must act as brigade, battalion, and unit staff.

The theater commander in chief's requirements determine the exact number and types of units deployed. Medical brigade units include—

- Headquarters and headquarters company.
- Deployable medical system hospitals (combat support hospital, general hospital, mobile Army surgical hospital, and field hospital).
- Dental company.
- Ground ambulance company.
- Air ambulance company.
- Area support medical company.
- Forward surgical team.
- Combat stress control detachment.
- Preventive medicine detachment.
- Logistics support company.
- Medical logistics company.
- Blood support detachment.

Other combat service support units do not face the same difficulties as a medical unit faces. However, there are many similarities in operations. The keys to deploying any unit successfully are cooperation, well-documented and clearly understood readiness standing operating procedures (SOPs), ingenuity, and communication.

Another important aspect of deploying a unit is the assistance provided by a committed garrison staff. It is the logistician's responsibility to step forward and assist, lead, and fill the void where appropriate. The S3 (operations) section normally provides the focus that drives deployments, training exercises, and garrison operations. However, when a unit receives notification of an impending deployment, this changes quickly: The S3 continues to control the organization for the commander, but the focus shifts to the S4 (logistics officer).

Mission

Once alerted of an upcoming deployment, the S4's main task is to understand the mission of the deploying unit. This includes location, timeline, constraints, and critical information about the combat service support architecture in the theater. Once he understands this information, the logistician's task in the mission analysis, course of action development, and orders production process is to identify requirements and capabilities. This will identify the deploying unit's shortcomings, for which the S4 then must provide solutions.

Task Organization

While the S4 is working the military decision-making process, he must simultaneously task organize the S4 section and analyze the logistics capabilities within the brigade to support the deploying unit.

The S4's first task is to assist the S3 in identifying a "pusher" unit. The pusher unit will complement the capabilities of the deploying unit with logistics, training, and administrative support. In many cases, medical brigade subordinate units do not have assigned mechanics, cooks, or supply personnel. Therefore, the clinical personnel of the deploying unit will need assistance in all logistics areas, which might include unit basic load requests, unit movement operations, maintenance, and hand receipt support. By working together, the deploying unit, the pusher unit, and the S4 can meet the deployment timeline.

The second task of the S4 is to alert higher support agencies immediately that a deployment mission has been assigned to the brigade. In most cases, the following organizations must be notified: directorate of logistics, ammunition supply point, direct support unit, supply support activity (SSA), installation medical supply activity (IMSA), U.S. Army Medical Materiel Agency (USAMMA), central issue facility (CIF), joint transportation division, corps G4, corps materiel management center, and troop issue subsistence activity (TISA).

The third task of the S4 is to meet with the deploying unit, pusher unit, and S4 staff to assign and clarify roles and responsibilities. All parties involved must understand the deploying unit's requirements. Based on the results of this meeting, the S4 will update the S3 on the timeline and additional tasking support needed.

Filling Requirements

Various obstacles exist when deploying a unit. For a successful deployment, the brigade and garrison must help overcome these obstacles, which are force protection and country-unique training, family readiness group


☐ An M998 cargo vehicle loaded with medical equipment (left) and M101 trailers loaded with medical supplies (right) are ready for air transport.

issues, Soldier Readiness Program (SRP), and logistics requirements; they involve supplies, resources, maintenance, and movement operations. Typically, planners handle the SRP and logistics requirements up front because they have longer lead times. They can handle family and training issues later with little interruption, provided the SRP and logistics requirements are complete.

Logistics Requirements

Class I (subsistence). Planners must compare the deploying unit's headcount to the theater days of supply (DOS) requirements. Ideally, the approved class I unit basic load (UBL), DOS, and headcount all agree. But this is not usually the case, and the unit has to resubmit its UBL request to the TISA. This request must include bottled water and meals, ready to eat (MREs). Medical units that provide food for patients also must consider potential patient densities in these numbers.

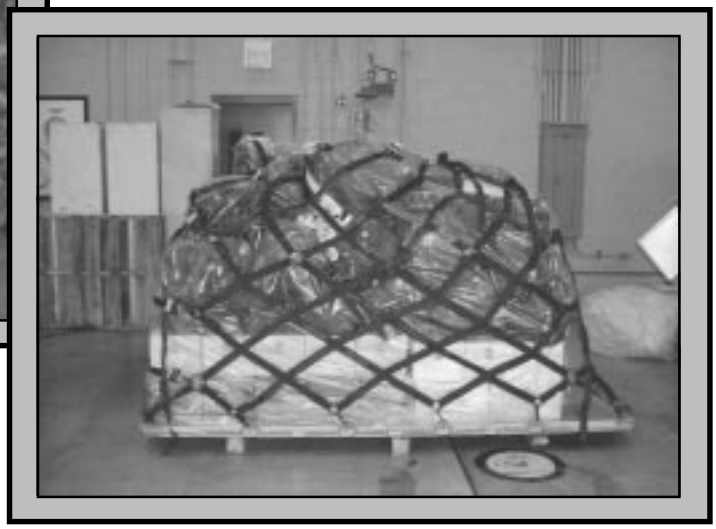
Class II (general supplies). When planning for class II supplies, planners again must look at the deployment order and compare the UBL with theater DOS requirements. It will take a significant amount of time to acquire items identified as shortages through contracts, standard requisitions through the military standard requisitioning procedures (MILSTRIP) process, and Government credit card purchases.

When determining class II needs, planners must consider office and automation supplies and common-use items such as engineer tape, cleaning items, rope, and tent pegs. They must coordinate with the CIF for an issue of organizational clothing and individual equipment (OCIE), previously known as TA 50, based on theater or regional requirements. In most instances, the unit will want to complement its current OCIE list with cold- or hot-weather items, additional force protection items such as flak vests, and environment-specific uniforms such as desert camouflage uniforms. Planners must have the hat, boot, pants, and shirt sizes of the deploying soldiers in order to assist the CIF in filling unit OCIE requirements. Moreover, they must consider the theater of operations requirements when coordinating uniform alterations, sewing, and patch requirements such as nametapes, U.S. Army tapes, shoulder flags, and additional rank and branch insignia. Planners also must coordinate with the SSA and CIF for expendable chemical defense items and chemical protective suits needed to reduce their nuclear, biological, and chemical supply and equipment shortages.

Class III (petroleum, oils, and lubricants). Planners must ensure that the unit has adequate petroleum, oils, and lubricants available to allow initial sustainment of operations in theater. Normally, these items include several 5-gallon cans of JP8 fuel, a quart or two of oil per vehicle or generator, lubricants, and pesticides for preventive medicine units and field sanitation stocks. These items must be labeled and loaded properly to ensure safe movement.

Class IV (construction and barrier materials). Force protection is a commander's single most critical task in a hostile environment. Unit planners must ensure that their supply lists provide for force protection. Force protection items should include concertina wire, tanglefoot, sandbags, pickets, plywood, and lumber. Requisitioning these stocks can be difficult because the units of issue are complicated.

To establish their class IV UBL, units must determine their perimeter defense plans. They must determine requirements for patient and survivability bunkers and fighting positions by national stock number, unit of



☐ Above, soldiers prepare a pallet of medical supplies for air transport. At right, a 463L pallet of medical supplies and equipment awaits air transport.

issue, quantity, and nomenclature. Additional class IV items include dunnage for movement operations, lumber for 463L pallets, and blocking and bracing materials for military containers.

Class V (ammunition). Medical unit planners must document ammunition requirements based on M16 and M9 weapons. Typically, the class V UBL calls for 210 M16 rounds and 150 M9 rounds per soldier with a weapon. The planners must use the documented UBL, the theater DOS, and the number of soldiers deploying to determine the ammunition requirement. Medical unit planners also should consider their smoke requirements.

Once they know the ammunition requirement, planners must prepare for its transport. This should include the movement timeline and the transporters (who must be school trained and licensed to transport these stocks). Unit planners also must arrange for temporary storage of the ammunition and hazardous materials (HAZMAT). They also must verify the information on the Delegation of Authority Card, Department of the Army Form 1687, at the ammunition supply point.

Class VI (personal demand items). Before deploying, medical units must contemplate the personal needs of their staff and patients. Unit sundry packs are a good source to assist in this process. Sundry packs are based on male and female individual personal use and hygiene requirements. The TISA is the source of supply for sundry packs. Planners should consider what assets will be available in theater and advise soldiers to bring personal items accordingly.

Class VII (major end items). The unit modification table of organization and equipment (MTOE) and common table of allowances (CTA) on-hand assets represent the major end items a unit must have to deploy. Once alerted, units immediately should perform preventive maintenance on their major end items and review their hand receipts for shortages, including component shortages. Each unit's commander must decide what shortages are critical and, based on the Accounting Requirements Code, whether his supply room or the property book officer (PBO) must requisition the critical items. Expendable and durable shortages should be annotated within the Unit Level Logistics System-S4 (ULLS–S4) to facilitate a quick requisition to the appropriate SSA; nonexpendable shortages should be identified at the PBO level for a quick requisition as well. This time-consuming process will require multiple requisitioners. Units must capture these costs for future reimbursements. They also must coordinate with the PBO for a deployment unit identification code (UIC) and Department of Defense activity address code (DODAAC) to facilitate supply operations in theater. This request must go through G3 and G4 channels.

The PBO must create a ZRF (unit transfer request) diskette to split the deployment hand receipt for stay-behind items. The deploying unit will carry the ZRF diskette into theater for loading into the gaining PBO's Standard Property Book System-Redesign. This will give the gaining commander in chief asset visibility in his theater.

Class VIII (medical materiel). When a medical unit is alerted of an upcoming deployment, it must examine

its mission and its documented shortages of medical and dental sets, kits, and outfits (SKO). Medical and dental SKO components can range from 20 to more than 1,000 different items. A medical brigade can have several hundred medical SKO. Typically, medical units do not have sufficient resources to stock their medical and dental SKO at 100-percent fill. Therefore, units must leverage Army stocks managed by USAMMA or their IMSA prime vendor.

Planners should be acquainted with USAMMA Supply Bulletin (SB) 8–75–S7, which discusses what sets and units are covered under the centrally managed short shelf-life program. Ordering these items can be cumbersome and time consuming.

It is critical for units to develop a solid relationship with the supporting IMSA. They should develop a routine discussion and a documented plan detailing which assets are not maintained at the unit level. This will minimize difficulties when the unit is notified of impending deployment. Planners also must coordinate the unit's medical chemical-defense requirements with the IMSA. The IMSA then will coordinate with USAMMA for the release of critical assets.

Class IX (repair parts) and maintenance. Deploying medical units must ensure that their equipment receives a solid technical inspection before the unit movement joint inspection. Medical and dental equipment should be inspected by the supporting medical maintenance facility. When personnel assets are limited, the brigade commander may direct other subordinate units to assist the deploying unit with mechanic support.

Unit commanders always should know the status of their equipment. The ULLS-Ground system not-mission-capable report should be the focus of the deploying- and pusher-unit maintenance sections. Deploying units also should verify prescribed load list status and consider the theater DOS, mission, and environment to determine if additional items should be procured.

The unit should collect calibrations from its test, measurement, and diagnostic equipment and Army Oil Analysis Program samples from its automotive equipment. The Director of Logistics then should suspend these programs until the unit returns to the home station. The gaining Directorate of Logistics will administer these functions while the unit is deployed.

Unit Movement

The unit movement process is the most challenging obstacle for a deploying unit. Typically, this becomes the responsibility of the pusher unit with S4 oversight. All units should have an up-to-date authorized unit equipment list based on their MTOE and CTA assets. Based on the mission and constraints placed on the deploying unit, the pusher unit will create a deployment equipment list. The pusher unit also must have trained personnel to build pallets, determine vehicle weight and center of balance, document and plan for HAZMAT shipments, and build loads for the resourced aircraft.

Units must make maximum use of secondary loads to save valuable strategic air assets. Planners should create preplanned secondary load plans for their vehicles and trailers. Units also must have unit movement supplies and equipment to deploy. These items include cargo straps, plastic pallet covers, tape, markers, dunnage, plywood, lumber, rope, and HAZMAT declaration forms. Units that have a well documented and rehearsed movement plan will find the joint inspection process quite easy.

Setting the Tone

The brigade S3 and S4, pusher unit, and deploying unit must share issues and status throughout the deployment process. The S4 must take the lead to ensure that the deploying unit receives the supplies and services it requires. This preparation will set the tone and conditions for the entire deployment.

There is no substitute for unit preparedness. The unit commander must rehearse and resource the unit deployment process. He must use the unit status report to portray the readiness of the unit. Before deployment, field medical units must train seriously on the strategic deployment mission-essential task list. Many of the logistics challenges facing the medical brigade during a deployment are unlike those facing other brigades. However, many of the tactics discussed in this article can be applied to most unit deployment scenarios.

The keys to a successful deployment are easy. Units must cooperate, have documented and clearly understood readiness SOPs, have ingenuous soldiers, and insist on solid communication. Units acting in isolation will not get through this process. Cooperation and sharing of information at all levels throughout the unit, brigade, and installation are paramount for a successful deployment. Units that do not rehearse and train on their readiness SOPs will find this process very difficult and time consuming. **ALOG**

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Situational Awareness and FSB Battle Command

by Lieutenant Colonel Jeffrey S. Wilson

Forward support battalion commanders have a difficult battle command challenge during combat operations because of their physical location on the battlefield and their place in brigade and division information networks. The forward support battalion (FSB) is located about 25 kilometers from the forward line of own troops and receives most critical information indirectly and passively over FM radio. What the FSB commander cannot glean from radio traffic, he must ask for directly, in the form of regular updates or reports, from forward-positioned FSB elements or from maneuver unit logisticians (commonly provided through the brigade S4). He does this knowing that he is distracting those farther forward from their primary focus: the battle itself.

The FSB commander's challenge is to maintain the maximum level of situational awareness in the least intrusive manner. He must be sensitive to tactical and environmental battlefield conditions so he can make cogent decisions about deploying and managing logistics resources.

The FSB commander can best acquire and maintain the level of battlefield sensitivity he needs by establishing and maintaining efficient and effective battle tracking, focused and evolving commander's critical information requirements, representation at the decisive points of brigade planning, and aggressive local reconnaissance. The following suggestions are based on doctrine and on empirical data gained during 15 rotations as an FSB logistics observer-controller at the National Training Center (NTC) at Fort Irwin, California. Though the suggestions focus on the FSB, main support battalion (MSB) or corps support battalion (CSB) leaders can benefit as well by adapting each suggestion to their particular situations.

Battle Tracking

Although the major events in the concept of support most often occur between battles, the battle itself influences the FSB commander's decisionmaking about combat service support (CSS) posturing for future operations. Battle tracking is the centerpiece of situational awareness during combat operations.

However, battle tracking is an art that is not taught as a separate subject at service schools. There is a lack of battle staff-qualified sergeants in FSB S3 shops. This deficiency is reinforced by the fact that most FSB S2 personnel are junior soldiers holding military occupational specialty 96B (intelligence analyst), and they tend to work under the supervision of an S3 who, more often than not, is a precommand captain and an S3 NCO in charge who may be a recently transferred automotive shop foreman. To overcome these impediments to effective battle tracking, the FSB commander can establish systems within the tactical operations center (TOC) that will enable even inexperienced people to manage information and facilitate decisionmaking effectively.

The FSB TOC should monitor the brigade command net and operations and intelligence net in addition to the FSB command net. The FSB commander also must have immediate access to the brigade administrative and logistics net, either through the support operations section or the brigade administrative and logistics operations center (ALOC). Because the FM radio is the primary conduit for information during combat, the commander must train TOC personnel to know what information is critical and what they ought to do with it once it is received.

Home-station field training exercises and command post exercises should feature an indepth focus on the roles and missions of each person in the TOC. Standing operating procedures (SOPs) should feature information management battle drills that new personnel can refer to so they will know what is expected of them. In order for soldiers to update the situation map effectively, the radio operators must understand how to keep an accurate message log and the battle captain must understand how to disseminate information in the TOC. FSB commanders who use the expertise of the combat arms officers and NCOs in the brigade ALOC in battle tracking will find that they are a resource that should be integrated fully into the TOC manning plan.

The FSB TOC is the cornerstone of the brigade rear command post; the other component is the brigade ALOC. Often the engineer battalion ALOC is integrated into the FSB TOC. This can increase the tendency to compartmentalize to the point where the only common thread among the FSB S3, FSB support operations officer (SPO), ALOC, and engineer ALOC is the fact that they are under the same camouflage net. An insistence on regular battle update briefs, with full participation by all major entities under the net, significantly enhances overall situational awareness and sensitivity to battlefield conditions. Knowing that they are directly responsible to the FSB commander for presenting a given set of data elements at defined intervals also enhances the motivation of the FSB S3, the FSB SPO, the brigade S1

and S4, and the engineer battalion S4 to interact and share information with one another.

Commander's Critical Information Requirements

No matter how good the information management systems in the TOC are, the FSB commander's situational awareness will be less than the best if he fails to articulate his information priorities clearly in the form of clearcut and evolving commander's critical information requirements (CCIR). CCIR are often vague, and even those commanders who start their NTC rotations with a solid set of CCIR often fail to make sure those CCIR evolve as the campaign evolves. Good FSB commanders realize that unaltered and unrefined CCIR diminish the effectiveness of even the best staffs. So they use brigade CCIR as touchstones for developing FSB CCIR during mission analysis and issue them as part of the commander's guidance to the staff as each new mission is received.

Another issue is CCIR dissemination, which is often uneven, with company command post personnel unaware of what constitutes battalion CCIR. The commander can use orders briefs and tenant meetings to reinforce CCIR to subordinate elements.

Representation at Brigade Planning

There is no set formula for determining the optimal level of direct FSB participation in brigade planning, and there are myriad opinions on what that level should be. However, this is certain: the more voice the FSB has in the actual crafting of the brigade plan, the better it can support that plan in actuality. The higher the level of inprocess dialog among the brigade S1 and S4, the FSB SPO, the FSB executive officer, and the supporting MSB or CSB SPO, the lower will be the frequency of unforeseen logistics emergencies during combat operations.

If the FSB commander clearly delineates to the SPO the level of direct involvement he expects to have in the brigade's military decisionmaking process (MDMP), the FSB operation order for the next mission can be over halfway to completion by the time the FSB commander attends the brigade commander's orders brief. If the FSB commander expects the SPO to focus on the next mission, the commander must ensure that the SPO shop has adequate personnel to manage current operations smoothly.

Many FSBs position a liaison officer at the brigade TOC to relay information and participate to some degree in the MDMP. NTC observations indicate that these liaison officers generally are ineffective because they lack both technical and tactical logistics expertise and because they have no personal credibility with brigade planners. The FSB commander and SPO must agree on what the decisive points of brigade planning are, and they must agree to accept whatever risks to current operations might result from SPO absences from the FSB TOC. When these agreements exist, the FSB truly becomes a player in the crafting of the brigade plan, and both situational awareness and anticipatory logistics capabilities increase.

Aggressive Local Reconnaissance

Because brigade-level reconnaissance and security assets, such as military police, are scarce, the FSB commander often must use internal brigade support area (BSA) resources to acquire and maintain situational awareness within the brigade rear area. The ability to support depends on the ability to survive, and threats to the BSA obviously affect the FSB commander's decisions on positioning CSS assets. Deploying forward logistics elements exacerbates physical security dilemmas. Reconnaissance and security planning must begin early in the process of developing courses of action for the FSB order.

Most FSBs at the NTC have trained on reconnaissance and security tasks before they arrive, and, in fact, they do set out observation posts, engage in patrolling, and allocate assets to a quick reaction force. However, most FSB S3s do not know how to unite the assets at their disposal into a coherent reconnaissance and security plan that is both active and passive, proactive and reactive. Too often, the FSB S3 makes two mistakes. First, he allows patrols to report through their parent company command post to the TOC, rather than controlling the patrols directly. Second, he neglects to integrate tenant units fully into the overall reconnaissance and security plan and fails to enforce perimeter security and communications SOPs. Consequently, tenant units often fail in defending the BSA during enemy attacks because they cannot communicate or format reports correctly.

Situational awareness is the key to effective battle command. The FSB commander can acquire and maintain sensitivity to battlefield conditions by establishing and maintaining efficient and effective battle tracking, focused and evolutionary CCIR, representation at the decisive points of brigade planning, and aggressive local reconnaissance. Implementing these suggestions will increase the FSB commander's ability to provide timely and competent CSS across the length and breadth of the battlefield, today and tomorrow. **ALOG**

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MTMC Surface Shipments Sustain Troops in Afghanistan

by Major David Cintron

Supporting U.S. forces in Afghanistan and surrounding countries in Central Asia requires surface transportation movements by train and truck across thousands of kilometers of some of the most forbidding territory in the world. Some shipments, after traveling by ocean carrier to Bremerhaven, Germany, journey by railcar to Uzbekistan. Other shipments arrive at Pakistani ports and move by truck to U.S. troop destinations in the region. Military Traffic Management Command (MTMC) transportation planners find that the movements are complicated by time zones, foreign languages, rugged terrain, and howling blizzards.

After MTMC surface shipments reach Karshi-Khanabad Air Base in Uzbekistan, the 164th Transportation Contract Supervision Detachment—a Third Army element—contracts private trucks to distribute the supplies to U.S. and allied troops in Afghanistan. The sustainment supplies are shipped primarily to the Afghan cities of Mazar-e-Sharif, Bagram, and, occasionally, Kandahar in support of Operation Enduring Freedom.

The surface shipments originally started as a means of relieving pressure on the overburdened aircraft. Using civilian trucks has freed the aircraft to move high-priority, sensitive, and perishable cargo. Working with the 507th Logistics Task Force at Karshi-Khanabad, the 164th orders vehicles, coordinates passes, documents cargo, escorts trucks, and assists customers.

Surface transportation in Afghanistan began in December 2001 with contract trucks moving sustainment supplies from Karshi-Khanabad to Mazar-e-Sharif. The 164th contracted for local 20-ton Super Kamas trucks to make these shipments because of the trucks' size and capacity.

The transporters did not encounter obstacles such as poor road surface conditions or bridge limitations between Karshi-Khanabad and Mazar-e-Sharif. However, the route climbs in places to an elevation of 6,000 feet,

☐ Dangerous, narrow bridges test the driving skills of the truck drivers. At bottom right, trucks detour around a destroyed bridge.

☐ MTMC cargo moves are challenged by destroyed or antiquated roads and bridges.

☐ Heavy snows impede surface transportation high in the mountains. Bottom left, a pallet of supplies is removed from a contract truck.

and snowdrifts sometimes blocked tunnel entrances and drifted over roads. Even so, the weather delayed only three movements. The team managed 38 separate supply movements to Mazar-e-Sharif in the first month.

While contractors trucked sustainment supplies to Mazar-e-Sharif, the 164th began planning for surface shipments to Bagram. Although shipments already were moving on the first 400 kilometers of highway, the last 450 kilometers proved to be the challenge.

After checking the tunnels, bridges, road conditions, threat, and weather throughout the second portion of the route, the transporters found that limited bridge capacity made it impossible to use large, heavy trucks to perform the mission. They decided to use 10-ton Kamas trucks that are readily available in the region.

Two trucks made the first run to Bagram, a trip that turned out better than expected. Reaching Bagram in 40 hours, the convoy had no problems crossing the Friendship Bridge that crosses from Uzbekistan into Afghanistan and managed to stay one step ahead of a blizzard. With the success of the first convoy, the transporters sent a second convoy of 10 trucks. As of mid-April 2002, the team had sent 600 contracted trucks to Bagram carrying approximately 4,200 short tons of cargo. Some of the obstacles transporters have encountered along the way include delayed bridge crossings, avalanches, blizzards, flooded tunnels, one-way traffic alternating daily, and administrative delays.

Expanding the supply chain to Kandahar has been the most difficult to arrange because of the distance from Karshi-Khanabad (1,500 kilometers) and the road conditions. The only successful route entails a 12-day transit over the Salang Pass, through Kabul, and into Kandahar.

Surface shipments in Central Asia have been successful because of the dedication of the 164th Transportation Contract Supervision Detachment soldiers, who ensure that trucks are on time with proper documentation. **ALOG**

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Transforming Finance

by Colonel Michael A. Shalak and Major Leo M. Impavido

The 13th Finance Group at Fort Hood, Texas, has embarked on a transformation effort to become a more deployable and relevant unit. The group's objective is to develop the most effective finance force in the world—lean, light, technically and tactically expert, and ready at all times to support the Phantom Warriors of III Corps and other units as directed. Central to the group's transformation has been the implementation of the finance support team (FST) concept.

An FST is a modular, deployable modification table of organization and equipment unit composed of four to six finance soldiers. A sergeant or staff sergeant leads the team. FST members are soldiers first—warriors with expertise in finance operations. The FSTs live, train, eat, maintain, and work together.

Each team is an integrated, cross-trained unit, able to survive and accomplish its mission under uncertain and austere conditions. It is trained in critical financial management functions, including vendor pay support, disbursing, military pay, resource management, personal financial readiness, and some travel functions. It also has the tactical competence needed to accomplish the mission. The team is trained in combat lifesaver skills, field sanitation, communications, and maintenance.

Each FST has an organic high-mobility, multipurpose, wheeled vehicle; trailer; and containerized, deployable equipment set, including ruggedized laptop computers with reach-back capability. The self-contained equipment set includes only what the team needs to survive and accomplish its mission. The FST has a very small footprint, providing the operational commander with a big bang for the buck. This low signature is a guiding principle of a deployed FST.

FSTs are not broken up after a mission. The members of an FST constitute a true team, akin to a tank crew or a Special Forces A team. Within the constraints of normal personnel rotations, finance battalions make every effort to keep FST personnel together for as long as possible. FSTs are broken up only when approved by the battalion commander, in conjunction with the battalion command sergeant major.

Certification of FSTs is conferred in formal ceremonies upon the teams' graduation from the Phantom Finance Warrior Center (PFWC). The PFWC is an inhouse academy operated by the 13th Finance Group. The PFWC trains soldiers in relevant topics, trains FSTs to operate in austere environments, instills basic skills so the teams can operate in an uncertain world, and inculcates situational awareness to protect the force against all threats, including asymmetrical ones. PFWC graduation ceremonies are critical rites of passage. For FST leaders, obtaining and maintaining PFWC certification is a fundamental performance objective.

FSTs in the group are guided by four principles—

- ***Responsibility.*** The FST leader has full responsibility for the team. To ensure consistent support throughout the customer base, each leader synchronizes with other FST leaders and higher headquarters on the latest systems changes and entitlements.
- ***Multifunctionality.*** Relevant tactical and technical training ensure that the FSTs are cross trained and that each team member is capable of performing each of the team's battlefield functions.
- ***Stand-alone capability.*** The FSTs are trained on systems, communications, software, and hardware, which gives them the self-confidence and technical knowledge to operate down range.
- ***Ownership.*** Each FST leader signs for all of the team's equipment, including vehicles, trailers, field equipment, laptops, printers, and other relevant items.

An FST has "ownership" of its supported units. For one FST, this may mean one line brigade; for another, several brigade-, battalion-, and company-sized units. The point is that an FST's bond with its supported unit is so tight that the supported unit always knows who to call to resolve finance-related issues. The brigade commander or sergeant major knows that the FST leader is *the person* in charge of his brigade's finance support. FSTs take the service mission on the road, providing finance support with deployable "toughbook" computers equipped with wireless connectivity. This service-to-the-soldier practice greatly reduces the number of soldiers who have to take time away from duty to come to the finance customer service counter.

Although the 13th Finance Group's transformation has been successful thus far, there have been some growing pains as the finance battalions at Fort Hood have transitioned to the FST concept. Organizational reshuffling and the decentralization of many functions have generated some turbulence. However, the units are meeting those challenges head on, and they are realizing the benefits and payoffs of the FST concept with each passing day.

The terrorist attacks of 11 September have added an extra sense of urgency to the group's transformation. FSTs that have deployed, or are preparing to deploy, are capitalizing on the positive effects of the FST concept. These empowered and trained soldiers are confident that they can accomplish any mission. **ALOG**

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Victory in the Division Rear Fight

by Captain John F. Carson, Jr.

A 2d Infantry Division warfighter exercise demonstrated how the division rear can be protected during a battle, causing the opposing forces to be unable to disrupt combat service support operations.

During the 2d Infantry Division Warfighter Exercise in December 2001—in which "Northland" invaded "Blueland" and U.S. troops were supporting Blueland's defense—the division rear command post successfully waged the rear battle against the Battle Command Training Program's world-class opposing force (OPFOR). The division rear command post dominated the rear fight with effective intelligence preparation of the battlefield (IPB), aggressive reconnaissance and surveillance (R&S), effective use of smoke, and solid base defense plans. As a result, the enemy's special-purpose forces were defeated and prevented from disrupting logistics support to the division. The division rear command post maintained control and initiative in the rear area of operations, providing freedom of action for combat service support (CSS) operations and ensuring that seamless, anticipatory, and robust logistics support was provided to the maneuver forces.

Intelligence Preparation of the Battlefield

To set successful conditions for planning and executing the division rear battle, the division support command (DISCOM) S2 conducted a thorough IPB of the division rear area. The most crucial IPB products were the modified combined obstacle overlay, the enemy situation template, and the named area of interest overlay. The commander's priority intelligence requirements (PIRs) were key to developing these products. The S2's IPB laid the groundwork for the staff to successfully wage the division rear battle and ensure unimpeded CSS operations in the division rear.

Modified combined obstacle overlay. Early in the IPB process, the S2 created a detailed modified combined obstacle overlay of the division rear in order to depict likely air avenues of approach, landing zones, dismounted routes, ambush sites, and observation posts. Unlike a traditional modified combined obstacle overlay for a mechanized threat, this overlay was created to show the threat posed by special-purpose forces to the division rear. The S2 depicted air avenues of approach and landing zones for inserting special-purpose forces teams by AN–2 Colt airplanes or Mi-8 Hip helicopters. The modified combined obstacle overlay also detailed the likely dismounted routes to and from ambush sites and observation posts adjacent to main supply routes and the division support area (DSA). This overlay was very helpful in visualizing where the enemy might operate in the division rear.

Enemy situation template. After completing the modified combined obstacle overlay, the S2 developed the enemy situation template. In conjunction with analysis from the division G2 multidiscipline counterintelli-

gence cell, the DISCOM S2 deduced that approximately 40 special-purpose forces teams would operate in the division rear. The S2 concluded that 25 of these teams would be from the 37th Special Purpose Forces Brigade of the Northland Southern Front and 15 of the teams would be from the 8th Infantry Army Special Purpose Forces Battalion. Northland's order of battle indicated that each team would consist of approximately 12 men, equipped with AK–74 rifles, AKSU–74 machineguns, RPG–16D rocket launchers, and high-frequency burst radios. The S2 also determined that the high-payoff targets for these teams would be aviation assets, command posts, fuel sites, ammunition points, and lines of communication.

Based on the terrain analysis from the modified combined obstacle overlay, expected composition of special-purpose forces in the division rear, likely special-purpose forces high payoff targets, and line-of-sight analysis from these high-payoff targets, the S2 developed the division rear enemy situation template. This template proved to be highly reliable, with the 40 templated special-purpose forces teams situated about where the 47 actual special-purpose forces teams were located.

> Modern wars will not be won in the rear area, but they may well be lost there.
>
> —Unknown

Named area of interest overlay. Once the enemy situation template was completed, the DISCOM S2 created the named area of interest overlay. This IPB product is key to developing the R&S plan and must be produced deliberately. Although the named area of interest overlay uses analysis from the modified combined obstacle overlay and enemy situation template, it is not simply a copy of those products. The S2 must select named areas of interest that will satisfy the commander's PIRs. The S2 also must prioritize the most likely locations for special-purpose forces teams and balance the total number of named areas of interest with the total number of R&S assets at his disposal.

For the warfighter exercise, the DISCOM S2 created 62 named areas of interest and organized them into phases corresponding to the anticipated boundary changes of the division rear as the exercise progressed. Of these 62 areas, 34 were for phase I (the period from the beginning of the exercise to forward movement of the brigade rear boundaries). The remaining 28 were phased in as the maneuver brigades' rear boundaries moved forward and the DSA redeployed. The S2 effectively placed these named areas of interest on likely landing zones, ambush points, observation posts, and sniper points. Of the 47 special-purpose forces teams that operated in the division rear, 40 were destroyed, and 19 of these were destroyed on or near a named area of interest.

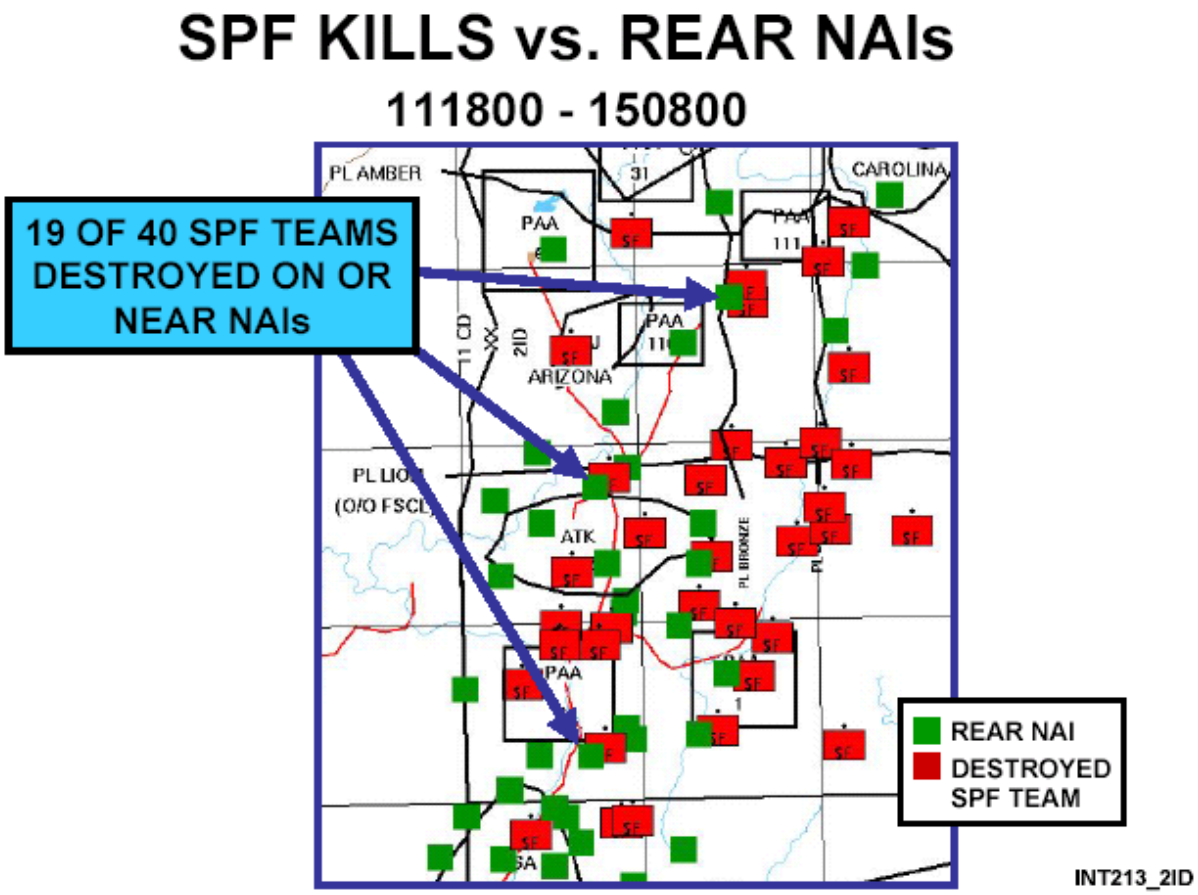
The DISCOM S2's thorough IPB created an effective foundation for the division rear's R&S plan and base defense plans. The modified combined obstacle overlay, enemy situation template, and named area of interest overlay provided the necessary framework for most other staff planning. The IPB was crucial to effectively waging the division rear fight and ensuring freedom of action for CSS operations.

R&S Plan

From well-prepared intelligence products, the DISCOM S2 developed a comprehensive R&S plan early in the military decisionmaking process. The plan was detailed in an easy-to-understand R&S tasking matrix that incorporated all available battlefield operating systems. The S2 carefully selected collection assets and established clear responsibility for each named area of interest. The S2 also led an R&S synchronization meeting with all key participants to ensure complete understanding of the R&S plan. Finally, the S2 occasionally altered the R&S plan's execution, based on his predictive analysis of anticipated activity by special-purpose forces.

The R&S tasking matrix incorporated all available assets in the division rear, including attack aviation, military police, engineers, CSS units, counterintelligence teams, ground surveillance radars, a remotely monitored battle sensor system, and communications intelligence intercept systems. An R&S matrix for each phase of the operation was completed in order to cover the division rear effectively as its boundaries changed. The R&S tasking matrix focused on the DISCOM commander's PIRs, ensured redundant coverage of named areas of interest, and integrated all available assets to create a solid web of R&S in the division rear area of operations.

Selecting the right asset to cover the right named area of interest was crucial to the R&S plan's success. Coverage of named areas of interest within or near the DSA was tasked to the main support battalion, the corps support battalion, the aviation brigade, and the engineer brigade. Attack helicopters and military police teams covered named areas of interest adjacent to main supply routes, possible special-purpose forces landing zones, and possible infiltration routes. The two AH–64 Apache attack helicopters normally dedicated to executing the



division rear R&S plan were particularly valuable assets because they could cover named areas of interest in mountainous terrain and engage targets quickly.

The 58 military police teams provided effective coverage along routes and responded quickly to the OPFOR operating in the division rear. The military intelligence battalion provided two counterintelligence teams, two interrogation teams, two AN/PPS–5 ground surveillance radar teams, and one string of remotely monitored battle sensor systems to operate in the division rear area of operations.

The forward-looking infrared radar on the Avenger air-defense weapon systems provided excellent ground coverage of special-purpose forces teams operating in and around the DSA at night. When the R&S plan was complete, the division rear's R&S assets provided complete and multidisciplined collection of intelligence in the division rear, protecting aviation assets, CSS units, and lines of communication.

Synchronization Meeting

Before conducting the warfighter exercise and executing the R&S plan, the DISCOM S2 led an R&S synchronization meeting with key representatives from each unit tasked in the R&S plan. The officers in charge of the R&S assets for each unit attended the meeting. The DISCOM commander, executive officer, and S3 also were present to provide direction and guidance.

At the meeting, the R&S tasking matrix and R&S overlay were briefed in detail. As indicated in the matrix, each named area of interest had at least one unit tasked as its primary intelligence collector. Units understood that, as primary collectors, they were responsible for covering and reporting on their named areas of interest. The S2 produced R&S graphics on FalconView maps (a Windows-based application). These maps provided a clear representation of the terrain, named areas of interest, the expected enemy situation, and R&S tasks. The R&S synchronization meeting ensured that every unit understood in detail what its tasks were on the matrix. This meeting paid big dividends while executing the R&S plan during the exercise.

R&S Plan Execution

During the exercise, every unit tasked as primary collector for named areas of interest was responsible for

reporting on the status of its areas of interest every 2 hours or when contact was made. The S2 tracked the progress of the R&S plan closely throughout the fight. Every 24 hours, the S2 conducted pattern analysis of the previous day's OPFOR activity. In order to predict the intentions and anticipated activities of the special-purpose forces, the S2 thoroughly assessed their composition, disposition, and targeting. He occasionally altered the R&S tasking matrix based on predictive analysis from this process. The refocusing of assets during the battle effectively reduced the OPFOR threat in the division rear.

By deliberately and thoroughly developing an effective R&S plan, the DISCOM S2 succeeded in finding and destroying enemy special-purpose forces teams. As a result, CSS units in the division rear were free to move and operate, ensuring crucial support to the warfighter in the close battle.

Base Defense Plan

The DISCOM S3 worked closely with the S2 and the rear tactical operations center commander to develop a base defense plan that provided maximum protection for units within the DSA. The base defense plan incorporated all battlefield operating systems, effectively used the tactical combat force, coordinated preplanned targets with division artillery (DIVARTY) and the aviation brigade, and organized all base defense activities on a base defense matrix. When completed, the base defense plan was well integrated and flexible enough that the division could react to any OPFOR threat. Since R&S support and base defense support are practically the same, careful attention was given not to overtask units providing both types of support.

The tactical combat force was centrally located within the DSA to ensure quick reaction to level II and III threats. Platoons from the tactical combat force also conducted local patrols in the area immediately surrounding the DSA. Units within the base clusters formed quick reaction forces to respond to level I and II threats.

Smoke operations were used frequently in the DSA to conceal unit locations and movements. While attack helicopters and military police teams conducted their R&S missions, they also provided base defense by chasing and killing enemy special-purpose forces teams throughout the division rear.

Effective targeting was another key component of the base defense plan. In order to streamline fire support, the DISCOM S2 coordinated with DIVARTY to develop preplanned target areas of interest. DIVARTY converted many named areas of interest into target reference points for fire-support planning purposes. Targeting was refined at a daily targeting meeting that was attended by representatives of each staff element and chaired by the DIVARTY executive officer. This targeting group reviewed preplanned target areas of interest in light of anticipated OPFOR activity in the division rear. The targeting group adjusted the division rear targeting plan based on the S2's predictive analysis. The group was careful to ensure that supporting mortars and attack aviation could cover target areas of interest. Because of these efforts, the division rear command post developed highly effective target areas of interest.

Base defense planning for the DSA went extremely well because of the close coordination among the rear tactical operations center, S3, S2, and subordinate units in the DSA. Throughout the exercise, these staff elements constantly passed information and battlefield updates to one another on standardized spot report forms in order to keep a common relevant picture of the battlefield. Because of the highly effective base defense execution in the division rear, CSS units provided logistics support to the division without interruption.

Through effective IPB, R&S planning, and base defense planning, the division rear staff developed effective plans for the division rear fight. Vigorous execution of a comprehensive, fully integrated R&S plan and effective base defense plan were crucial to waging the rear battle. Feedback from the Battle Command Training Program observer-controller team stated that the OPFOR special-purpose forces operators felt they were "chased" throughout the exercise. As a result, the DISCOM's logistics support was not impeded and CSS units had freedom to provide full-spectrum support to the warfighter. **ALOG**

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Commentary

The Objective Force and Logistics Force Protection

by Colonel Steven A. Bourgeois

The Army recently conducted a futuristic event in Carlisle, Pennsylvania, called the Army Transformation War Game. The war game gave the Army an opportunity to put into play the force it envisions having on the battlefield in the 2015 to 2020 timeframe. Two futuristic battlespaces were simulated during the war game—one in Asia and one in the Pacific. Units in both battlespaces had Objective Force capabilities.

The timeframe selected for the war game may seem a long way off, but it will be here before we know it. The captains who are commanding our companies today will be colonels commanding the Objective Force brigades that will face tomorrow's enemy in a new type of battlespace. If you think force protection has been challenging in the past, just wait. To steal a phrase from a popular song, "You ain't seen nothing yet."

We must never forget that we are soldiers first and logisticians second. We must be as skilled at firing an M16 rifle or an M249 squad automatic weapon as we are at changing engines.

When drawing up plans for force protection, three areas must be considered: the enemy or threat, the battlespace, and the way we must operate to succeed.

The Enemy

The enemy we will face in the future will be very different from the enemy we have trained to defeat over the last 40 years. Gone are the days of the Warsaw Pact heavy-armor force. Gone is the old Soviet heavy-armor force doctrine that the Iraqi Army used in the Persian Gulf War.

By now, our enemies have picked up on our use of after-action reviews as a learning tool. Tomorrow's enemy will have studied, learned, and honed his techniques and procedures. He will have one goal in mind: to negate our size and technological superiority in order to defeat us.

The new enemy will be technologically suave. He will make optimal use of readily available technology. Cellular phones and the Internet will give him robust and adaptive communication capabilities. For example, in the movie "Black Hawk Down," civilians who were stationed near airfield runways simply called in their reports of coalition activity to the enemy on their cell phones.

The 21st century enemy will attempt to limit our use of ports and airfields. Operation Desert Storm sent a loud and clear message to our enemies: "Don't let the Americans get a foothold that will allow them to build up the logistics capability to unleash their combat power." Therefore, ports and airfields will be potential targets that will be under constant observation.

By using simple, commercially available technology, our enemy could develop a capable intelligence-gathering system. Anyone can obtain night-vision devices commercially at stores like Radio Shack or Sharper Image. An inexpensive remote camera suspended from a helium balloon could feed real-time video to our enemies.

Our future enemy will attack to destroy our support capability. He will attack our logistics tail across the spectrum, including our homeland. He will have a more lethal array of weapons than anything we have seen in the past, ranging from car bombs to mortars and rockets. Huge stockpiles and warehouses full of supplies will become "metal magnets" for enemy gunners. As the current Middle East situation demonstrates, it does not take a sophisticated weapon to inflict significant damage. Suicide bombers are the epitome of simplicity.

We should be able to assume that we can resupply

☐ Soldiers experiment with an end user terminal, a new technology that will enable brigade and below troops in the field to communicate and make decisions faster and more accurately.

with relative ease and security from an intermediate supply or staging base (ISB) established outside the area of responsibility. Unfortunately, this couldn't be further from the truth. Our enemy's area of operations knows no bounds. Against a lethal, technologically enhanced enemy, we can no longer assume the security of an ISB. Instead, we should expect our enemy to attack our ISB directly. We also should expect him to attack the host nations and to put political pressure on them to deny access to the U.S. military.

Our enemy's intent is to put our logistics forces continuously in harm's way, which will divert critical combat forces from their primary mission and cause high casualty counts in the rear area. This tactic has been used successfully against the Russian Army in Chechnya.

The Battlespace

Tomorrow's battlespace will present logisticians with challenges very different from those we face today. Because of the size of the area of operations and the innovation and dedication of our future enemies, protecting our logistics capability will be significantly more difficult

Most of us have grown up learning how to fight the "Fulda Gap" scenario involving fast-moving, heavily armored forces. Most of today's force structure was designed for that type of battlefield. Such a structure was triumphant in Operation Desert Storm.

We have been trained to think in a linear fashion. This lulls us into thinking that our lines of communication are relatively secure behind the forward line of the battle area. Rear area security is viewed as a military police or tactical combat force mission, because the major threat in the rear area typically is from small, irregular units and lone combat systems that may have leaked through the main fight.

However, the battlefields of tomorrow will be significantly different. The battlespaces represented by Operations Urgent Fury in Grenada, Just Cause in Panama, and Joint Endeavor in Bosnia, as well as the current war in Afghanistan, point us in a new direction as we design the Army's Objective Force. Of the conflicts in which the U.S. military has been involved over the last 20 years, Desert Storm stands out as the anomaly.

What We Must Do to Succeed

U.S. forces will maneuver rapidly over distances that are unimaginable by today's standards. Units will be separated geographically but linked virtually. An area of operations will have no well-defined rear area. The emerging term "gray area," which means that no one really controls the area, is gaining popularity. We no longer can count on secured and patrolled lines of communication or assume that our base defense clusters are

secure areas. Tomorrow's force must have the lethality of today's heavy force, the deployability of today's light force, and the agility of today's special force.

An important lesson learned during the Army Transformation War Game is that force protection will be important to successful sustainment operations. A lot of innovative work is being done on maneuver support and the role of military police in the Objective Force. Many out-of-the-box organizational designs and innovative materiel solutions also show promise in providing the tools needed to improve force protection capabilities. However, we logisticians can begin now to implement some of our own improvements.

Other force protection "take-aways" from the war game include—

- ***Logistics operations are combat operations.*** Convoys, recovery operations, and ammunition transfer points must be viewed not only as logistics operations but also as combat operations because they are lucrative targets for the enemy. Logisticians must plan, coordinate, and, if necessary, conduct combat actions to protect our assets on the battlefield, starting with techniques such as four-vehicle convoys, assistant drivers in every vehicle, vehicles equipped with crew-served weapons, and positive command and control.
- ***We must create a combat culture in the logistics branches.*** Sustainment operations are not just logistics operations; they are combat multipliers as well. We must create in the logistics community a combat ethos that views all logistics operations as contributing to the combat mission.
- ***We must never forget that we are soldiers first and logisticians second.*** We must be as skilled at firing an M16 rifle or an M249 squad automatic weapon as we are at changing engines. Rules of engagement must be part of our everyday training and ingrained in all of our soldiers, not just training conducted annually to beef up quarterly training brief statistics. These rules must become part of our culture; logisticians must know when and how to engage targets to protect not only themselves but also other soldiers in their units.
- ***There is safety in movement.*** Future combat systems will not be designed simply to "slug it out" with the enemy. Rather, our forces will use speed and agility, coupled with information dominance, to strike the enemy on our terms at times and places of our choosing. This principle holds true for logistics units as well. Forward support battalions "jump" to make it more difficult for the enemy to get a good fix on their locations. Refueling on the move and ammunition transfer point operations are designed to happen quickly and efficiently and not allow the enemy to "draw a bead" on us. We need to broaden these types of concepts and find better ways to provide support on the move.
- ***Stockpiles are lucrative targets for the enemy.*** The Army must continue its ongoing move away from a supply-based logistics system to one that is distribution based. We must become expert at managing the supply pipeline and avoid providing the enemy with high-payoff targets.
- ***Distribution methods must not become predictable.*** We shouldn't make it easy for the enemy to find us. To quote from our transportation brethren, we must be "multinodal and multimodal." That means that we must learn to use diverse methods, both air and ground, to resupply our forces. We can no longer build our resupply operations around LOGPACs [logistics packages] that arrive at a set time at a set location. We must resupply on an irregular basis and never fall into a discernible pattern. We must integrate "pulse" sustainment into the maneuver battle rhythm. Conducting sustainment the same old way, along the same routes, will make the enemy's work a lot easier.

Our future enemy and the battlespaces to which we will deploy undoubtedly will present us with dynamic challenges that are difficult to comprehend in today's terms. New, innovative technologies and organizational designs will help us to meet those challenges. Protecting our forces will become even more important as we are called to meet the new enemy on the future battlefield. The insights gained during the Army Transformation War Game demonstrate immutable truths; they are evolutionary, not revolutionary. We must begin today to set the condition for success on tomorrow's battlefield.

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Technical Competence Versus Jack of All Trades

by Colonel Korey V. Jackson

Has the Army gone too far in pushing for multifunctional logisticians and combined logistics units?

A family member suffers a severe head trauma and is rushed to the nearest hospital. The emergency room doctor examines the patient and sends him to the nearest neurosurgeon—a specialist capable of working successfully with these types of injuries.

What does this have to do with contemporary logistics? For the past 20 years, the Army logistics community has drifted toward generalization and away from specialization. At the same time, the Army has experienced high growth in operation and maintenance costs while equipment readiness, which rose in the 1980s, has trended downward. While there are many complex reasons for this situation—increased costs and reduced readiness—I suggest that a contributing factor is the loss of technical competence in the Army's logistics ranks.

The dedicated soldiers, noncommissioned officers (NCOs), warrant officers, and contractors who provide Army logistics support perform magnificently, often in adverse conditions and with little thanks. But are they as good as they should, and could, be? Are today's commissioned officers in the logistics branches the experts that many Americans believe them to be? The logistics community should take a hard look at itself and where it is going. We should examine the impact of the "jack of all trades" versus expert trend on today's military and consider where this path is taking us.

Technical Competence

General Montgomery C. Meigs points out in his article, "Generalship: Qualities, Instincts, and Character," in *Parameters* (Summer 2001 issue), that General Lawton Collins, when he was head of the machinegun board at Fort Benning, Georgia, was proud that he and his fellow officers could take down and emplace a machinegun as well as his team of instructor NCOs. In Collins' words, "As an instructor there, I always prided myself that I could mount a machine-gun just as fast as Sergeant Wolf could, which was something, I can assure you . . . We wanted to know as much about it as Wolf did, . . . and if we could do that, then we knew our business." As General Meigs explains, officer intellectual development walked hand in hand with technical mastery.

Yet how many company-grade officers in the Army logistics community today can display technical proficiency, let alone mastery, of the individual and crew skills that they ask their platoons to perform daily? Are our transportation lieutenants licensed to drive heavy equipment transporters? Are our quartermaster lieutenants licensed to operate materials-handling equipment? Do we at least familiarize ordnance lieutenants with metal inert gas (MIG)/tungsten inert gas (TIG) welding, recovery vehicle operations, basic electronics, and soldering and circuit card repair? Does the young maintenance officer know the difference between a "short" and an "open"? (A "short" occurs when a hot wire is connected to a ground, creating a short circuit. An "open" occurs when a circuit is interrupted, say with a broken wire. When I was assigned to instructor supervisory duties at the Army Ordnance Missile and Munitions Center and School in the mid-1980s, an absolutely unpardonable description of a student's inability to be trained was summed up by these eight words: "He doesn't know an open from a short.")

If we can expect officers in the combat arms and combat support arms to display the technical proficiencies of their soldiers—and we should—why do we not have similar expectations for today's combat service support officers? Infantry and armor officers are trained to command tracked vehicles and to have some familiarity with each job on the vehicle, such as driver, gunner, and loader. (While a combined arms team captain from the Infantry branch may not be a qualified tank commander, his armor platoon leader is expected to be. Armor battalion commanders, operations officers, and company commanders often are qualified tank commanders.) Air defense and field artillery officers actively participate in crew training and table training certification. What is different about the water platoon lieutenant, the supply platoon leader, the maintenance platoon leader, or the

heavy equipment transport platoon leader that we do not demand similar technical mastery from them?

Many successful senior leaders of the past and present were technical experts in their particular fields as young officers, and they continued their professional technical studies as they rose through the ranks. Who can forget the scenes in the television series *M*A*S*H** of the fictional Colonel Potter reading field manuals? Now retired Brigadier General Robert P. McFarland, as a maintenance battalion commander and later a division support command (DISCOM) commander, often would have his staff provide him with technical manuals at the end of the duty day. The next morning, he would quiz the owners and maintainers of that particular item, keeping them on their toes and testing their technical competence. I observed then-Brigadier General Larry Lust, as 3d Corps Support Command commander, question company commanders, platoon leaders, and platoon sergeants on the technical aspects of maintaining their high-mobility, multipurpose wheeled vehicles (HMMWVs) and other wheeled equipment; his questions were based on his personal, thorough study and knowledge of technical manuals.

So what is the difference today? Today's company- and field-grade officers become broad-based "logisticians" earlier in their careers during assignments to consolidated logistics units. The breadth of knowledge required to succeed in these duties is greater than in the past, but the depth of knowledge is less. At the same time, the Army has eliminated most remnants of the old "technical services," with no specialists above the rank of E4. Our personnel structure and NCO corps emphasize corporals over specialists. While the concepts of master mechanic, master technician, and master warrant officer seem to counter this trend, I am left with the overall impression that technical specialization is declining.

A contributing factor to this trend away from technical mastery and toward generalization is the pushing of the concept of combined logistics down to lower and lower levels. Combined logistics used to begin at the support command level, with support commands at the theater army, corps, and division levels being "logistics" integrators. Below them were the functional brigades, groups, and battalions. Then, beginning with the DISCOMs, functional battalions were reorganized into forward support and main support battalions. While I endorse this concept as an effective reorganization, once this trend started, it kept on rolling. Corps support groups and corps support battalions were created, as were area support groups, and they all but eliminated the concept of logistics functional battalions in active Army tables of organization and equipment.

The combined logistics concept now is pervasive through the Army, and, with the organization of forward support companies to support Division XXI forces, it is being applied further forward. If we continue this trend—consolidating the core logistics functions of supply, transportation, and maintenance into one entity at lower and lower levels—why not create a forward support platoon? Why not create a forward support squad, or forward support team? Following this line of reasoning to the end, why not designate a forward support sergeant and make him personally responsible for all of a unit's organizational, direct support (DS), general support (GS), or intermediate-level maintenance, supply, and transportation support? He would be a true jack of all trades—a super-sergeant, a modern renaissance man—wielding a breaker bar with one hand and driving a truck with the other while replacing line replaceable units and delivering supplies and the mail. (This actually might describe the trinity of NCOs behind a highly successful unit: first sergeant, supply sergeant, and motor sergeant.)

But if the Army officer corps no longer has masters of trades in its uniformed ranks, can't we always contract these duties out? The answer is ambiguous in the short term, but in the long term it may be no. The contractors' source of skilled technical labor for Army equipment often is former Army soldiers. Where does a contract employee learn the intricacies of, say, radar system maintenance? While MIG and TIG welding skills may be taught at many industrial trade schools, few if any nonmilitary schools have courses on fire system control maintenance and repair. How are these experts, whether uniformed military, Department of Defense or Department of the Army civilians, or contractors, best developed?

Readiness Versus Technical Excellence

Partly in response to the high personnel costs associated with highly trained technicians, the Army rightly requires that equipment maintainability and affordability be considered in the acquisition process. Few would question that today's Army equipment generally is easier to maintain than similar equipment was 20 years ago. Modularization, improvements in diagnostics and test equipment, and improvements in MANPRINT (manpower and personnel integration) design all have helped. At the same time, the Army has reduced dramatically the number of spare parts in the field (some would say at a readiness cost) and thus the operation and maintenance Army (OMA) budget.

What is not so obvious, though, is the reduction of available highly skilled labor, since payroll dollars are not the direct responsibility of system managers. OMA costs also have increased as systems have grown more complex; what once may have been a 49-cent resistor replacement on a printed circuit card, plus the cost of a little time, flux, and solder, now often is a $10,000 black

box replacement.

Costs are shifting more from the Army wholesale and depot levels to field commanders. Where once a PEMA (procurement of equipment and missiles Army)-funded module was readily available and quickly swapped out, now the field battalion and brigade commander sometimes must choose between funding unit readiness and soldier quality of life. Other units in the institutional support base, such as the Army Training and Doctrine Command schools, which are barely funded for their missions anyway, must resort to cannibalization at times. Hard choices then are made: should the readiness of an M1A2 Abrams tank in the training base have priority for parts or dollars over a tank that will not deploy early?

Levels of Support

The Army has long claimed to have four levels of maintenance, but typically there are five. Just look at the numbering scheme for technical manuals: operator (–10), organizational maintenance (–20), DS (–30), GS (–40), and depot (–50). In the missile and aviation communities, DS and GS normally are combined, which, though it often results in more skilled labor in the field at DS and GS maintenance units, tends to increase the need to send modules or end items back for depot repair and maintenance.

The Ordnance Corps is pushing for just two levels of maintenance. Why two levels? Largely, it is due to perceptions that the logistics tail must be reduced. Senior leaders push for a reduction in the tooth-to-tail ratio in the hope that reducing the number of logisticians (or pushing active-duty soldiers into the Reserve components) will result in overall dollar savings. Given a cap of 480,000 soldiers on active duty, our most senior leaders, all from combat arms branches, believe combat force structure must be preserved. Though I do not believe any senior leader really wants to see the Army logistics force structure being pinched, the combat force structure will dominate when a choice must be made between maintaining logistics force structure and preserving combat power. A mantra without solid foundation has developed: "More tooth, less tail."

The reduction of the tail can go too far. Small-unit leaders can be forced to create "shadow logisticians" who lack the needed technical training to execute their immediate logistics requirements. The sophistication of today's equipment and logistics systems makes on-the-job training less feasible today than it once was. The cruel irony is the possible effect on the unit: even less tooth and less combat effectiveness.

Consolidating MOSs

Just as logisticians are pressured to reduce "the tail," the logistics training base is pressured to reduce costs. While this pressure in itself is not necessarily bad, the implementation may be shortsighted. Some questions should be asked after any military occupational specialty (MOS) consolidation. How have readiness and its associated costs been affected? Is the quality of support better or more efficient? Or has the result been less efficiency, lower quality of support, and an uneasy acceptance of decreased readiness and increased costs? What has MOS consolidation bought us?

Stovepiping

Certain high-cost, high-value items, including aircraft and missile systems, have stovepipe support. While some arguments against stovepipe support are valid as transportation and supply capabilities increase, it makes little sense to take the debate too far. For instance, some might want to consolidate the separate standards and equipment for aviation and ground fuels, but few would want to risk their lives in helicopters fueled from a truck park. Nor would it make economic sense to pay increased fuel-handling costs to burn aviation-quality fuel in multifuel trucks and HMMWVs. We would not want our unit generator repairers to work on large regional power plants, at least not without significant additional training. How many of us would want a mechanic from the local garage to change the gas turbines' engine oil on a CH–47 Chinook helicopter or lube a C–17 transport?

I believe that there are appropriate circumstances for stovepipe logistics support. Unique items of equipment, newly fielded equipment containing new technologies, low-density equipment, and unusually high-cost, high-value equipment may be worthy candidates for stovepipe logistics support.

There is a rightful place for generalists in the Army. They usually are the first echelon of support, which is similar to the concept of general practitioners in the medical community. However, there also is a rightful place in the logistics community for experts, as there is a rightful place for neurosurgeons in regional medical centers. What we seem to be doing in much of the logistics community is cutting out the "regional centers" with their subject-matter experts: the DS, GS, and depot-level support. Will the result be the willing acceptance of loss of life or limb of our soldiers because we lack these admittedly high-cost specialists? **ALOG**

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Determining Cargo-Handling Requirements

by Major Gregory H. Graves

Modeling and simulation help combat service support combat developers make sure that soldiers have the container- and materials-handling equipment they need to accomplish their missions.

As the Army transitions from a supply-based logistics system to one that is distribution based, we must make sure that we continue to provide the organizations that perform distribution functions in the theater of operations with the equipment they need. Following the Gulf War, senior Army leaders identified key logistics issues that required attention; since then, they have made great strides in addressing them. One of those key issues is the importance of container- and materials-handling equipment (CMHE).

Units that operate as nodes in the theater distribution network can be transportation, quartermaster, ordnance, medical logistics, or postal units. However, each unit must have the proper CMHE to receive, store, reconfigure, and issue cargo. Every unit does not perform all of those processes in every situation, but each should have the capability to do so.

In recent years, the Army Combined Arms Support Command (CASCOM) at Fort Lee, Virginia, has been assessing the cargo-handling capabilities of logistics units and seeking to improve the way requirements for cargo-handling equipment are determined and documented. To that end, improved decision-support tools will be incorporated into the processes used to determine the CMHE required by current theater distribution doctrine.

The improved method to ensure that each organization is equipped to perform its required distribution processes has three steps.

Step 1—Document the Unit Process

To determine accurate CMHE requirements for an organization, it is necessary to know the unit's required throughput capacity. For current Army units, this requirement is taken from the unit's table of organization and equipment and is stated in either short tons per day or containers per day.

To determine the type and quantity of CMHE needed, the processes required to move the cargo through the organization must be defined and documented. Several different proponents within the combat service support (CSS) combat developments community are involved in this effort. To establish a uniform standard for the CASCOM study, TeamFlow, a commercial process-mapping software package, was selected to document the processes within the units. The documented processes form the basis for the two steps remaining in the CMHE requirements determination process.

Step 2—Assess Unit Equipment Adequacy

Over the past 3 years, CASCOM has focused on improving the analysis in this step. The major accomplishment was the development of the CMHE assessment tool (CAT). As its name suggests, the CAT is used to assess the adequacy of a unit's CMHE to achieve its required throughput capacity.

The CAT is a Microsoft Excel-based spreadsheet tool developed during the CMHE study completed by CASCOM in April 2001. It has a Visual Basic for Applications interface for data input and output reporting. The final report for the CMHE study includes a summary of the intent of the current version of the CAT—

> The CMHE Assessment Tool (CAT version 2.0) was designed to standardize the calculation of minimal CMHE Requirements for Supply Support Activities, Ammunition Supply Operations, and Transportation Terminal Operations. The model provides the combat developer or planner with the means to quantify cargo-handling equipment requirements based on a specified support mission and the tasks and processes associated with a variety of inbound and outbound cargo platforms. This model determines the accumulated cycle time to complete a daily workload that provides the basis for minimum CMHE requirements.

The basic equipment requirement calculation per-

This future truck with an intelligent load-handling system is a component of the Smart Distribution System being developed by CASCOM and the Army Tank-automotive and Armaments Command Armaments Research, Development, and Engineering Center.

formed by the CAT is found in Technical Manual 38–400, Joint Service Manual for Storage and Materials Handling. It takes into account the amount of cargo to be moved during an operational day, the amount of cargo carried per trip by type of equipment, the average time to accomplish a complete equipment trip cycle, and the length of an operational day. This calculation determines the minimum required quantity of each type of CMHE for a unit's operation.

The value of the CAT is clear when the amount of cargo to be moved in a day is expressed in short tons or containers per day. This amount of cargo must be converted into numbers of lifts by various types of equipment. The CAT currently determines quantities for the 4,000-pound rough terrain forklift; the 6,000-pound variable-reach forklift; the 10,000-pound ATLAS (all-terrain lifter, Army system); the yard tractor; the palletized load system; the rough-terrain container handler; the 7.5-ton rough-terrain crane; and the 40-ton rough-terrain container crane.

Based on the documentation of the unit's processes and input from unit proponent subject matter experts, input data are developed for the CAT. The CAT can assess units functioning as supply support activities, distribution terminals, or ammunition organizations. A module for each function presents the user with a site layout screen based on the doctrinal operations of the type of unit selected. The user enters distances in meters between activity areas on the site layout screen. On subsequent screens, the configuration of cargo when it enters the unit is specified by platform and quantity (in either short tons or containers). The configuration of cargo when it leaves the unit then is specified in the same manner. Finally, the user specifies the percentage of each type of platform that undergoes each type of transfer operation in the receipt, storage, or issue process. Current cargo platforms incorporated in the CAT are 20- and 40-foot containers, 463L aircraft pallets, palletized load system flatracks, container roll-in-roll-out platforms, and a variety of breakbulk cargo vehicles.

Since container handlers and forklifts move platforms rather than pounds or tons, a common unit for the amount of cargo being moved is needed. The CAT converts tonnage to breakbulk pallets by using cargo density factors. The cargo density factors used in the CAT were derived by CASCOM from historical data on military cargo shipments. The breakbulk pallet provides a common basis for determining the tonnage (weight) and volume (cubic inches) that platforms will hold. This becomes particularly important if reconfiguring loads is part of the unit's mission.

After the user enters a platform mix and combination of processes, the business rules programmed into the CAT select the proper type of CMHE for each lift required to move cargo platforms through the organization. The business rules are based on the capabilities of the various types of CMHE and the physical characteristics of the platforms being moved. Examples of business rules on CMHE are: A 4,000-pound forklift is required for efficient discharging of breakbulk pallets from 40-foot ISO (International Organization for Standardization) containers; a 10,000-pound forklift is needed to handle 463L air cargo pallets and ISU (internal airlift/helicopter-slingable-container unit) containers.

Once the proper type of equipment is selected, the CAT determines the cycle time for the lift. After all data have been entered, the CAT adds all cycle times for each type of equipment to determine the total number of hours that each must operate every day to accomplish all required lifts. The total then is divided by the

number of hours in the unit's operational day and rounded up to determine the required baseline quantity for that type of equipment.

After displaying the initial assessment results, the CAT also allows analysis of mission, enemy, terrain and weather, troops, time, and civilian considerations (METT–TC) to determine the impact that degraded environmental conditions would have on equipment requirements. Variations in illumination, mud depth, and mission-oriented protective posture levels are all modeled in the CAT. A reduced operational readiness rate also can be selected for each type of CMHE in the organization.

The current version of the CAT was developed as a prototype to illustrate the principle of converting throughput capacity statements to equipment operational requirements. Initially, the focus was on moving cargo through the distribution system to the consumer. Realistically, organizations may be required to retrograde cargo and empty platforms through the system as well. These functions will be incorporated into the next version of the CAT proposed for development at CASCOM.

Most business rules and equipment characteristics are programmed into the underlying CAT logic and therefore are inaccessible to the user. The next version of the CAT will have defaults for business rules, equipment characteristics, and operational day length, but the user will have certain options to change these defaults to add flexibility to the tool. Additional work is underway to refine data used for equipment characteristics and unit processes.

Step 3—Simulate Unit Operations

The final step in the assessment methodology is to model the unit's operational processes using Arena simulation software. The CAT calculates the minimum quantity of equipment required based solely on the time it takes to move cargo through the unit. Therefore, the possibility exists that complex interactions between various pieces of equipment during the handling processes may have effects for which the CAT cannot account. Simulation helps to account for these effects in units where process mapping shows equipment interactions to be particularly complex. Simulation also allows the introduction of uncertainty into loading and unloading times and movement distances to assess the robustness of the CAT recommendations. Here the primary concern is determining the number of containers or short tons that move through the organization in a day.

The baseline equipment requirements provided by the CAT serve as an initial basis for a simulation of the unit's operations. Since the unit's cargo-handling processes have been documented already using TeamFlow, these processes are converted to models in Arena. Arena provides the capability to simulate the movement of hundreds of platforms through a unit without actually having to deploy the unit to a tactical setting. Not only does the simulation capture the time that is spent moving cargo with CMHE, it also captures the time that cargo sits on the ground or on a truck waiting to be moved. Military units must be able to operate in a variety of conditions, so simulation is a valuable tool. While the CAT is deterministic and therefore uses typical layout distances and representative values for movement rates and lifting times, simulation provides the realism of uncertainty in these areas.

Once the unit is modeled, the output from the simulation is analyzed to determine if adjustments to the CAT output have to be made to attain the required throughput capacity. If adjustments are needed, additional simulations are run to make sure that the adjusted quantities meet the unit's mission requirements. These adjustments then can be used by combat developers to propose changes to the unit's equipment requirements.

While military experience and judgment are key aspects of combat developments, solid analysis is crucial for determining and defending requirements. The process of documenting cargo-handling procedures, assessing equipment adequacy, and simulating unit operations allows CSS combat developers to make sure that soldiers have the equipment they need to accomplish their missions. This process also will help ensure that future organizations will be able to support the Army's transformation to a distribution-based logistics system.

As proponents develop concepts for units to support the Objective Force, the tools used in the process will enable the combat developers to build models that not only determine what equipment the units need but also illustrate and help clarify the way the units should operate. For this purpose, simulation will be particularly helpful. Simulation models provide animated views of unit operations so the people who formulate the concept for the unit will be able to see if the unit is operating the way they envision. Based on experience gained through simulation modeling, unit concepts and designs can be adjusted, and the end result will be a smoother CSS transformation. **ALOG**

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Packaging Military Equipment for Overseas Shipment

by Steve Hanna

Nearly 25 percent of the technical equipment shipped to the Middle East for the Gulf War was inoperable when it was unpacked. This happened because the equipment was not packaged properly before it was shipped. What might have been suitable packaging in the United States could not withstand the fine-grain sand that is constantly in the air throughout the deserts of the Middle East. All of the equipment had to be cleaned extensively before it could be put into operation.

This is only one example of one of the biggest headaches that military logisticians encounter when moving sophisticated equipment around the world. Manufacturers spend millions of dollars designing the equipment, yet they often overlook the importance of properly packaging their products once they are ready for shipment. For example, should the packaging for a weapon system going to the nearest military installation for testing be the same as the packaging for a weapon system that is to be stored for 10 years in a bunker in the Middle East? The obvious answer is "no." Yet, many manufacturers pack equipment the same way regardless of where it is being shipped or how it will be stored.

Environmental Hazards

Because many factors can adversely affect today's weapons, they must be protected from a full range of environmental stresses. Protection from contaminants such as sand and dirt is relatively easy, but corrosion and static electricity provide a greater challenge.

A person touching a product can generate up to 10,000 volts of static electricity. In documented instances, munitions have exploded accidentally because of static electricity built up in the air. Certain everyday packaging materials, such as poly and cardboard, can increase the presence of static electricity greatly.

Packaging

Sealing a product inside a poly bag will not protect it from moisture and corrosion. A poly bag *enhances* condensation within, and a metal part enclosed inside a poly bag will have visible rust within 2 days in a high-humidity environment. This happens because polyethylene and polypropylene—the main ingredients of a poly bag—are porous and allow moisture to be transmitted through the material.

A product wrapped in plastic, surrounded by foam, and placed in a wooden crate will have absolutely no protection against corrosion and static electricity. However, many packaging materials on the market today provide excellent protection against moisture and static electricity. These packaging materials meet certain military specifications for being either antistatic, static shielding, moistureproof, or all of these. For example, the bag that stores the Joint Direct Attack Munitions weapon system made by Boeing must maintain an interior humidity level of less than 20 percent and also dissipate a static charge of less than 10^{12} ohms per square for a period of 20 years.

The packaging industry has been tremendously innovative in the past 5 years because it had to stay abreast of today's sophisticated weapon systems. Protecting a product from damage if it is dropped or hit is only the beginning. More weapon systems have been deadlined because of corrosion or other defects caused by airborne elements than because of physical damage sustained when dropped. A simple, correctly designed, flexible bag can provide greater protection from these elements at a lower cost than a metal container.

Determining Packaging Needs

To determine his packing needs, the logistician should look at the materiel that will be shipped and determine what elements could affect its operation adversely. Those elements could be mold for food or clothing, corrosion for metal or electrical connections, or static electricity for capacitors or computer chips. This process will lead to a selection of packaging that will protect the contents from all potential hazards.

Nothing is worse than transporting products halfway around the world and discovering that, due to poor packaging, the product is worthless. Determining packaging needs before shipping will help ensure that soldiers have the equipment they need when they need it. **ALOG**

Steve Hanna is the president of Specialty Bags Corporation in Dallas, Texas.

Commentary

Direct Support Plus in Korea

by Major Timothy A. McKernan

The Army is phasing out the Direct Support Plus maintenance program. The author argues that DS+ has been a valuable, cost-effective tool for maintaining readiness in Korea. The conversion to a new system must be managed carefully.

"Ready to fight tonight!" In the 2d Infantry Division in South Korea, those words are not only a battle cry but also a state of mind—a warrior creed made real because of the threat posed by the North Korean Army arrayed along the division's front. In the 2d Infantry Division, maintaining maximum combat power is paramount to our continued success in deterring an invasion from the North. A large amount of the division's combat power lies in its almost 150 M1 Abrams main battle tanks.

To most, a combat-effective armor unit is one that is fully manned, equipped, and proficient in shooting and maneuvering its Abrams tanks. However, it is just as important to combat power to have those tanks fully mission capable. Proper maintenance is imperative to continued high rates of readiness, and the Direct Support Plus (DS+) program provides the tools that help the 2d Infantry Division keep its wartime edge.

DS+ in the 2d Infantry Division

DS+ is a maintenance repair and training program designed to reduce the turn-in of serviceable and unserviceable Abrams tank AGT 1500 turbine engines. The program provides exceptional training to forward support battalion (FSB) maintenance support teams (MSTs), organizational maintenance personnel, and key unit leaders. These key personnel ensure that M1 engine faults are properly diagnosed forward on the battlefield. The DS+ program also helps leaders improve M1 engine preventive maintenance checks and services (PMCS) and develop invaluable tactics, techniques, and procedures (TTPs) on how to lengthen the life of M1 engines through proper operations and maintenance.

DS+ is licensed and supported by the Army Tank-automotive and Armaments Command (TACOM). It is executed in the 2d Infantry Division in E Company (Heavy Maintenance) of the 702d Main Support Battalion (MSB). Under normal circumstances, unserviceable M1 engines requiring work on their forward and rear modules must be evacuated to a depot-level repair facility. However, under DS+, the DS+ shop can perform 22 depot-level repairs to M1 engines, including repairing modules; replacing bearings, seals, powershafts, and gears; and many other tasks.

In the 2d Infantry Division, whenever an M1 engine fails diagnostic tests at the unit level, its supporting MST runs further diagnostic tests and either repairs the engine or turns it into the class IX supply support activity (SSA). The SSA then issues the unit an engine, and the unit can quickly bring their tank back to fully mission capable status. The SSA sends the unserviceable engine to the DS+ shop, where it is repaired or rebuilt. After DS+ personnel verify that the engine is serviceable, they repack it and return it to the SSA for subsequent issue to a unit. Thus, the SSA does not have to buy a new engine from the wholesale level each time one becomes unserviceable.

DS+ Saves Time and Money

Without DS+, the 2d Infantry Division would have to evacuate every unserviceable M1 engine all the way back to the continental United States (CONUS) for repair. Evacuation of M1 engines to CONUS would greatly increase transportation costs. It also would increase the number of engines the division (and its supporting SSAs in Korea) would need to stock. Based on the current customer wait time from CONUS to Korea, the division estimates that the number of M1 engines it

☐ During frequent training sessions, DS+ personnel provide invaluable instruction on maintaining M1 tank engines to leaders from tank units and maintenance support teams.

would need to stock without DS+ would have to be doubled from current levels. Without this increased number of engine stocks in Korea, units would be forced to wait 2 weeks or more for an engine to arrive from wholesale stocks in CONUS. Unit readiness undoubtedly would decline and thus affect the division's ability to conduct its wartime mission.

In an era of tight budgets, DS+ makes more sense now than ever. During fiscal year (FY) 2001, the net cost of buying an M1 engine (FEDLOG price minus unserviceable turn-in credit) was approximately $210,000. However, through DS+, the 2d Infantry Division was able to repair 112 engines at an average cost of less than $60,000. The division was able to realize a cost avoidance of almost $17 million dollars. Because this $17 million was not spent on new M1 engines, the division was able to use limited maintenance funds to purchase critically needed parts for other combat systems.

Some would argue that DS+ serves as a "bandaid" approach to M1 engine repairs by claiming that it is more cost effective to retrograde all unserviceable engines to the depot level. At the depot, engines are returned to "zero hour" status (meaning they are restored to a "like new" condition). Opponents of DS+ state that the mean time between failure (MTBF) rates for engines repaired at the depot level are significantly greater than those repaired in DS+, where only unserviceable components are repaired. DS+, they argue, leads to engines that require repair much sooner than those repaired at the depot. However, the 702d Support Operations Office, using detailed data taken from DS+ job orders, has found that repairing engines through DS+ is indeed cost effective when compared to purchasing depot-repaired engines from the wholesale system.

Engines repaired at the depot have a projected MTBF rate of approximately 750 hours. During FY 2001, the MTBF rate for M1 engines in the 2d Infantry Division was 250 hours. On the surface, DS+ opponents seem to be correct in their assessment. However, since it only cost $60,000 to repair each engine in the 2d Infantry Division, the division's DS+ shop was able to repair 3.5 engines for the same amount of money it would have cost to buy a single depot-repaired engine. (The 2d Infantry Division MTBF rate was computed as follows. The 821 miles driven per Abrams tank in FY 2001 was divided by the average speed of 4 miles per hour. This figure was multiplied by the 147 tanks in the division and divided by the 120 engine failures experienced in FY 2001. That produced the MTBF rate of 250 hours. The MTBF rate was multiplied by $210,000—the net cost of a new M1 engine—and that figure was divided by the $60,000 average cost of DS+ repair per engine. The result equaled 875 hours of operation per M1 tank engine for the same amount of money as buying an engine from the wholesale level.)

So, although engines repaired under DS+ require repairs more often than those repaired at the depot level, the 2d Infantry Division could have operated its tanks for 875 hours (125 hours more than depot-repaired engines) for the same amount of money it would have cost to buy engines instead of repairing them. Clearly, DS+ is doing something right, and it all comes down to the least heralded but most important aspect of the DS+ program: training.

Train to Maintain

Training is the cornerstone of the DS+ program. In the 2d Infantry Division, the DS+ shop operates a formal leader certification program designed to ensure that leaders from tank units and MSTs know how to maintain their Abrams tanks properly. Nowhere else is this training more important than in Korea, where there is an almost 100-percent rotation of leaders annually.

At least quarterly, but normally on a monthly basis, DS+ personnel provide leaders formal training on tank engine maintenance. One key aspect of the training is prevention of foreign object damage, which accounted for over a third of the division's total engine failures during FY 2001. Leaders also see examples of various engine components rendered unserviceable because of either improper PMCS or improper operation (mainly during start up and cool down). After displaying the results of poor operations and maintenance, the DS+

personnel demonstrate TTPs that the leaders can use to prevent recurrence of the problems.

According to James Terrell, the 2d Infantry Division's TACOM-funded Honeywell contractor, this increased training frequency provides a great benefit to the Army—

> Since 1999, the 2d Infantry Division's operational tempo [OPTEMPO] has increased dramatically, yet we have seen our average cost of repairing M1 engines shrink by almost 50 percent. We now see many more instances where an engine received in DS+ can be repaired cheaply and quickly. Before, we often had to replace entire engines or engine modules, which is an expensive endeavor. Clearly, operators and MST personnel take our training to heart and now recognize problems early enough to allow us to repair versus replace engines.

Facts echo this opinion on the benefits of leader training in Korea. Between FY 2000 and FY 2001, the 2d Infantry Division's armored forces trained hard by driving an average of 821 miles on all assigned tanks. Because of this high OPTEMPO, the number of engines sent to DS+ for repair increased by 67 percent. However, the average cost to repair engines dropped 45 percent (from almost $110,000 in FY 2000 to under $60,000 during FY 2001).

Through effective training, units recognize the symptoms of M1 engine failures earlier and thus turn engines into DS+ for repair before the engines incur a catastrophic failure. For example, if a failure is caught early enough, an engine can be returned to serviceable status by simply replacing a seal costing a few thousand dollars rather than paying over $200,000 for a new engine from the depot.

Future of the DS+ Program

DS+ is currently in the process of being phased out throughout the Army. The Department of the Army G4 has developed an integrated process team that recommended converting Abrams tank sustainment maintenance from the current concept of modular-level repair at the direct support (DS) level to a two-level "repair through replacement" concept. Scheduled to begin with the 4th Infantry Division (Mechanized) and the 3d Armored Cavalry Regiment in FY 2003, the conversion will be in place Army-wide by the end of FY 2005.

Under the proposed conversion plan, DS+ personnel no longer will separate and replace modules or complete the 22 additional depot-level tasks currently authorized. Instead, divisional DS maintenance shops in the FSBs and MSB will be authorized only to separate and replace an engine's reduction gearbox and accessory gearbox. Engines requiring additional repairs will be turned in to the SSA. The SSA will issue a new engine, and the unserviceable engine will be evacuated to a depot-level maintenance facility.

Migration of DS+ tasks back to the depot level will allow the 8 to 12 soldiers normally assigned to a DS+ shop to be used elsewhere. By consolidating repairs of all M1 tank engines in a single location, the Army quite possibly will realize substantial personnel savings. The Army also may realize lower costs by being able to reduce the number of tools and expensive test equipment used to repair tank engines.

Complete loss of the DS+ program may pose serious consequences for the 2d Infantry Division's ability to maintain its currently high operational readiness rates. Training its leaders already has resulted in lower rates of expensive catastrophic engine failures. Having a TACOM-funded contractor working for the division also allows units to verify their engines as unserviceable before having to purchase new ones.

Although the future of the DS+ program is in doubt, the benefits it provides to the 2d Infantry Division are not. From better readiness through improved maintenance operations at all levels, to reduced costs and increased MTBF, DS+ is a success story in Korea. The Army needs to ensure that adequate funding and engine stocks are in place to support the two-level Abrams tank engine program before ending DS+. TACOM also must continue to fund contractor or logistics assistance representative support so the division's proven leader certification program can be maintained.

Smooth transition to the new maintenance program, continued training, and leader involvement on every level will allow the 2d Infantry Division to remain "Second to None!"

Major Timothy A. McKernan is the S3 of the 43d Area Support Group at Fort Carson, Colorado. When he wrote this article, he was the support operations officer of the 702d Main Support Battalion, 2d Infantry Division, at Camp Casey in Korea, where his duties included managerial oversight of the division's DS+ program. He is a graduate of the Quartermaster Officer Basic and Advanced Courses, the Army Logistics Management College's Logistics Executive Development Course, and the Army Command and General Staff Officer Course. He holds a B.S. degree in petroleum engineering from the Montana College of Mineral Science and Technology and an M.S degree in logistics management from the Florida Institute of Technology.

Commentary

Sergeant's Time Training in CSS Units

by Lieutenant Colonel Robert A. Swenson

Many of the soldiers in the combat service support (CSS) units I have worked in were so busy providing support that enabled others to train that they gave a back seat to their own training. That kind of situation is unfortunate, because training is no less important in CSS units than in any other kind. I also have been in CSS units that conducted great training. The difference is in the planning, focus, and leader involvement.

The biggest training event in a typical CSS unit's week is sergeant's time training (STT). I don't like the term "*sergeant's* time training" because it causes many *officers* to think that they are not responsible for it. Wrong! The commander is still the primary trainer of the unit, even during STT. Yes, the noncommissioned officers (NCOs) should conduct the training, but the platoon leaders and the commanders share the responsibility for deciding what should be taught, providing resources for the training, ensuring its quality, and integrating STT into the company's overall training strategy. I prefer to call it "prime-time training" because it is the only time of the week when the attention of the entire unit is on training.

Unfortunately, here's how STT often is managed. Around 6 weeks or so out, the platoon sergeant asks the squad leader what he is planning for STT in 6 weeks. The squad leader then does a 4.8-second training assessment and says "mapreading." The platoon sergeant says, "You did that last week." The squad leader says, "I know, but we need to do it again." What he really is thinking is, "Mapreading is an easy class to give, and I'm comfortable giving it." So that is what goes on the training schedule. Six weeks later, the platoon leader reminds the squad leader that he is scheduled to teach a mapreading class this week and asks if he is ready. Of course he is. On the day of the class, he scrambles to find some maps and protractors and gives a class. The soldiers sit around bored to death as he calls them up one at a time and has them point out various terrain features on a map. The soldiers all do well—after all, they just had the class 6 weeks ago! Mapreading is one of the worst examples of STT that I've seen, mainly because it is done in a classroom, often using a map of some other part of the world. It is a useless skill unless you use a map to teach land navigation, and that is best done one on one, out on the ground.

Here are some other examples of bad STT—

- ***Location survey.*** This is an attempt by the officer in charge of the supply support activity to conduct a location survey and call it training. He gives the soldiers 5 minutes of training, and then they conduct the survey. STT is supposed to be based on the unit's mission-essential task list (METL). No unit is going to fail in war because it didn't train on conducting a location survey.
- ***Maintenance management procedures***. Again, soldiers sit in a class while the sergeant shows them forms in a job packet and explains how they are used. Soldiers "check out" of this class; their bodies are there, but their minds are not. Unless they are involved in maintenance management, they don't care about what the sergeant is saying and won't remember it after they walk out the door. The best way to teach maintenance management is to give a soldier responsibility for it for a couple of months until he has it down pat and then pass the responsibility to another soldier.
- ***Common task training.*** Using the only opportunity available during the week for collective training to conduct individual training is not a good plan. Every unit has dead time, often not planned. Use that dead time for hip-pocket common task training.

What do these examples have in common? They are all easy to prepare, and they are squarely in the instructor's comfort zone. We need to get our NCOs out of their comfort zones. We need to take the time to plan STT that is METL-based, includes hands-on training, and addresses collective tasks.

STT Done Right

I once had a platoon sergeant who consistently had the best STT in the unit. In fact, it was the best I've ever

seen. I asked him how he did it, and this is what he told me. Right after we got back from a National Training Center rotation, he used his experience there and my training guidance to develop titles for 10 classes. He picked 10 because there are only about 10 STT days in a quarter, and he would get to train these critical tasks only 4 times a year. He wrote the titles on manila folders and gave each of his squad leaders a folder. He told them what he had in mind for each class and that they should be prepared to teach the class in 6 weeks. After the class, each squad leader gave the folder back to the sergeant with a lesson plan, a list of resources, and an after-action report. The platoon sergeant then gave the folder to another squad leader and told him to improve on it and give the class in 6 weeks. Soon he had the best training around, and he had made everyone's life easier. All the squad leaders knew what had to be taught, and the platoon sergeant knew what to say each week at the company training meeting.

I'm sure that by now you are dying to know what those 10 classes were. Here they are; I have updated them and added a few thoughts of my own.

1. Establishing an operating area. This class covers everything involved in setting up at a new site, starting at the release point. It includes positioning vehicles; establishing security; and setting up tents, camouflage, communications, power, light sets, heaters—the works. You may not think this training is important, but wait until you see how much faster and more professionally you can set up in the field after being trained.

☐ From their newly constructed fighting positions, soldiers receive instruction in fire-control procedures.

2. Building a squad defense. This class involves digging fighting positions with proper overhead cover and setting up tactical wire, protective wire, and supplementary wire. (The digging alone could take all day, so the platoon sergeant had the basic holes dug by a small emplacement excavator [SEE] the day before.)

3. Defending the assigned sector. This class is on the actual defense of the sector, fields of fire, sector sketches, fire control, signals, claymores, flares, and integrating the quick reaction force.

4. Reacting to a nuclear, biological, chemical (NBC) attack. I see a lot of NBC training during STT, but it rarely goes beyond individual skills. This class starts with individual tasks. It then goes on to what you do after you get to mission-oriented protective posture 4, such as finding and treating the wounded and finding and marking contaminated areas. The class also includes the proper use of M256-series chemical agent detector kits, unmasking procedures, and NBC reports. The class ends with a mock attack from start to finish, integrating everything learned. Captain Peter Ramirez wrote a great article on this in the Fall 2000 issue of *Ordnance* magazine.

5. Patrolling. No adversary is going to stumble onto a support area and attack it. He is going to hide in the bushes or in the village and watch the support area while he develops an attack plan. Aggressive patrolling will deny the enemy that opportunity or actually disrupt his preparations. Patrolling is not easy to do, and regular training is required to get it right.

6. Managing a convoy. This class covers everything from precombat inspections and communications checks to ambushes, rally points, land navigation, actions to be taken on a halt, casualty evacuation, and reporting in.

7. Special teams training. This class covers all of the small teams needed to make a unit successful in the field, such as a quick reaction force, an NBC team, a field sanitation team, an advance party, an entrance control team, an enemy prisoners of war team, and listening and observation post teams.

8. Evacuating casualties. We all receive a lot of first-aid training, but it usually covers only individual skills. What do you do after you apply the bandage? This class covers first aid as well as carries, litters, nonstandard ambulances, MEDEVAC (medical evacuation) requests, landing zone designation, and preparation of feeder reports and witness statements. Get your combat lifesavers in-

volved. They should demonstrate their skills, including starting an intravenous line, during this class.

9. Handling crew-served weapons. This class covers weapons assembly and employment, traversing and elevating mechanism, types of fire, fire adjustments, tripod mounts, and ring mounts. For this training, gather up all of the crew-served weapons in the unit, not just the ones in the platoon. That way, you will have 1 weapon for every 2 or 3 soldiers, not 1 for every 20. In an infantry unit, the .50-caliber gunner is highly trained to be just that. However, CSS units rotate soldiers on the crew serves so the gunner can get other things done. But the enemy is not going to wait until the most qualified soldier is manning the weapon to attack, so all soldiers need to know how to use the weapons even if they have never fired them before.

10. Operating communications equipment. Communications undoubtedly will be discussed in classes 1 through 9, but this class is dedicated exclusively to proper use of available communications equipment. As with the crew-served weapons, pull together all of the communications equipment in the company to use during the class so every 1 or 2 soldiers can train on a piece of equipment, not every 20. That way, you don't have the instructor working with only one soldier while the rest sit around bored to death.

Getting Started

To start a program like this, you need some kind of leader certification. Our NCOs are great Americans, but many of them have not conducted this kind of training at all, or at least not at this level. A lot of them don't know how to use a traversing and elevating mechanism or build a proper overhead cover. I've seen training fail because our junior leaders were poorly trained and rehearsed on the training they were asked to give. We have to train the trainer first. A way to do this is through officer and NCO development programs.

When I tell people about this method of training, the first criticism I get is, "Sergeant's time training is supposed to be done by the squad leader." That's true. However, in most units that conduct STT, the squad leaders are expected to put together seven classes at once (the six already scheduled and the one proposed for this week's training meeting). It is a lot to ask of a squad leader to come up with good quality training week after week in addition to all of his other responsibilities. With this method, different NCOs prepare the training, obtain the resources, and then get all the squad leaders up to speed so that they, in turn, can properly train their soldiers.

The next question is, "Where is common task training?" Well, take another look at the classes. What common task training is not covered in them? Most of the classes start with the individual tasks, walk through the collective tasks, and end with a scenario-driven exercise.

You might wonder also about military occupational specialty (MOS) training. We work our MOSs every day, but we do not always make the best use of the opportunities we have. For example, when a transaxle repair job comes into a maintenance shop, the shop foreman looks around for his best transaxle guy and gives it to him. At the end of the day, he still has one guy who does a great job on transaxles and no one else who can. Why not get the best guy to talk through the repair with another guy who has never done it?

As another example, consider what you do when tasked to provide fuel support. Don't just ship it out from the main post. Instead, help your soldiers gain valuable experience by allowing them to set up the fuel system supply point, ship the fuel there, and then send it on to the supported unit.

Almost everything your unit does is a training opportunity. Making the most of training opportunities takes more time, but, in the end, you've improved the readiness of your unit and the skills of your soldiers.

Developing a training program like the one I've discussed enables you to cover all of your combat tasks during STT. Field training exercises then are not a time to *train* these tasks but rather an opportunity to validate your training program and to integrate the various pieces while providing support and doing all the other things that must be done in the field.

This training methodology works. It results in focused, well-resourced, hands-on, *interesting* training. It also results in increased readiness, and it actually reduces the time we spend planning and preparing training. Most importantly, it results in more motivated, confident, and capable soldiers who are able to stay alive while providing support.

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NEWS

(Continued from page 1)

- The role science and technology can play in reducing demand, which is vital to reducing the logistics footprint.
- The National Inventory Management Strategy (see article on page 2).
- The two-level maintenance system (see article on page 6).
- Assignment-oriented training.
- The future of officer, warrant officer, and noncommissioned officer training, including the Basic Officer Leader Course.

Highlights of the symposium included a live satellite hookup with Colonel Ron Beasley, the commander of the AMC Logistics Support Element-Southwest Asia in Qatar, and a briefing by Major Stephen Wade, who described his recent assignment with the Logistics Support Element (Forward) Uzbekistan.

For more information on symposium proceedings, view the AMC Web site at www.amc.army.mil/amc/ausa_spring02/index.html.

OBJECTIVE FORCE WARRIOR UNVEILED

Although fielding of the Land Warrior system is still 2 years away, a prototype of its successor, the Objective Force Warrior, was demonstrated at the Pentagon on 23 May by project managers of the Army Materiel Command's Natick Soldier Center in Natick, Massachusetts.

The Objective Force Warrior program was developed at the direction of Army Chief of Staff General Eric K. Shinseki. According to project engineer Dutch Degay, developers tossed out the current system of individual equipment and designed a new integrated, holistic system from the "skin out."

The Objective Force Warrior system, which is scheduled for fielding in 2008, integrates and improves on the electronic capabilities inherent in the Land Warrior system. For example, soldiers will not have to wear cumbersome night-vision or infrared goggles or heavy laser training components on their helmets. These and other features, such as thermal sensors, video cameras, and chemical and biological sensors, are integrated fully in the helmet. The helmet also has a visor that acts as a "heads-up display monitor" equivalent to having two 17-inch computer monitors in front of the soldier's eyes.

The uniform system is a multifunctional garment that incorporates physiological sensors that allow the soldier, his chain of command, and nearby medics to monitor the soldier's blood pressure, heart rate, internal and external body temperature, and caloric consumption rate. Commanders and medics will be able to access the information through a tactical local area network. The system's built-in climate-control system has a spacer fabric with "capillaries" that blow hot or cold air through the system.

The Objective Force Warrior system is powered by fuel cells and weighs approximately 50 pounds, compared to 92 to 105 pounds of equipment soldiers on combat patrols typically carry today. Many of the system's built-in functions eliminate the requirement to carry extra equipment, and the climate-control feature reduces the need for extra clothing. The outer garment has some biological and chemical protection capabilities, decreasing the requirement for extra protective gear.

Other mission-essential equipment not built into the individual soldier system will be carried on a small, remote-controlled wheeled vehicle called a "robotic mule," which is part of the Objective Force Warrior system. Each squad will have one mule that not only will take some of the load off the individual soldier but also will act as a weapons platform, generate and purify water, and recharge batteries. The mule has day and night thermal, infrared, and forward-looking imaging systems, as well as chemical-biological sensors. It will be able to communicate with unmanned aerial vehicles to give squad members a 360-degree image of the battlefield.

FIRST STRYKERS FIELDED TO FORT LEWIS

The Military Traffic Management Command has shipped the first new Stryker interim armored vehicles to the two interim brigade combat teams (IBCTs) at Fort Lewis, Washington. The vehicles were shipped by commercial truck from manufacturing facilities in Anniston, Alabama, and London, Ontario.

More than 600 Strykers eventually will be shipped to Fort Lewis, where they will be the primary weapons platforms of the IBCTs. The first units to receive the Strykers are the 3d Brigade, 2d Infantry Division; and the 1st

Brigade, 25th Infantry Division (Light). Those brigades are expected to be equipped and ready for deployment during fiscal years 2003 and 2004, respectively. Other units that will receive the Stryker include the 172d Infantry Brigade (Separate) at Fort Richardson, Alaska; the 2d Armored Cavalry Regiment (Light) at Fort Polk, Louisiana; the 2d Brigade, 25th Infantry Division (Light), at Schofield Barracks, Hawaii; and the 56th Brigade, 28th Infantry Division (Mechanized), Pennsylvania Army National Guard.

The Stryker is the Army's first new armored vehicle in 18 years. A $4 billion contract with the joint venture team of General Motors and General Dynamics Land Systems Defense Group, LLC, calls for the production of 2,100 Stryker vehicles in the next 6 years.

FEDLOG CAPABILITIES EXPANDED

FEDLOG (Federal Logistics Data on Compact Disk) users now can purchase items directly using an "EMALL" online Internet shopping capability. Drawings of many items also have been added to the FEDLOG system.

FEDLOG developers at the Defense Logistics Information Service in Battle Creek, Michigan, believe the system's 300,000 subscribers will benefit greatly from these two new capabilities. According to Virgil Akins, FEDLOG program manager, the system "has gone from being a 'Model T to a Ferrari' in terms of speed, technology, sophistication, and user value" since it was developed in 1992. "We've gone from being just a DOS operating system to UNIX, and [then to] a true 32-bit Windows environment. This represents a terrific increase in productivity for FED LOG subscribers."

FEDLOG users can retrieve information from the Federal Logistics Information System (FLIS) or service-specific databases. FEDLOG combines the power of personal computers with the advanced storage technology of compact disks, digital videodisks, and the Internet. The system contains data on any defense-related item that has a national stock number (NSN). If the NSN for an item is unknown, a user can find the number by searching for other pieces of known information about the item. With FEDLOG, users have a quick and easy way to—

- Cross-reference part and stock numbers.
- Identify suppliers of an item.
- Obtain management data for procurement, requisition, storage, issue, and logistics decisionmaking.
- Determine freight standards.
- Find service-unique logistics information.
- Search for an item based on any single item characteristic.
- Store massive amounts of data on compact media, making it easier to handle, ship, update, and search.

Free training is available worldwide for FEDLOG users. For information about the system, visit the FEDLOG Web site at www.fedlog.com or call (800) 351–4381.

☐ Combat Equipment Battalion-Livorno (CEB–LI), Italy, workers prepare a water treatment unit for shipment to a United Nations relief agency. In April, CEB–LI workers took 800 family-size tents, 1,600 five-gallon water containers, 1,600 hygiene kits, and water treatment units to support 10,000 people to the Pisa Airport for shipment to Tel Aviv, Israel, in support of humanitarian aid for the Palestinian town of Jenin.

CEB–LI, an element of the Army Materiel Command Operations Support Command, stores, maintains, and ships Office of Foreign Disaster Assistance humanitarian supplies under an interagency agreement, in addition to its mission to provide combat-ready equipment for the Army's global power-projection mission.

7TH TRANSPORTATION GROUP COMPLETES HISTORIC TUGBOAT LIFT

In April, two 110-ton Army tugboats were lifted from the water at Fort Story, Virginia, and placed on the deck of an Army logistics support vessel (LSV). The operation, involving watercraft and personnel from several 7th Transportation Group units at Fort Eustis and Fort Story, Virginia, was significant not only because it was the first super-heavy lift of its kind, but also because it had a real-world purpose of moving vital Army assets to where they were needed.

The tugboats were to be transported to Hythe, England, as part of the Army's Watercraft Restructuring Plan. The decision was made to transport them onboard an LSV because it would be cost effective and the 7th Group had the assets to make it happen in a timely manner.

☐ A tugboat is lowered onto the deck of the Army LSV.

WEB-BASED NCO CAREER GUIDE AVAILABLE

Soldiers can consult a new Web-based version of Department of the Army Pamphlet 600–25, U.S. Army Noncommissioned Officer Professional Development Guide, for guidance on what it takes to be successful in any military occupational specialty in the Army.

The new pamphlet, which is available at www.perscomonline.army.mil, sets realistic, achievable professional development objectives for noncommissioned officers and provides soldiers with structured self-development information. It also tells them what they can do on their own to hone professional skills and put themselves on the fast track to success.

The Web site also has several hundred hyperlinks to references and other career-development information. Some of the links provide information for commanders, supervisors, managers, and others who counsel and evaluate enlisted soldiers. The new information source is expected to be especially helpful to career managers at the Total Army Personnel Command when they coordinate assignments and training.

STRATEGIC DISTRIBUTION PROGRAM EXTENDED TO PACIFIC THEATER

The U.S. Transportation Command (USTRANSCOM) and the Defense Logistics Agency (DLA) are joining with the U.S. Pacific Command (USPACOM) to expand the Strategic Distribution Program (formerly known as the Strategic Distribution Management Initiative, or SDMI) to the Pacific theater.

The SDMI began in late 1999, when DLA and USTRANSCOM joined forces to improve the Department of Defense's distribution functions. Since that time, distribution processes have improved significantly in the U.S. European Command and U.S. Central Command.

The new partnership will look for ways to improve the responsiveness and reliability of distribution service to warfighting customers in the Pacific region. Key areas of this initiative are—

- Stock positioning management: Optimal positioning of DLA, service, and General Services Administration stock, tailored to Pacific unit needs, to leverage improved distribution of limited resources.
- Air distribution service: Synchronized use of airlift resources to improve transportation delivery times and reliability, and use of contracted Civil Reserve Air Fleet or common user land transportation trucking to provide intermodal service.
- Surface distribution service: Improved surface cargo management process to reduce cargo movement delivery times and increase reliability.

- Theater distribution management: Use of advance information and theater management and transportation to enhance delivery times and reliability with alternate lift and timely supply receipt documentation.

Each of the participants, including DLA, USTRANSCOM, and USPACOM, will coordinate available resources and oversee the actions and results of the Strategic Distribution Program.

ARMY ANNOUNCES LOCATIONS OF WELL-BEING LABS

The Army has announced the sites of five well-being laboratories that are being established to enhance the well-being of soldiers, Department of the Army civilians, and their families. The sites selected are Aberdeen Proving Ground, Maryland; Fort Bragg, North Carolina; Fort Jackson, South Carolina; the 2d Infantry Division in Korea; and the 26th Area Support Group in Germany.

The primary difference between what was once called quality of life and well-being is that well-being seeks to integrate the mutually supporting demands and expectations of the Army and its people, said Lieutenant Colonel John Wood, chief of the Well-Being Division, Office of the Deputy Chief of Staff, G1 (Personnel)

"In the past, [a commander] had to gather information from stovepipe systems," Wood said. "He would have to ask the housing chief for a snapshot of his area, the hospital commander for the medical picture, his finance officer for pay issues, and so on. Ideally, Well-Being will integrate those systems by having someone responsible for looking across those systems and evaluating them in a holistic manner with the results tied to readiness."

Brigadier General James A. Coggin, director of human resources policy, Office of the Deputy Chief of Staff, G1, briefed the initiative to garrison commanders in March. "About the best way I can describe well-being labs is that they will demonstrate the best business practices of well-being—sharing what works and what does not," Coggin said. "They are being put into place to determine what the well-being philosophy looks like in execution. We are doing something here that hasn't been done before—there are no templates."

"A good Army completes its mission," Coggin said. "A good Army takes care of its people. But a great Army does both. We have a great Army now and it will continue as a great Army while transforming to the Objective Force."

POCKET SANDWICHES APPROVED

Soldiers soon will be able to eat sandwiches while on the move in the field. Pepperoni stick and barbecue chicken pocket sandwiches have been approved for meals, ready-to-eat (MREs).

The shelf-stable sandwiches were first developed by the Department of Defense Combat Feeding Program at the Army Soldier Systems Center in Natick, Massachusetts, in the mid-1990s as a ration to enhance soldier mobility. The pocket sandwiches do not need to be kept refrigerated or frozen, nor do they need to be heated before they can be eaten.

The sandwiches are comparable in size, calories, and appearance to Hot Pocket sandwiches found at the grocery store. The major difference is in the processing, which allows the food to meet the Combat Feeding Program's minimum shelf-life requirements of 3 years at 80 degrees Fahrenheit or 6 months at 100 degrees Fahrenheit.

Other sandwich varieties under consideration are a pizza pocket with Italian sausage and pepperoni slices in a tomato sauce, sliced beef in a barbecue sauce, tuna salad, chicken salad, ham and cheese, and peanut butter and jelly.

The same technology is being applied to a new program for combat breakfast foods. Some concepts that have been proposed are cream-cheese-filled bagels with and without fruit fillings, sausage and cheese biscuits, breakfast burritos with bacon and eggs in a tortilla wrap, and breakfast pizza.

Prototypes of the sandwiches should be ready this year. Production is planned for 2004.

☐ Pocket sandwiches soon will be available as part of the MRE.

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Coming in Future Issues—

- Information Management in the Brigade Rear Command Post
- Designing a Lieutenant Professional Development Program
- The Attack on Attu
- Logistics Lessons Learned by Lieutenant Grant in Mexico
- USTRANSCOM: A Case for Transformation
- Brigade Inspection and Reconnaissance Exercise Program
- Conversion of APS–3 Sustainment Munitions
- The Deployment of Task Force Blackjack
- Munitions Survivability Software
- Transforming Management of Army Logistics Publications
- Chemical Warfare Service in World War II
- Ammunition Training in the 2d Infantry Division
- Developing Logistics Systems for the Finnish Defence Forces

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