

ARMY LOGISTICIAN

JANUARY-FEBRUARY 2002



Munitions Logistics

ARMY LOGISTICIAN

PROFESSIONAL BULLETIN OF UNITED STATES ARMY LOGISTICS

PB 700-02-1
VOLUME 34, ISSUE 1
JANUARY-FEBRUARY 2002

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Army Logician (ISSN 0004-2528) is a bimonthly professional bulletin published by the Army Logistics Management College, 2401 Quarters Road, Fort Lee, Virginia 23801-1705. Periodicals postage paid at Petersburg, VA 23804-9998 and additional mailing offices.

Mission: *Army Logician* is the Department of the Army's official professional bulletin on logistics. Its mission is to publish timely, authoritative information on Army and Defense logistics plans, programs, policies, operations, procedures, and doctrine for the benefit of all logistics personnel. Its purpose is to provide a forum for the exchange of information and expression of original, creative, innovative thought on logistics functions.

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Submissions: Articles and information on all facets of logistics operations and functions are solicited. Direct communication is authorized and should be addressed to: EDITOR ARMY LOGISTICIAN/ALMC/2401 QUARTERS RD/FT LEE VA 23801-1705. Phone numbers are: (804) 765-4761 or DSN 539-4761; Fax (804) 765-4463 or DSN 539-4463; e-mail alog@lee.army.mil.

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Distribution: Units may obtain copies through the initial distribution system (DA 12-series). Private subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office (order form is on inside back cover). Subscribers should submit address changes directly to *Army Logician* (see **Submissions**, above). *Army Logician* also has a homepage on the Internet's Worldwide Web at <http://www.almc.army.mil/alog>.

Postmaster: Send address changes to: EDITOR ARMY LOGISTICIAN/ALMC/2401 QUARTERS RD/FT LEE VA 23801-1705.

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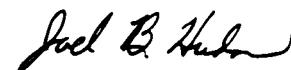
"Armament for Peace" is the motto of the Ordnance Corps. But it is in times of war like Operation Enduring Freedom that munitions supply, storage, and quality assurance become paramount concerns. The series of articles beginning on page 9 examines some aspects of munitions logistics. The photo shows a Marine Corps-developed shoulder-launched multipurpose assault weapon firing an antitank rocket.

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

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ALOG NEWS

2001 QUADRENNIAL DEFENSE REVIEW SETS BASIS FOR RESHAPING MILITARY

As the Nation began to respond to the terrorist attacks of 11 September, the Secretary of Defense issued the 2001 Quadrennial Defense Review (QDR) Report on 30 September. The QDR had been underway for several months before the attacks. As Secretary of Defense Donald H. Rumsfeld observed in the report—

The Quadrennial Defense Review was undertaken during a crucial time of transition to a new era. Even before the attack of September 11, 2001, the senior leaders of the Defense Department set out to establish a new strategy for America's defense that would embrace uncertainty and contend with surprise, a strategy premised on the idea that to be effective abroad, America must be safe at home.

The QDR is based on the reality that the United States faces a changed security environment—

Unlike the Cold War period, where the key geographic regions of competition were well defined, the current period has already imposed demands for U.S. military intervention or activity on virtually every continent and against a wide variety of adversaries. The United States will not be able to develop its military forces and plans solely to confront a specific adversary in a specific geographic area.

The new strategic framework for this changed environment is based on four defense policy goals—

- Assuring allies and friends.
- Dissuading future military competition.
- Deterring threats and coercion against U.S. interests.
- If deterrence fails, decisively defeating any adversary.

These goals are supported by interconnected strategic tenets that form “the essence of U.S. defense strategy.” These tenets are—

- Managing risks. The “tension between preparations for the future and the demands of the present requires the United States to balance the risks associated

with each . . . Through the QDR, the Department has developed a new defense strategy and an associated risk management framework, and is in the process of building new performance measures, both to better manage the risks the United States faces and to meet the defense policy goals.”

- Shifting to a capabilities-based approach, which focuses on how an enemy might fight rather than on who a potential enemy might be.

• Defending the United States and projecting U.S. military power.

- Strengthening alliances and partnerships.
- Maintaining favorable regional balances.
- Developing a broad portfolio of military capabilities.

• Transforming the U.S. military and DOD establishment. “The Department's leadership recognizes that continuing ‘business as usual’ within the Department is not a viable option given the new strategic era and the internal and external challenges facing the U.S. military. . . . Therefore, the Department is committed to undertaking a sustained process of transformation—based on clear goals—and strengthening the spirit of innovation in its people, while remaining prepared to deal with extant threats.”

To determine the size and shape of the Armed Forces, the defense strategy “restores the defense of the United States as the Department's primary mission” and “shifts the focus of U.S. force planning from optimizing for conflicts in two particular regions . . . to building a portfolio of capabilities that is robust across the spectrum of possible force requirements, both functional and geographical.”

As part of efforts to reorient the U.S. military's global posture—

The Secretary of the Army will accelerate the introduction of forward-stationed Interim Brigade Combat Teams (IBCTs) to strengthen deterrence and improve U.S. strategic responsiveness on a global basis. In consultation with its European Allies, the United States envisages that an IBCT should be stationed in the European area by 2007. In addition, the Secretary of the Army will explore options for enhancing ground force capabilities in the Arabian Gulf.

(News continued on page 39)

Critical Logistics Information and the Commander's Decisions

by Lieutenant Colonel Kevin T. McEnery

A commander's critical information requirements (CCIR) are the specific pieces of battlefield information needed by a commander that directly affect his tactical decisions. Logisticians must understand how important it is to battlefield success that they develop relevant logistics CCIR that can help their commanders make the best tactical decisions.

By definition, CCIR are unique to a given tactical situation. This article is not intended as a simple listing of tactics, techniques, and procedures. Instead, it offers a framework for thinking through and communicating essential logistics information that influences tactical command decisions. The goal is to produce relevant logistics information that the commander ultimately may select as part of his CCIR.

Command decisions are driven by unique circumstances that may cause the commander to have to change his intended course of action during execution. In general, CCIR may indicate to the commander that a new opportunity for exploitation is presented or that new threats must be countered. In both cases, CCIR serve to focus the staff's attention and narrow the scope of the information they process. CCIR thus protect both the staff and the commander from information overload, which can be created by the mass of data reports habitually associated with planned decisions.

It is also important to establish what CCIR are not. They are not information that a staff officer would like to have in order to perform his functions better. Functional staff officers supporting an operation certainly have their own unique information needs. However, they cannot be allowed to simply pass on their own information needs to subordinate commands by using the commander's name and nominating those needs as CCIR.

The specific questions that CCIR attempt to answer change over time and according to circumstances. They must not be a list of "things I wish I knew." For example, CCIR usually are presented in the form of questions, but in actuality a commander in the field must be able to describe them as the specific *answer* for which he is looking. They should be a description of the unique set of enemy, friendly forces, and terrain circumstances

that will require the commander to make a decision. When written as questions, CCIR usually are too broad or require too much interpretation by individual observers to be of use to the commander. The commander, with help from his staff, must narrow the broad questions down to a set of circumstances (actually, the required answers to the questions) that, if observed, call for a command decision.

To understand how logistics information can become CCIR, we first must distinguish between the information that a commander needs to know in order to command and the information that staff logisticians need to carry out logistics functions. While staff logisticians focus on meeting specific requirements and track much detailed information about those requirements, the commander is concerned with making decisions that will affect the favorable outcome of a future fight. So we need to focus on the logistics information that a commander needs from his staff and subordinate commanders so he can make feasible tactical command decisions.

Feasibility and Flexibility

The Army's role is to conduct sustained land combat. The primary purpose of logistics at the tactical level is to generate combat power over time. Therefore, the essential logistics information a commander needs to know is if his command will be able to generate enough combat power over the duration of an operation to accomplish the mission at the least practical cost in resources.

Since CCIR involve both receiving and transmitting information, they can be divided into two broad categories. The first is information the commander needs to refine his initial intent. This is the battlefield information that establishes the parameters of *feasibility*, such as staff estimates, reconnaissance and security orders, and status reports. The second category is battlefield information the commander needs to make decisions and then communicate orders to execute branches or sequels from his base plan. This information focuses on providing the commander with the *flexibility* to deal with uncertainty—allowing him to recognize that a decision must be made, choose a feasible option, and communi-

When unit commanders take the field, they can be overwhelmed by the mass of information available to them. The challenge for logisticians is to provide only the essential elements of information commanders need to make decisions.

cate his decision in a timely fashion in the form of an order that subordinates can recognize and execute.

The primary value of logistics CCIR is that they help the commander to recognize the impact of his current course of action on future courses of action in time to make feasible modifications or complete changes. Specifically, logistics CCIR relate to two types of risk with which a tactical commander must deal.

The first risk is that the enemy may do something that the commander either did not anticipate or does not have the capability to mitigate effectively. In any military endeavor, there is a finite amount of capability—human and materiel—available to meet all of the actual and potential tactical requirements. Command decisions are made to prioritize efforts and focus subordinates on essentials, but always with the understanding that there is a certain level of risk.

The second risk is that executing the concept may consume more resources than the commander's available sustainment capability can provide. Casualties, equipment losses, consumption of critical supplies, and the distance (or the lack of security) of lines of communication can place the commander's tactical concept at risk.

CCIR do not apply just to the fight. So, whether he is addressing planning, deployment, execution, or the transition aspects of an operation, the commander must be concerned with these three areas of CCIR—

- Information needed to create a feasible intent for an operation.
- Information needed to deal with uncertainty during an operation.
- Information needed to execute the transition to a subsequent operation.

Planning

In the planning phase of an operation, the commander needs to know if his organization is capable of meeting the requirements of the mission and the intent of the operation. Operation planners must anticipate their rate of resource consumption over the duration of the operation. Logistics planners must determine if the supply chain can meet those operational demands.

The commander first needs indicators that tell him if capabilities, in terms of resources, are available to meet the requirements of his intent. Then he needs indicators that show if the supply chain is, in fact, working to acquire and distribute the resources needed to accomplish his intent. The staff's focus in planning is on the feasibility of meeting the combat-power generation requirements associated with the commander's intent. If this is the case, the commander does not have to concern himself with all of the indicators; he can focus his attention only on those shortfalls that would cause him to have to invalidate or modify his intent.

Some examples of key indicators that the logistics staff must monitor during planning are—

- The anticipated duration of the operation versus the anticipated consumption and replenishment of resources.
- The status of operational digital communications links for Standard Army Management Information Systems.
- The ability to deliver and distribute sufficient supplies as scheduled.
- The ability to requisition and process demands for supplies in time to meet requirements.
- The presence of sufficient supplies (primarily classes III [petroleum, oils, and lubricants], V [ammunition], and VIII [medical supplies] and water) on hand in the brigade support area to minimize risk.

Deployment

During the deployment phase of an operation, time is the most critical issue. All requirements and capabilities are evaluated against a tight timeline established by a higher headquarters. The activities of sequencing, staging, loading, administrative movement, unloading, staging, and then tactical movement must be completed against specific time windows, or the command may put not only their own commander's intent at risk but also the intent of a higher command.

The continual assessment of the unit's ability to move, transport, sustain, and communicate to meet the commander's intent drives the commander's logistics CCIR. The commander, with the help of his staff, iden-

tifies, refines, and adjusts potential critical points of failure. From this analysis, the staff can use recognizable indicators to anticipate that a failure point will be reached and that a decision by the commander will be required. Again, what differentiates these CCIR from other information requirements is that they are articulated to the command as a set of specific answers about matters the commander wants to accomplish (or to prevent); they are not a broad question open to the interpretation or judgment of individual subordinates.

Here are some examples of key indicators that the logistics staff must monitor during deployment—

- Critical planning assumptions that have become invalid.
- That units are meeting critical time windows for preparation, movement, and loading.
- That critical deployment activities are prepared to accept and process the units moving through them.
- That critical transportation resources—trains, ships, planes, heavy equipment transporters (HETs), road clearances—are available consistent with the timeline.
- That command and control and communications capabilities are functioning at potential points of intermodal conflict. These points can include conflicts of convoy and HET arrivals with train and ship load times; mismatches between troop transport and aircraft arrivals and departures; and problems at points where equipment, personnel, and supplies are supposed to link up.

Execution

During the execution of an operation, the commander is focused on understanding the impact of what he currently is doing on what he must do next. Once an order is issued, subordinate commanders carry out the first actions (the “now” part) of the operation; the authority to make decisions within the commander’s overall intent has been delegated properly. The “next” action will be the execution of a planned sequel, exploitation of an unanticipated opportunity, or reaction to a new threat; in these situations, the commander needs to issue a specific order to redirect all or part of the command.

During execution, the commander’s logistics-focused CCIR can be narrowed down to two broad concerns. The first is identifying the point at which the unit exceeds its capability to sustain itself. The second is identifying resources needed to mitigate the two types of risk—that the commander cannot counter what the enemy does, or that executing the commander’s concept may consume more resources than are available—to an acceptable level. The answers to these two concerns, which usually are tied to particular unit capabilities, form the basis for the information the commander needs if he is to recognize that a command decision must be made

and what his potential options are.

As an example, there are two areas where peacetime training exercises give tactical commanders a false sense of security: class V resupply and casualty evacuation and treatment. Training scenarios typically do not require commanders to deal realistically with subsequent fights; they only have to deal with the first fight that occurs as the unit moves out of the tactical assembly area. The short duration of our live, lane-focused, force-on-force fights does not stress adequately a unit’s actual ammunition consumption or its casualty evacuation system and demonstrate their impact on execution over time. The Multiple Integrated Laser Engagement System (MILES) minimizes the need for units to understand the true effect of their munitions consumption, especially when operating on complex terrain. When units transition during an exercise, it is usually to an administrative pause for an after-action review and then to another event-based lane, not to a true branch or sequel of an operation plan. It thus is easy for commanders and observers to attribute logistics problems incorrectly in short-duration exercises to either lack of discipline or lack of detailed planning.

Because soldiers are not really wounded or killed in MILES training, and because casualties (especially leaders) always return to duty with their own unit, the true impact of casualties on unprepared units is easily ignored. Simulation-based wargames, as we all know, do not cause commanders any real logistics stress unless the scenario is written specifically for a unit that already has been fighting for many days. In event-based live exercises, mass casualty evacuation has become a scheduled activity to observe, rather than an integral element of realistic combat training, with units continuing to fight despite an accumulation of casualties over time.

Given this example, a commander taking his organization into actual battle for the first time, and understanding that our peacetime training does not prepare soldiers adequately for combat ammunition requirements or casualty evacuation, can expect that situations arising in those two areas will require a command decision at some point. He then should focus his logistics staff on developing execution CCIR for the availability of ammunition resupply, casualty evacuation, and treatment capabilities over time in order to focus the staff and anticipate the need for decisions. He should have his logistics staff develop CCIR and generate options so that he can make decisions and modifications before the overall mission itself is at risk. This allows the commander, already under pressure to make tactical decisions, to recognize immediately the difference between a logistics dilemma that affects his desired intent and a logistics status or situation report with which his subor-

dinates can and should deal.

Transitions

The transition to a branch or sequel of an operation plan will come sooner or later, usually before the “end state” described in the plan. This is a critical decision point for tactical commanders. No operation goes according to plan. The higher the level of headquarters involved, the longer into the future the planning must project—and thus the greater will be the impact of logistics assumptions on decision making. So when the commander must decide to transition to another operation, he wants to know that his unit has the capability to execute his intended transition. The consumption of resources during execution is not completely under the control of the commander or his logisticians. However, consumption of resources not only drives resupply requirements; it also sets a limit on the ability of a commander to continue to his next mission without a halt for extensive consolidation and reorganization.

For example, in an attack, a commander’s transition options could be either a hasty defense, a pursuit, or a withdrawal. Depending on the particular circumstances offered by the enemy and the terrain, the commander will prefer one option over the others. But his final decision will rely on understanding his organization’s ability to execute his intended choice. The scope of the operation is too great and the time for seizing opportunities too fleeting for the commander to continuously draw relevant conclusions about options from a mass of raw or standing operating procedure logistics data. However, there is critical information that the commander will focus on immediately.

To anticipate a successful transition, the commander must articulate the critical effects he needs to create and the critical enemy effects he needs to prevent if he is to transition effectively. There is an inherent expectation in a transition that subordinate staffs and commanders will exercise initiative and energy to overcome their own difficulties. Some difficulties cannot be avoided or overcome because of time and resource constraints. Staff conclusions about feasibility and risk must focus on anticipating those circumstances that require the commander to make decisions that only he can make and then allow him to select those logistics concerns to include in his CCIR.

To anticipate transition requirements effectively, logistics staff officers must monitor the following performance areas that can indicate critical points of failure—

- The functioning of the supply chain and the supporting communications infrastructure.
- The proximity of casualty care to unit casualty col-

lection points.

- The proximity of on-hand class III, V, and VIII supplies and water to subordinate distribution points.
- The transportation assets needed to distribute supplies effectively across the area of operations.
- The ability to integrate replacement logistics personnel, assets, and units from outside habitual unit associations.

As we teach, discuss, and train CCIR throughout the Army, we tend to focus on “tip of the spear” issues. The wording of CCIR examples used in schools and in training at every level tends to be vague, presumptuous, hopeful, or reactive. They often are tied only to decisions associated with “executing the plan (synchronization matrix) as planned.” Only rarely are CCIR linked clearly to the type of battlefield observations that drive command decisions.

As tactical commanders move higher in terms of the scope and duration of their battlefield responsibilities, logistics issues play a greater role in command decision making. Institutionally, we still have a strong cultural divide between the fighters and the supporters. CCIR in particular tend to remain focused on confirming enemy actions and on raw friendly forces status reports presented without analysis. We do not teach operations officers to include logistics analyses routinely in the ever-changing assessments of a unit’s capability to accomplish the immediate mission and subsequent missions.

The commander of a large tactical unit has a staff to help him process the mass of important battlefield information into a few absolute essentials that he needs for decision making. The commander needs his staff to help categorize those essentials of his vision as CCIR, not to provide wish lists of general observations that he then must analyze personally under pressure. Just as importantly, logisticians need to help communicate effectively those CCIR in a manner that subordinates can recognize clearly and then report amid the chaos of the battlefield.

ALOG

Lieutenant Colonel Kevin T. McEnery, an Armor officer, is a tactics instructor at the Army Command and General Staff College at Fort Leavenworth, Kansas. He previously served as executive officer of the 3d Brigade Combat Team, 4th Infantry Division (Mechanized), at Fort Carson, Colorado. He is a graduate of the Armor Officer Basic Course and the Infantry Officer Advanced Course and holds a B.A. degree in history from the University of Michigan, an M.B.A. degree from Benedictine College, and a master of military art and science degree from the Army Command and General Staff College.

Commander's Critical Information Requirements: An NTC Perspective

by Lieutenant Colonel Judith Lemire

The author offers some advice to unit commanders on how to obtain the vital battlefield information they need to make decisions.

A forward support battalion (FSB) commander is the brigade commander's senior logistician. As such, the FSB commander is more than a unit commander who plans and executes his own operations; he also is a key adviser and planner during the entire military decision-making process at the brigade level and a key decision maker on employing logistics assets before, during, and after the battle. Both the FSB tactical operations center (TOC) and the brigade administrative and logistics operations center serve as command and control facilities available to the FSB commander to accomplish his varied roles and missions. Focused and relevant commander's critical information requirements (CCIR) are the keys to harnessing this command and control power.

The brigade had just crossed LD [the line of departure]. Everything seemed to be going according to plan. However, as the battle unfolded, the scheme of maneuver appeared to fall apart.

The lead task force couldn't mass its combat power on the point of penetration. All of the units appeared to be in the right place, the smoke and fires were integrated, and the engineers were in position, yet the direct firepower the commander had been counting on wasn't there. As a result, the breach took twice as long as the wargame had predicted and produced about three times the casualties.

Finally, as the unit reported a successful penetration, the follow-and-assume task force got ready for action. But as they passed through the lead task force to begin their assault, their tank company teams started reporting black [lacking] on fuel. The nearest resupply was moving with the combat trains, but the vehicles had to slow their progress to take on fuel. Meanwhile, as the

medical teams started to clear the battlefield from the breach, they simply did not have the assets to move the number of casualties they encountered.

How did this happen? The brigade's plan was solid—they integrated all the combat functions, estimated their fuel consumption and casualties, and even refueled before LD!

This scenario, from the National Training Center (NTC) at Fort Irwin, California, is common in the Army. A brigade may create a great plan, but as it prepares and executes, things change. First, the brigade probably did not foresee everything in its plan. Next, the enemy gets a vote—he may not follow the exact courses of action the brigade rehearsed. Finally, Murphy joins in for fun, providing great (and unexpected) challenges with maintenance failures, harsh weather conditions, and the like.

Most combat service support (CSS) leaders can expound with ease on the impacts of some of these changes in the tactical situation. In the example, the maintenance posture of the lead task force reduced the available combat power; the subsequent delay in the penetration had a direct effect on the fuel status of the follow-on task force; and the longer fight contributed to a greater number of casualties, which exceeded the treatment and evacuation resources available to the task force.

So how did the brigade miss the signs? The maintenance support teams (MSTs) operating from the unit maintenance collection points (UMCPs) knew about the large number of vehicles pulling in during the night. The FSB S2 noncommissioned officer (NCO) monitored the fight on the brigade operations and intelligence net and knew how long the fight was taking. The ambulance platoon leader got reports on the number of casualties. So the information was there, but what did they do with

it? Was anyone making the connection between the initial symptoms and the larger problems that could result?

Who Has the Information?

As we know from Army doctrine, a plan based on assumptions must be adjusted if any of the assumptions are no longer valid. In the example, there were elements within the FSB who knew that these assumptions were superseded by events, but that information, even when in the TOC, never reached the senior leaders who could issue the necessary orders to realign CSS power to meet the changes.

Whose job is it to pass on this information? The TOC has a large part of the responsibility. Some of the TOC's roles include gathering and analyzing information and making recommendations to the commander. However, most TOCs are staffed with junior personnel. An FSB is authorized a major as the S3, but it typically has a captain. The S2 is only authorized a sergeant. The key field-grade officers, the executive officer (XO) and the

support operations officer, cannot be there 24 hours a day. The battalion commander himself is normally out and about—checking CSS operations and force protection and participating in brigade-level backbriefs and rehearsals. Sometimes, TOCs consist solely of an operations NCO and a junior officer as battle captain. (Battle captain is an unauthorized position. Usually, another staff officer is dual-hatted to serve as battle captain.)

But the TOC is not the entire answer. Remember that the TOC is only as good as the information reported to it. So even the most junior officer, NCO, or soldier needs to recognize important information when he sees it.

What We Need to Know

So how do we help these folks help us command our battalions? The answer is the CCIR. Our decisions will be driven by the things we need to know about the enemy (primary intelligence requirements, or PIR), the

things we know about ourselves (friendly force information requirements, or FFIR), and the things the enemy knows about us (essential elements of friendly information, or EEFI).

Yet here are some common CCIR trends we have observed at the NTC—

- PIR are too general. They lack the specificity needed to focus intelligence collection efforts.

- There are multiple FFIR, which should be tracked by staff for those requirements calling for command action.

- No CCIR are defined for decisions such as reacting to increasing threat conditions, executing the save plan, increasing the military operational protective posture, repositioning ambulance exchange point assets, or relocating a forward logistics element (FLE).

- Brigade-level decisions (such as the Brigade Decision Support Matrix) are not analyzed for CSS decision points and CCIR.

Most of us execute the concept of CCIR on a daily basis. Probably every soldier knows he needs to report to his chain of command if there is a serious accident.

<p>Supplies</p> <ul style="list-style-type: none"> • Enforcement of accurate, timely reporting (log status) • Keeping a running estimate • Tracking of receipts and issues at support operations • Task organization changes • Logistics CCIR <p>CCIR</p> <ul style="list-style-type: none"> • Forward area refuel point, landing zone, and pickup zone emplacement • FLE LD and establishment • Arrival and issue of critical supplies • Arrival and issue of emergency resupply • Loss of critical logistics assets and supplies due to maintenance, contamination, enemy action, or accident • Change in task organization and execution of BCT decision point 	<p>Maintenance</p> <ul style="list-style-type: none"> • Preventive maintenance checks and services • O26 report • Brigade maintenance meeting <p>CCIR</p> <ul style="list-style-type: none"> • BLAST (blocked asynchronous transmission) status • Standard Army Maintenance System (SAMS) and Standard Army Retail Supply System (SARSS) operational status • 70 percent operational readiness • Location and status of MSTs, UMCPs, and company maintenance teams • Critical class IX (parts) status • Unit Level Logistics System to SAMS and SARSS disk drop status • Form 5988E flow 	<p>Medical</p> <ul style="list-style-type: none"> • Casualty estimates • Tracking aid stations • Readiness of evacuation platforms • Nonstandard platforms on station • Aircraft on station • Level II capabilities • Positive communications • Rehearsals <p>CCIR</p> <ul style="list-style-type: none"> • Loss of level I treatment • Loss of level II treatment • Loss of evacuation platforms • Loss of condition for air evacuation • Linkup of nonstandard evacuation assets • Location of medical assets
<p style="text-align: center;">Force Protection</p> <ul style="list-style-type: none"> • Intelligence summaries (INTSUMs) • Reconnaissance & surveillance (R&S) plan and execution • Nuclear, biological, chemical (NBC) reports • SALUTE (size, activity, location, unit, time, equipment) reports • Defensive preparation tracking <p>FFIR</p> <ul style="list-style-type: none"> • Loss of crew-served weapons (to maintenance, logpack departure) • Listening post (LP)/observation post (OP) emplaced; patrol status • Loss of communications with LP/OP, quick reaction force, patrol • Completion and status of defensive preparations • Location of friendly elements within surface danger zone (SDZ) and range of BSA • Return of logbirds/logpacks (intelligence debrief) <p>PIR</p> <ul style="list-style-type: none"> • When and where will level I threat interdict BSA and main supply routes (MSRs)? • When will regimental and division artillery groups (RAG/DAG) be in range of BSA? • When and where will the enemy use chemical or biological agents? • When and where enemy defeats friendly forces and penetration by enemy combat force? • Any encounter with civilians on the battlefield • Closure of line of communication (LOC) or air LOC (by enemy, bad weather, etc.) • Obstacles along MSRs and LOCs 		

Key information for a forward support battalion.

Everyone who pulls staff duty or charge of quarters knows that if the military police show up, the leaders need to know. These are serious incidents that require leader actions.

But how do we transfer this same logic to the tactical realm? Most of us have seen lists of CCIR. They usually include combat power dropping below a certain percent, loss of direct support assets, and direct or indirect attacks on the brigade support area (BSA). These do not make a bad baseline for consideration, but how do we refine them for a given mission?

In the chart at left, I have identified some key information that is important to an FSB, including information on its support role (FFIR) and base defense information (both FFIR and information requirements). There also are some things that we need to ensure the enemy does not know about us (EEFI), such as the position of the BSA. (If the enemy knows the BSA position, and his artillery is in range, we would strongly need to consider jumping.)

These are the sorts of data that we expect our staffs to track on a regular basis. This is the conduct of our mission—the maneuver force equivalent of destroying the enemy on an objective. But which elements have even greater meaning for us as leaders? How do we identify the most critical elements and refine them to help us make decisions for the current fight?

In the example, we assumed that the lead task force would cross LD at 85-percent combat power. When it dropped another 5 combat vehicles, bringing its power down to 75 percent, its ability to accomplish the mission was affected significantly. Assumed combat power is a key CCIR not only for the FSB, which may be able to surge assets, but also for the brigade combat team (BCT) commander, who may have to adjust his task organization, commit a reserve, or otherwise alter a course of action. The exact percentage that becomes the “breaking point” for reporting is based on the combat power required for the specific mission and should be adjusted based on wargame results.

A second assumption in the example was that the fight would take a certain amount of time, which had implications for the fuel (and possibly ammunition) situation. By identifying delays in commitment greater than a certain time (perhaps 3 hours), we can adjust resupply activities to reduce further delays at key points in the battle.

A third assumption was the casualty estimate. When the estimate was exceeded, we needed to adjust both treatment and evacuation assets. Adjustment also will be required if previously allocated assets are disabled or destroyed. We may need to generate additional, non-standard platforms for evacuating casualties; relocate the FSB’s treatment teams; or direct another brigade asset (such as the forward area battle aid station) to respond

to the situation.

So, to drive the successful execution of the fight, we need to—

- Identify assumptions that affect our combat function or specific unit.
- Develop CCIR related to those assumptions.
- Develop means of observation or reporting to track those CCIR.
- Issue and execute fragmentary orders in response to those CCIR.

Units can improve their use of CCIR through home-station training that incorporates the following practices—

- The unit should use doctrinal terminology, such as CCIR instead of serious incident report (SIR).
- Commanders should train on CCIR in concert with the orders process.
- Staffs and subordinates should develop FFIR for their daily operations. Senior staff members then should identify CCIR from that FFIR listing.
- The unit should use staff duty officers as battle captains who track CCIR.
- The unit should conduct “battle update briefs” on CCIR, both in garrison and in a tactical environment.

The CSS aspects of the operation should be wargamed during the BCT wargame and again within the FSB. This will help our senior leaders (the XO, the support operations officer, the brigade S1 and S4, and the FSB commander) to identify those critical CSS and combat health support (CHS) tasks that must be accomplished and those CSS and CHS conditions that must be met to ensure that the BCT can accomplish its larger mission. The FSB staff (the S2, S3, and XO), along with the key battlefield operating systems representatives within the BSA (such as the engineer battalion commander for mobility, countermobility, and survivability), must do the same to identify critical information affecting BSA defense.

Successful use of CCIR requires more involvement up front in our BCT and BSA planning processes. By performing the analysis in the early effort, we can energize our subordinate staff and units to assist us in fighting the fight, which then frees us to do more critical thinking.

ALOG

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Munitions Logistics Readiness Support Plans

by Marguerite E. Taylor

Ammunition logisticians have a tool that will help them ensure deploying units have ammunition where and when they need it.

Is your division ready to deploy? On the surface, everything may look ready. However, as you analyze your class V (ammunition) asset posture, your level of uncertainty may begin to rise. When your division commander asks the division G4 if the class V assets not stored at their home station will be ready to deploy within the division's deployment timelines, he expects a reassuring answer. However, if you think all of your division class V assets are ready to deploy, you may need to think again.

Ammunition distribution operates as a "push" system rather than a "pull" system. The stocks are planned in peacetime for use during wartime. However, peacetime planning is especially difficult when ammunition logisticians must deal with rapidly deploying divisions. These logisticians must be able to move the ammunition required by deploying forces from continental United States (CONUS)-based storage facilities to ports of embarkation and then on to the combat theater's port of debarkation within a specified timeframe. They also must work closely with warfighters to design ammunition basic loads (ABLs) and sustainment stocks as task force, brigade, and division packages. The objective is to store and maintain ammunition at storage facilities that can best support the warfighting divisions in meeting their deployment timeframes. To facilitate this, the Joint Munitions Transportation Coordinating Activity (JMTCA) has developed the Munitions Logistics Readiness Support Plan (MLRSP).

Background

Before the Gulf War, division ammunition officers (DAOs) did not give much thought to ammunition stored at the wholesale level during peacetime. The general assumption was that the required ammunition was stored in the wholesale base and would be available when needed. As deployments began, DAOs started requisitioning basic load requirements based on prepositioned requisitions on file at the Industrial Opera-

tions Command (now the Operations Support Command [OSC]) at Rock Island, Illinois. The majority of the prepositioned requisitions were not reviewed or updated by the DAOs before release. OSC supported these requisitions without being aware of the major problems that soon would arise. The problems included shortages of selected wholesale ammunition, overshipments, and requisitions of ammunition for weapon systems that the requesting divisions no longer used. Because of these problems, OSC had to review, verify, and reprocess requisitions. This verification process delayed some shipments beyond the required delivery dates.

OSC has not resolved all the problems with delivering ammunition for deploying units within the specified timeframe. Required delivery dates for rapidly deploying units cannot always be met because of the current storage configurations. Division ABLs are stored at ammunition storage facilities throughout the United States. In most instances, the storage facilities are located far from the deploying units. OSC developed the MLRSP to work with division deployment timelines to deliver ammunition when needed.

MLRSP

The MLRSP enhances the capabilities of both the warfighter and the logistician. The purpose of the plan is to ensure rapid deployment of basic load ammunition for the Army's CONUS-based divisions. To project and sustain the force quickly, the ammunition distribution system must be ready and able to meet division deployment timelines. The MLRSP helps ensure rapid ABL deployment for divisions based in CONUS by aligning the ammunition delivery with the deployment sequence of the divisions.

The MLRSP is an ammunition distribution plan that seeks to have ABL requirements identified and, where possible, strategically positioned at an ammunition storage facility near the deploying unit. The MLRSP establishes a transportation plan that, with no advance warn-

ing, will allow the logistics pipeline to absorb the surge of critically required munitions and deliver them where and when they are needed.

Developed shortly after the Gulf War, the MLRSP has taken quite a while to gain momentum. The delays can be attributed to several factors, ranging from the rotation of DAOs to multiple deployments to changes in Army doctrine for deploying divisions to combat theaters. Since obtaining ammunition stored in the wholesale base was not a high priority for deploying divisions, the main cause of the delay has been getting the warfighter to agree that a problem exists and to recognize that the MLRSP can solve division ammunition movement issues during deployment.

The MLRSP consists of two separate documents: a memorandum of understanding and an MLRSP support plan. Each document should be reviewed annually.

Memorandum of Understanding

The memorandum of understanding is an agreement among the supported division, the Department of the Army Deputy Chief of Staff for Logistics (DA DCSLOG), the Army Forces Command (FORSCOM), OSC, the Army Aviation and Missile Command (AMCOM), and the ammunition storage facility designated to support the division. It outlines the responsibilities of each organization to ensure compliance and agreement with the MLRSP.

The supported division provides a comprehensive list of basic load requirements to the JMTCA annually. This list is used to update the pre-positioned requisitions on file at the national inventory control points (NICPs). The supported division notifies the JMTCA of the ammunition theater configuration it needs for deployment. The MLRSP support plan outlines this configuration in detail. If a major modification table of organization and equipment change occurs in the middle of the review process, the division must submit the changes immediately.

The JMTCA is responsible for managing the MLRSP and receives the list of ABL requirements from the division. It distributes the list of ammunition requirements to the NICPs for review. The JMTCA reviews compatible container load plans designed specifically for the division by the Defense Ammunition Center. The JMTCA determines the method of delivery to the port of embarkation based on division deployment timelines and configurations. When needed, the JMTCA provides a transportation representative at the port of embarkation. The JMTCA helps establish a partnership agreement between the ammunition storage facility and a commercial carrier. Under this agreement, the carrier will provide sufficient transportation assets to the storage facility within hours of notification to ensure on-time delivery of division ABL assets.

OSC's Deputy for Munitions and Armaments at Rock Island Arsenal, Illinois, is the NICP for conventional ammunition. AMCOM, at Redstone Arsenal, Alabama, is the NICP for missiles. These NICPs maintain the pre-positioned requisitions for each division, receive deployment notifications, and fill (partially or totally) the pre-positioned requisitions.

The Deputy for Munitions and Armaments and AMCOM send the materiel release orders through the supply channels to the designated ammunition storage facility to fill the requirements. AMCOM must receive approval from DCSLOG to send their materiel release orders through the supply channels.

The NICPs identify shortfalls in the wholesale or retail base that will not allow complete fill of division ammunition requirements. They coordinate with Deputy Chief of Staff for Programs and DCSLOG representatives to purchase, freeze (hold), or allocate ammunition to provide 100-percent fill of the division ABL.

OSC provides depot storage space at the ammunition storage facility to store and maintain division ABL assets. The NICPs assign a special purpose code to the frozen MLRSP assets at the ammunition storage facility and ensure that surveillance functions are performed as outlined in Supply Bulletin 742-1, Ammunition Surveillance Procedures, to maintain quality and reliable stocks.

DCSLOG coordinates the MLRSP program with the DA Deputy Chief of Staff for Operations and Plans (DCSOPS). DCSLOG, in conjunction with DCSOPS, resolves ammunition prioritization issues and determines the freeze quantity authorized for basic load assets. If needed, DCSLOG recommends purchase or reallocation of ammunition to bring a division up to 100-percent fill of ABL requirements.

FORSCOM, working in conjunction with the respective commanders in chief, determines the theater configuration of division basic loads. The theater configurations are sent to the supported division for inclusion in the MLRSP support plan.

The ammunition storage facility receives and stores division ABL assets under a special purpose code. It provides the division a comprehensive list of the division's ammunition frozen at the facility. The list includes the current Department of Defense identification code, the condition code, and the current quantity maintained in the special account. The ammunition storage facility maintains visibility of division MLRSP assets and immediately notifies the JMTCA and the division if stocks become unserviceable.

MLRSP Support Plan

The MLRSP support plan is broken down into four sections: requirements, sourcing, surveillance and inspection, and movement plan.

The requirements section specifies the storage locations of the division's ABL assets. The ABL can be broken down into division ready brigade (DRB) packages (DRB-1, DRB-2, and DRB-3 assets) or task force packages. DRB-1 assets are stored at the division ammunition supply point; DRB-2 and DRB-3 assets will be stored at a designated ammunition storage facility close to the deploying unit.

The sourcing section of the MLRSP support plan lists the current location of all division ABL assets, as well as frozen assets currently held at the designated ammunition storage facility. Since the assets are stored throughout the United States, this section gets the most attention. OSC will begin to shift ammunition assets from their current storage locations to those ammunition storage facilities that are aligned with deploying units. Once all the ABL assets are in place at the ammunition storage facility, OSC will periodically review this portion of the support plan.

The surveillance and inspection section of the plan requires that a quality assurance/surveillance ammunition specialist (QASAS) be assigned to the ammunition storage facility to inspect the MLRSP-project-code ammunition as outlined in Supply Bulletin 742-1. The NICPs are responsible for ensuring that these surveillance functions are performed. This section also allows division representatives to visit the ammunition storage facility periodically to inquire about the status of their ABL assets.

The backbone of the MLRSP support plan is the movement plan, which specifies timeframes and desired locations of basic-load assets based on the guidance in the division's tactical standing operating procedures (SOP) and readiness SOP. This plan specifies the ammunition configuration determined by FORSCOM and the commander in chief, such as containerized or breakbulk, for direct movement to the port of embarkation. The movement plan also specifies the mode of transportation, the quantity of containers, and the commercial carrier designated to support the respective ammunition storage facility.

If movement of the division assets requires a waiver, the division coordinates with the Military Traffic Management Command (MTMC). The waiver should accommodate the configuration of munitions for the deploying unit, such as loading ammunition onto combat vehicles or moving ammunition through a port not approved for the movement of munitions. MTMC waivers, if required, are a part of the movement plan.

Consequences

As the MLRSP is implemented, the redistribution of assets will have a possible negative consequence for the ammunition logistics community. The MLRSP high-

lights the need for an intense analysis of the entire ammunition industrial and wholesale base. The analysis should identify the true level of class V support (with follow-on sustainment) that the ammunition community is able to provide to rapidly deploying divisions while maintaining the class V stocks needed to sustain a major theater war.

The MLRSP will have a positive effect on the designated ammunition storage facilities. The facilities will be able to use more of their available storage space and container-loading areas while fostering a good working relationship with warfighters.

As the Army's operating tempo continues to increase, the inability of the ammunition logistics base to meet the required delivery dates of rapidly deploying units is unacceptable. The MLRSP provides a relevant, viable solution for meeting division ammunition deployment timelines and improving division readiness. It fosters an environment that encourages everyone in the ammunition logistics pipeline to be proactive in supporting rapidly deploying units. The redistribution of ABLs to storage facilities that are close to deploying divisions will increase the capability of the ammunition logistics pipeline to handle the surge that occurs when units deploy rapidly.

Division commanders should feel comfortable about rapidly deploying their class V assets not stored at their home stations. The MLRSP is a strategic ammunition plan that provides warfighters with the security and confidence that ammunition assets not stored at their home stations will be available when and where they need them. The current storage configuration of division ammunition is inconsistent with division deployment timelines. OSC is in the process of improving this situation by implementing the MLRSP. For division commanders to be confident that their class V assets are ready for rapid deployment, they must embrace the MLRSP.

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Managing Hellfire Missiles: An Operator's Perspective

by Lieutenant Colonel Paul J. Wood and Captain John M. Hinck

Hellfire missiles—laser guided and millimeter wave guided—are air-to-surface missiles used with several helicopter platforms, including AH-64 Apache attack helicopters, as a multimission, anti-armor, precision attack weapon. They are intended for use against tanks and other heavily armored vehicles. The AGM-114L, or Longbow Hellfire, is a millimeter-wave-guided missile that uses a fire-and-forget capability found only on the AH-64D Longbow Apache helicopter. Attack aviation units must aggressively manage the Hellfire missile, which is a critical ammunition resource. This article will address the means by which corps aviation Apache helicopter units should manage Hellfire missile ammunition. The procedures and techniques described are based on analyses of methods used by the 11th Aviation Regiment from Illesheim, Germany, during three V Corps simulation exercises at the Grafenwohr Simulation Center in Grafenwohr, Germany: Desert Victory in February 1999, Victory Focus in February 2001, and Urgent Victory in April 2001.

Determining the Requirement

Under most battle circumstances, the Hellfire is a restricted resource. Ammunition supply rates help commanders determine needs and plan allocations when inadequate amounts of missiles are available. The required supply rate (RSR) and the controlled supply rate (CSR) are the key statistics that drive the planning for use and resupply of Hellfires. The RSR is the amount of missiles a maneuver commander estimates he will need to sustain tactical operations without restrictions for a specific mission over a given period. The CSR is the amount of ammunition that the corps allocates to each unit based on the availability of ammunition, class V storage facilities, and transportation assets over a specific period. Both RSR and CSR are expressed in rounds per weapon system per day.

RSR and CSR can change over time. RSR changes to meet the requirements of a new mission, while CSR changes when supplies either decrease or increase. Commanders use CSR to define or prioritize the flow of ammunition to units engaged in combat. Commanders can hold some Hellfires in reserve for unforeseen circumstances, but they seldom do so. When RSR equals CSR, there are no ammunition supply constraints. How-

ever, for critical ammunition types, especially Hellfires, RSR usually will not equal CSR. Hence, under most circumstances, some type of control must be established for use of the missiles.

Computing RSR

Planning for Hellfire use begins during the mission analysis phase of the military decision-making process. The RSR is determined through S3/G3 (operations) channels based on the following factors—

- Mission purpose—destroy, defeat, attrit, delay, or observe. A higher percentage of destruction requires a higher RSR.
- Command guidance. The intent may be to destroy the enemy or equipment at any cost.
- Aircraft availability. A higher number of available, fully mission-capable aircraft generates a higher RSR.
- Anticipated threat, or gun-to-gun lay. A higher number of targets generates a higher RSR.
- Environmental conditions. In poor visibility, the percentage of hits and the percentage of kills decrease, thus requiring more ammunition and a higher RSR.
- Length of air routes and auxiliary fuel tank requirement. When an auxiliary tank is used, the aircraft weapon load decreases, reattacks are necessary, and the RSR is higher.
- Enemy situation—known or unknown. The potential use of ammunition increases when the enemy's situation is unknown.

All of these factors help determine the weapons mix needed to defeat an enemy. For an Apache helicopter, the weapons mix will consist of 30-millimeter rounds, rockets, and Hellfires.

During the mission analysis, the planning data tend not to be as precise as data compiled a few days before the battle. This is because an accurate target count is not available early in the planning stages, when the enemy's strength and situation are unclear and details on the specific number of targets to be destroyed are unavailable. As the battle develops, more accurate intelligence data become available. Planners and operations officers will refine the RSR as the knowledge of the enemy's strength and situation increases.

Computation of the RSR is based on the number of targets, aircraft weapon loads, and the percent of kill



□An AH-64 Apache helicopter loaded with 8 Hellfire missiles and 19 rockets maneuvers to the objective.

(PK). (PK refers to the percent of the target destroyed by each fired missile. It is based on ammunition used and enemy posture.) Early in the planning stages, a good rule of thumb for determining RSR is to compute the number of targets that must be destroyed to accomplish the mission and carry out the commander's intent based on identified essential tasks and the S2 analysis of enemy strength. When the enemy's strength and situation are unclear, the number of targets counted most likely will be higher. After the S3 knows the number of targets, he must factor in the percent of kill.

In Exercise Desert Victory, the PK was 25 percent for stationary, dug-in targets and 35 percent for moving targets. A PK of 25 percent would require four times as much ammunition to destroy a target as a PK of 100 percent. A PK of 35 percent would require 2.9 times as much ammunition to destroy the target. In Exercise Urgent Victory, the PK was 70 percent for all targets, so fewer missiles were needed to accomplish the mission than in Desert Victory. PK may vary among units. Regardless of the PK, the important factor is the analysis, which develops the ammunition requirement.

When the S3 knows the total amount of ammunition available, he can establish a weapons mix for each aircraft to best destroy the targets. Based on the number of targets to be destroyed, the established PK, and a standard weapon mix per aircraft, the S3 can calculate the amount of ammunition needed and the number of squad-

ron turns that will be required throughout the exercise.

If, for example, a regiment must destroy 3,500 targets over a 7-day period, it must destroy 500 targets each day. To destroy 500 targets with a PK of 25 percent, the regiment needs 2,000 Hellfires a day. The regiment expects to use 96 AH-64s; 2,000 divided by 96 equals 20.8. So the RSR is 21 Hellfires per aircraft per day. The S3 assessed the following weapons loads on the aircraft per troop: 5 AH-64s with 12 Hellfires, 0 rockets, 660 30-millimeter rounds, 1 auxiliary tank (60 Hellfires total for the troop); and 3 AH-64s with 8 Hellfires, 19 rockets, 660 30-millimeter rounds, 1 auxiliary tank (24 Hellfires total). Some units installed a Robertson fuel tank on their helicopters. The "Roby" tank provides the helicopter about 1 hour of additional flight time. When used, the "Roby" tank replaces the external auxiliary tank. This limits the 30-millimeter cannon to 90 rounds but allows all four wing stores to carry ammunition, providing space for an additional missile launcher or rocket launcher.

If the troop is expected to use 84 Hellfires per turn, then a squadron with 3 troops would use 252 Hellfires per turn and 504 Hellfires for 2 turns. When 504 is divided by 24 (the number of AH-64s expected to be available in the squadron), the result is 21 Hellfires per aircraft. This number must be provided through S3 channels as the unconstrained requirement and must match the target analysis. If the regiment had to fire 2,000



□An AH-64 Apache helicopter returns from a mission with empty Hellfire missile launchers and rocket pods.

Hellfires per day to destroy 500 targets, then 8 squadron turns would be required per day (or 2 for each of the 4 squadrons in the regiment).

Assessing CSR

For a simulation exercise, the corps may not release the CSR until only a few days before the exercise starts. When this occurs, the unit must review its ability to accomplish the commanding general's purposes successfully. It is critical to have a clear statement of vision and intent from the commanding general that defines where he thinks attack helicopters will be used most successfully in his maneuver scheme. With clear vision and intent, accurate target analysis and ammunition forecasting are possible. The S4 and the executive officer should understand the mission requirements and ensure the supplies needed to succeed are acquired.

Although determining the CSR seems simpler than reaching the RSR, the process is not a simple math equation of the number of missiles divided by the number of units. Computing CSR is based on the following factors—

- Available unit ammunition basic load.
- Mix of ammunition types for the basic load (laser and millimeter wave guided).
- Total amount of ammunition available for the campaign. When the total amount of ammunition available over a specified time is known, the unit S4 can manage the ammunition by meeting surging requirements by phase of the operation. If the total amount is not known or if the length of the campaign is uncertain, the unit S4 must restrict use and allot a specific amount of ammunition per day throughout the campaign.
- Number of assets allocated to each unit, or a percentage analysis of all units. Allocation is based on a straight percentage of the total force's assets. For example, if four units each have 25 percent of the Apaches

in the battle, then each unit receives 25 percent of the available Hellfires. However, if one unit owns 96 of the 160 Apaches in the battle, that unit should receive 60 percent of the Hellfires. While CSR is based on the actual number of aircraft on hand, RSR usually is based on the number of aircraft that are mission capable.

- Commander's intent and emphasis on unit missions. If the commander emphasizes a particular unit, then that unit might receive a larger ammunition allocation in order to accomplish its higher priority mission. Commander's intent and emphasis can provide a viable reason to request additional ammunition. However, not receiving more ammunition does not relieve a unit of completing essential tasks.

- Commander's logistics priority, especially in terms of ammunition priority.

- Combat service support rehearsal. The G4 may impose constraints based on the supply forecasts or as a contingency (via branch or sequel) during the combat service support rehearsal.

If the commanding general emphasizes the importance of deep attack success on days 1, 2, and 5 of the operation, the aviation commander must allocate ammunition to allow surging during those high-priority mission days. While ground maneuver forces are conducting the counterreconnaissance fight, destroying the enemy's first operational echelon force, and assisting in the counter-attack, aviation forces destroy the enemy's deep fire assets (artillery and rocket groups) or his mechanized or armored forces. If the commander anticipates a critical fight against counterattacking second-echelon forces in the later days of the operation, the aviation forces must plan their ammunition use accordingly. Hence, Hellfires must be allocated to support the anticipated plan on days 1, 2, and 5. On other days, Hellfire loads would be expected to remain low.

Managing the Impact of CSR

When Hellfire allocation is constrained, it may be necessary to revise RSR estimates if intelligence sources identify an actual threat or if aircraft status changes. This enables a unit to maximize the use of available missiles.

Planning for Hellfire use is important, but executing the plan is even more critical. The "fog of war" often causes leaders to lose sight of a well-devised resource utilization plan. As a result, a long-term tracking system must be in place to maintain an accurate count of the missiles available as the battle progresses. This means that missiles uploaded on an aircraft and those available at the forward area rearm and refuel points must be considered. If multiple turns are required during missions, then Hellfire weapon mixes must be reduced so as not to use ammunition needed for critical phases later in the fight. Forward area rearm and refuel points must be prepared to change aircraft ammunition and fuel loads based on aircraft losses and maintenance status.

During the daily commander updates, it is vital for the aviation commander to keep the commanding general informed of Hellfire status; it is not enough simply to report the stockage through formal reporting channels. Hellfire availability must be reported to the chain of command in operational terms (number of squadron turns) so the commander has an idea of how he can employ his combat power.

The commander also must know if a lack of ammunition will prevent mission success or stop his intent from being accomplished. It is equally important to keep the deputy commanding general, who serves as the commanding general's principal logistics leader, personally informed. He has the authority to reallocate Hellfire distribution throughout the corps as well as to obtain additional stocks from within the theater or, possibly, from out-of-theater stocks.

Results of Hellfire Management

During Exercise Victory Focus, the 11th Aviation Regiment planned and executed its Hellfire use with a great deal of precision, which enabled the Victory Corps commanding general to attain his intended purposes during the critical phases of the exercise. For Victory Focus, the CSR was 12 and the RSR was 13. The regiment planners used a standard PK of 60 percent for all missions. Auxiliary fuel tanks were used on all aircraft. Despite a constrained missile supply, the regiment reduced the enemy forces to sufficient numbers so ground forces could defend and then transition to the offensive successfully. The operation was a success; however, there were only four turns of Hellfire remaining after day 5. This amount would need to last for the remaining 2 days of the exercise (initial planning would have called for 16 battalion-size turns). The success of deep

attack aviation during night 5 significantly reduced the enemy's strength to the point that he could not mount a decisive attack against corps ground maneuver forces, so the exercise was halted.

During Exercise Urgent Victory, the 11th Aviation Regiment used a higher PK of 70 percent for all mission planning. All aircraft had an internal Roby fuel tank, thus allowing for longer station time and more Hellfires in the weapons mix. Aircraft conducted the mission with a standard load of either 8 Hellfires, 38 rockets, and 95 30-millimeter rounds or 12 Hellfires, 19 rockets, and 95 30-millimeter rounds. Hellfire use was about the same as in previous exercises, but the unit conducted fewer turns. The advantages were longer station time and the additional 40 nautical miles that aircraft could fly because of the Roby tank, which permitted a deeper penetration into enemy territory. The regiment received only four ammunition pushes during the entire exercise. At the end of the exercise, because of the higher PK and higher Hellfire density on aircraft, only two turns (using 12 Hellfire per aircraft per turn) remained. Although the battle damage assessment was higher, aircraft loss also was higher, which could be attributed to the deeper flight routes into enemy territory.

To forecast and manage Hellfire use properly, one must consider many factors. The bottom line is that the ammunition must be available when it is needed during critical phases of the operation. Aggressive tactics, coupled with sound logistics management, will allow attack aviation units to reach mission success and achieve the commander's intent.

ALOG

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Insensitive Munitions and the Army: Improving Safety and Survivability

by Kendal Duncan

Since 1987, the Army has led the armed services in implementing a Department of Defense (DOD)-wide initiative to improve the safety of munitions. This program, called the Insensitive Munitions (IM) Program, seeks to adopt gradually an inventory of the world's most lethal ground force munitions that perform as they are intended but are less prone to violent reaction when subjected to impact from bullets and fragments, heat from fire, and shock from neighboring explosions.

The Army's IM Program was created as a result of lessons learned from ammunition accidents and combat incidents that occurred during and after the Vietnam War. For example, four separate munitions incidents involving the U.S. aircraft carriers *Oriskany*, *Forrestal*, *Enterprise*, and *Nimitz* left a total of 250 personnel dead and 717 injured and 48 aircraft destroyed. There was significant ship damage as well. Two separate ammunition transportation accidents in Roseville, California, and Benson, Arizona, resulted in 48 injuries and millions of dollars' worth of damages. These incidents, along with accidents and attacks on munitions storage areas in Bien Hoa, Qui Nhon, and Da Nang, Vietnam; Camp Doha, Kuwait; and Al Jubayl, Saudi Arabia, have shown that our lethal weapons have the devastating potential to cause our own forces irreparable harm.

IM and the Army Transformation

Fundamental to the Army IM Program is the concept that an IM inventory is an integral component of the Army's Munitions Survivability Program that will help ensure successful force projection. Since the end of the Cold War, the Army has been transforming actively from a forward-based Army to a continental United States-based power projection force. At the same time, the Legacy Force is being reshaped to meet new requirements through an Interim Force that ultimately will evolve to an Objective Force. With these changes, the Army must balance the often-competing requirements of lighter weight, greater agility, increased lethality, and survivability. The ongoing transformation highlights the critical importance of protecting our transportation, storage, and staging facilities throughout the world, since the vulnerabilities of logistics nodes and the consequent impact on military operations have been demonstrated

clearly. Without safe, survivable ammunition and missiles, we risk losing our warfighting assets during deployment and distribution, as well as in combat.

The Army owns approximately 3 million tons of conventional ammunition and missiles worldwide with an acquisition cost of over \$30 billion. By incorporating IM into the inventory, the risk of catastrophic loss is reduced and force survivability is improved. With IM, not only are our combat systems more survivable, but also the critical logistics nodes through which our vital munitions flow are better protected. This, in turn, helps to ensure the successful projection and return of our combat forces.

The Army's IM procedures are described in Department of the Army Pamphlet 70-3, Army Acquisition Procedures. Details concerning the program's structure and management and the responsibilities of materiel developers also are found in this pamphlet.

A Work in Progress

The Army has taken numerous steps toward achieving its goal for the IM Program. Our materiel development process and program oversight ensure incorporation of the best IM technologies to meet performance requirements. In 1988, the Army became the first service to appoint an insensitive munitions executive agent to provide oversight of all Army IM activities. The Army Executive Agent for Insensitive Munitions (AEA-IM) is the Deputy for Ammunition under the Assistant Secretary of the Army for Acquisition, Logistics, and Technology. The AEA-IM, along with the Army Tank-automotive and Armaments Command Armament Research, Development, and Engineering Center (TACOM-ARDEC) and the Army Insensitive Munitions Board, reviews munitions development programs and munitions procurement for compliance with DOD and Army IM policies, advises project managers on available IM technologies, and makes recommendations to the Army Acquisition Executive on the progress being made in achieving an improved munitions inventory.

With the development of sense-and-destroy armor in 1992, the Army became the first service to combine IM and hazard classification testing, which since has become a DOD goal. Combining insensitive munitions



□ Soldiers evacuate Doha's North Compound on 11 July 1991 after a fire breaks out in the motor pool.

□ This is the aftermath of a motor pool fire at Camp Doha, Kuwait, in July 1991. Earlier, an M992 ammunition carrier loaded with 155-millimeter artillery shells caught fire in the North Compound. The resulting series of explosions and fires devastated the vehicles and equipment in the compound and scattered unexploded ordnance and debris over much of the remainder of the camp.



and hazard classification tests reduces development time and saves the Army money by avoiding the separate costs of tests that are similar in nature.

In 1998, the Army led the DOD in becoming the first service to incorporate language that mandates the development of IM into its policy for preparation of Operational Requirements Documents (ORDs). The Army language subsequently became the model for the Joint Chiefs of Staff policy on IM requirements.

The Army broke new ground again in 1998 by becoming the first service to include other services formally on its Insensitive Munitions Board. This change greatly facilitates effective coordination of IM efforts in the joint environment. Numerous other firsts demonstrate the Army's commitment to, and leadership in, the IM area.

The Army's unique requirement to balance greater agility and increased lethality, survivability, and deployability provides a tremendous technology challenge. Its efforts have been rewarded with significant IM improvements, such as the improved M829 tank cartridge, the modular artillery charge system, the Pa-

triot advanced capability missile system, the 60-millimeter high-explosive mortar cartridge, and the Hellfire missile.

Guarding against catastrophic incidents during the development, production, transportation, storage, use, and disposal of munitions requires skill during their design and constant vigilance by their users. The Army has met these requirements and continues to be a leader in the implementation of IM goals. **ALOG**

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Training Ammunition Units in Peacetime

by Major René Jackson, Jr.

Training ammunition units in peacetime is difficult. The diversity of ammunition units and their configurations, which helps in wartime operations, creates a peacetime training problem. There is no “one size fits all” formula for training ammunition units.

In Korea, for example, the Republic of Korea (ROK) Army owns the ammunition storage points and storage magazines that support U.S. forces and maintains the keys to the locks (except for category 1 rockets and missiles). U.S. Army ammunition companies fall under the wartime host nation support modification table of organization and equipment, which limits the number of U.S. personnel to approximately 15 soldiers per company. U.S. equipment likewise is limited, and materials-handling equipment (MHE) is not authorized within these companies.

In Japan, the Army has contractors who provide most of the hauling and labor for ammunition operations. The Army conducts annual exercises, such as Turbo Cads, which greatly benefit the combat service support organization but do little to train soldiers in hands-on ammunition operations.

In the continental United States, Department of Defense civilians or contractors oversee much of the day-to-day ammunition mission. At some locations, “green suiters” may operate the equipment but do little else. At installations with divisions, division ammunition officers (DAOs) work closely with the ammunition supply points on a daily basis to ensure and monitor issues, receipts, and turn-ins.

Ammunition transfer point sections within the forward support battalions usually do little in ammunition operations until it is their supporting brigade’s turn to go to the National Training Center at Fort Irwin, California, the Combat Maneuver Training Center at Hohenfels, Germany, or the Joint Readiness Training Center at Fort Polk, Louisiana.

Innovative Training

The key to meeting ammunition unit training needs is to be innovative. Here are some ideas that may help an ammunition unit get the training it needs.

DAOs and ammunition unit commanders should work closely with installation personnel when setting up training sites. Division-size posts usually have adequate space for setting up ammunition training sites. Such sites can be compared to military operations on urban terrain sites. They are mock operational environments.

DAOs and ammunition unit commanders also should work with installation Defense Reutilization and Marketing Offices (DRMOs). DRMOs have large amounts of ammunition residue items that they would rather reuse than turn over to a contractor to sell for pennies on the dollar. (Residue items are empty ammunition shipping containers that are sent to DRMO after the ammunition is used.) DRMOs are required to deliver residue items where and when they are needed, and they typically do not charge for delivery.

Commanders and first sergeants can create all kinds of training opportunities with these assets. They can set up ammunition transfer points managed by the DAO and the division transportation officer. They can use a container roll-on-roll-off platform when fully fielded or palletized load system flatracks when the brigades and the division support command go to the field. Commanders can set up field training exercises (FTXs) to conduct ammunition operations 24 hours a day, 7 days a week using the ammunition residue items obtained from the DRMO. Banding, palletizing, and bracing operations can be included.

Ammunition units can start training soldiers to construct and handle strategic-configured loads for wholesale operations or mission-configured loads for direct support or retail operations. This type of training has been limited at best. Units can obtain information on the 33 currently approved strategic-configured loads by contacting the Army Training and Doctrine Command Munitions System Manager’s Office at the Army Munitions and Electronic Maintenance School at Redstone Arsenal, Alabama. Exact drawings and tie-down schematics can be viewed on the Defense Ammunition Center web site at <http://www.dac.army.mil/det/default.html>.

An ammunition unit located near a depot may try coordinating with the depot commander to conduct an FTX at the depot. At the depot, ammunition unit commanders can simulate ammunition operations for an extended length of time. During the FTX, they also can create mission training plans or conduct their own Army training and evaluation programs. The depots all have railheads, some have airfields, and some also can conduct waterborne operations on inland waterways or on the ocean.

Most depots have dining facilities and billeting areas that could be used during the exercise. Many depot commanders would welcome the outside activity. Coordination could be made to conduct the exercise in con-



□ At top, a strategic-configured load is inserted into an ISO container. In the middle photo, a rough terrain container handler loads an ISO container onto a heavy, expanded mobility tactical truck (HEMTT). At the bottom, an ammunition soldier visually inspects artillery propellant charges in support of rail operations at a railhead.

they can conduct banding, palletizing, and bracing operations. They also can start training in strategic-configured load and mission-configured load operations.

To train MHE operators, Reserve component unit commanders can offer to conduct warehousing operations for the Red Cross or the Salvation Army on weekends. These nonprofit organizations usually are happy to accept the free labor, and this allows the MHE operators to practice their materials-handling skills.

Most home stations have buildings with large open areas. MHE and simulated magazine-storage-area training can be conducted in these areas. The unit training noncommissioned officers can acquire the standard 40-foot flatbed and palletized load system flatrack dimensions from the Internet, spray-paint the exact configuration onto the pavement or bay area, and conduct ammunition loading and unloading operations. Commanders can petition their chains of command for permission to buy or lease a couple of International Organization for Standardization (ISO) containers for training. They can issue mockups of Department of the Army Form 581, Request for Issue and Turn-In of Ammunition, to the MHE operators and simulate issuing ammunition to conduct operations.

The challenges of training an ammunition unit during peacetime are tough, but the possibilities are endless and limited only by one's imagination. Unit commanders need to be audacious and innovative when it comes to developing new ways to train. They need to conceive, plan, and develop training program plans that are well thought out. After that, they can present the plans to their commanders for approval to execute. **ALOG**

junction with a real-world ammunition movement, with the training unit providing the labor.

Training Reserve Component Units

Reserve component units face additional training challenges. Except for their 2-week annual training, training time at their home stations is limited. Implementing some of the training ideas already mentioned could prove difficult but not impossible. Commanders of Reserve component ammunition units need not be discouraged. They, too, can petition the closest DRMO for ammunition residue items and set up limited training areas where

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Modeling Ammunition Logistics

by Alan Santucci and Donna Woodman Drohan

The Army's warfighting vision foresees a force characterized by flexibility, speed, precision, and lethality. Achieving this vision is based on assumptions of reduced deployments and engagements, information and technological advances, and increased effectiveness and efficiency. The latter two assumptions require "doing the right thing"—accomplishing the delivery of the appropriate force and supplies at the right time and place—and "doing the thing right"—expending resources as efficiently as possible to accomplish the mission.

Forces both within and outside the Army and the Department of Defense will shape the future ammunition distribution system. An understanding of future weapon systems, wartime and contingency environments, and commercial trends is needed to develop a system specifically tailored to support the warfighting vision.

The Logistics Research and Development Activity at the Army Tank-automotive and Armaments Command Armament Research, Development, and Engineering Center (TACOM-ARDEC) at Picatinny Arsenal, New Jersey, is undertaking a modeling effort that uses a systems approach to analyze the distribution system for ammunition. This approach emphasizes trading off alternative solutions based on clearer information about both the efficiency and effectiveness of the choices. The model will assess system-wide changes in distribution system performance caused by each hypothetical alternative. Information from the model will assist decision makers in making choices about system improvements.

A Systems Approach

TACOM-ARDEC will use modeling and simulation as a prototyping mechanism to determine the potential benefits of a new or improved process or system. To quantify these improvements, the existing system's baseline must be understood clearly, with all human, machine, and materiel interactions completely defined and measured. Changes to the baseline then can be measured and the return on investment calculated for a given improvement.

The model will assist the decision maker in answering several critical questions before determining how to ensure that a proposed system delivers as planned—

- How much ammunition will have to be moved, when, and by whom?
- What is the current distribution system capability?
- What changes are expected to impact the system in the future?

- What is the extent of any shortfall in distribution?
- What are the alternative courses of action to alleviate shortfalls? What does each cost?
- What will the distribution system of the future look like?
- How do you decide what to do?
- How do you know when you have it right?
- How do you solve the problems of ammunition distribution in airlift operations?
- What are the current policies and concepts? What needs to be in place to provide guidance for the future system?

Rationale for a Systems Approach Using Metrics

The model will take a system-level perspective because an action taken in one part of the system will impact other parts. Imbalances can cause some nodes of the ammunition distribution system to be swamped and others to be idle. Under- and overutilization inefficiencies can occur at lateral, upstream, and downstream nodes within the system. The challenge of the analysis is to reveal, evaluate, and quantify system-wide impacts and then determine alternative actions for ensuring a seamless flow of ammunition.

The model will be able to balance capabilities and constraints against requirements. The goal is to have the ability to determine the value of any change that will improve the function (effectiveness) or the efficiency (use of resources) of the distribution system.

Ideally, system stakeholders will agree on metrics, or measures of effectiveness, for judging mission accomplishment. The measures should unify the stakeholders and measure total system performance. Then improvements, their costs, and their impacts can be evaluated systematically, thus measuring "bang for the buck." Decisions on trade-offs still may not be easy, but at least system-wide expected outcomes will be visible. This type of analysis is important because it can identify potential balance, bottlenecks, and efficiency problems and may point to solutions other than adding capability, such as reducing the demand on a node, reallocating assets, and managing the flow (timing) of distribution.

Current Status

TACOM-ARDEC will develop baseline estimates for each node in the logistics chain. Analysts also will develop process descriptions of the current munitions-handling activities and transportation requirements

through the entire system. Analysts will review applicable field manuals and interview subject-matter experts to develop and validate these descriptions.

The logistics nodes to be diagrammed using flowcharts include—

- Production base. This node includes all activity at ammunition-loading plants and all transportation to depots.

- Depots. These nodes include all activity related to storing, receiving, shipping, and turning in munitions stored at the various tiers of depots and transporting all shipments to ports of embarkation.

- Air and sea ports of embarkation. These nodes include unloading and temporary storage of munitions from depots and loading and shipping munitions from the port.

- Air and sea ports of debarkation (PODs). These nodes include the offloading of any conveyance, temporary storage, and shipment from the port by line-haul assets.

- Line-haul transportation. This involves all conveyance of munitions from the POD to an in-theater storage area.

- Theater storage area (TSA). The TSA is the first field storage area. Its capacity does not exceed a stockage objective of 25,000 short tons or 17 days of supply. It receives 100 percent of its munitions from the POD and includes all requirements for transportation out of the TSA.

- Corps storage area (CSA). This is the second field storage area. It has a stockage objective not to exceed 25,000 short tons or 7 days of supply. It receives 50 percent of its munitions from the TSA and 50 percent directly from the POD and includes all transportation requirements out of the CSA.

- Ammunition supply point (ASP). This is the third field storage area. It is smaller than a CSA and stores 3 days of supply. There are three or more ASPs for every TSA-and-CSA pair. It receives 50 percent of its munitions from a CSA, 30 percent from a TSA, and 20 percent from the POD.

- Ammunition transfer point (ATP). This is the location at which munitions are transferred from the storage areas to the combat trains. This is typically a roadside storage area forward of the CSA.

- Combat unit. The combat trains interface with the ATP and bring munitions to consuming units.

- Future intermediate staging (or supply or support) base (ISB). This will be an operational- or tactical-level field storage area or base designed to support forward support company deployments. The organizational layout and functionality of the ISB will be refined continuously as ISB operational doctrine is defined.

These ten nodes (excluding the ISB) make up the entire logistics infrastructure required for the shipment

and storage of munitions. Individual process documents will serve as the roadmap for building the flowcharts to explain fully all procedures executed in support of each node. These flowcharts will represent the actual activities and required resources necessary for each node to function properly. An information-gathering effort will be conducted to interview agencies with knowledge of the processes. This effort is intended to leverage the results of all prior work.

New Systems

The first model, which was completed last summer using the Rockwell Arena environment, simulated the CSA node. [Arena is a family of modeling and simulation products sold by Rockwell Automation.] The number of soldiers and available equipment were defined by the latest table of organization and equipment data for the modular ammunition medium and heavy lift platoons. This simulation permitted evaluation of the expected capabilities of materials-handling equipment enhancements now under development against the current baseline level.

As the through-put capabilities of the CSA node are increased by equipment or doctrinal changes, a process of feeding these results into a global theater model must be defined. TACOM-ARDEC will specify an interface for exporting data generated by the Arena model to the Global Deployment Analysis System (GDAS) maintained by the Center for Army Analysis. Then, as additional nodes are developed in the stochastic Arena environment, the results will be easily transitioned to the deterministic GDAS model.

This new simulation tool set will provide the capability to evaluate a wide range of ammunition-handling improvements and determine distribution impacts across all logistics nodes. The tool set will assist in answering the questions posed earlier: Are we “doing the right thing,” and are we “doing the thing right?” As we continue with this approach, we should see a return on investment in innovative solutions much earlier in the development cycle.

ALOG

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Building Roads on Soft and Sandy Soils

by Rosa L. Santoni and Jeb S. Tingle

Joint logistics over-the-shore (JLOTS) exercises simulate military sealift deployment operations and provide military forces with realistic lessons that can be applied anywhere in the world. During these exercises, equipment and personnel are transported from a ship to a bare beach and moved to the area of operations. However, JLOTS operations usually are conducted on soils that are not strong enough to support aircraft or ground vehicles.

When loose sand, marshes, or swamps are encountered, transferring personnel, equipment, and materials can be delayed because the ground lacks the strength to support military truck traffic. Heavy trucks traveling over sandy and soft soil can produce ruts up to 14 inches deep. Sometimes vehicles become stuck in the ruts, resulting in delays that could jeopardize both the mission and soldiers' safety.

To solve the problem of moving vehicles over soft and sandy soils, the Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi, was tasked to develop new materials and matting systems for rapid construction of airfields and roadways. ERDC conducted an enhanced coastal trafficability demonstration that investigated using a combination of geosynthetics, mat systems, and strong soil layers to surface roadways. Geosynthetics are planar, polymeric (synthetic or natural) materials used in contact with soil, rock, or any other geotechnical material in civil engineering applications.

Since 1996, ERDC has identified discrete fibers as a potential material for constructing roads and airfields over sandy soils; developed several structural matting systems to support operations over sandy soils; and evaluated several structural mats and geosynthetic-reinforced pavement systems to support heavy-truck traffic over soft soil.

Existing Airfield and Roadway Systems

The Army has several mats and a sand grid system available to construct airfields and roadways over sandy soil.

Mats are divided into two major categories—airfield mats and roadway mats—based on the primary use of the mat system. These mats were developed in the 1960s and 1970s.

Airfield mats are made of aluminum and steel for quick airfield construction. They support the high gross loads and tire pressures associated with aircraft. Airfield mats include a light-duty steel mat (M8A1), three types of medium-duty aluminum mats (XM18, M19, and AM-2), and a heavy-duty truss web aluminum mat. These mats were developed to support aircraft when placed on a California bearing ratio-4 subgrade. (California bearing ratio (CBR) is a standardized testing procedure for determining the strength of soils by measuring the soil's penetration resistance and comparing it to the penetration resistance of crushed rock. For example, you will sink up to your knees in a CBR of less than 0.2, you will sink up to your ankles in a CBR of 0.5, your heels will sink about ¼ inch in a CBR of 1, and a spike heel will make a slight indentation in a CBR of 4.)

Three existing types of mats are available to create roadways over sandy soils. The first, Mo-Mat[®], consists of semirigid panels of fiberglass-reinforced resin material that are rolled out, bolted together, and anchored in place to form temporary roadways and parking and storage pads. The second, the M8A1 light-duty airfield mat, works well for large turning area pads and straight roadway sections. The third roadway mat, the Uni-Mat[®], is a patented interlocking mat made from hardwood lumber. Two layers of Uni-Mat create a heavy-duty roadway over sand or wet soil.

These existing mat systems have several limitations

□ Soldiers roll out Mo-Mat to make a roadway over a sandy beach.

that prohibit their use in many military applications. The Mo-Mat requires extensive maintenance and is difficult to replace because it is no longer available commercially. The M8A1 requires significant maintenance when used in curved roadway sections. The last known military purchase of the M8A1 mat was in the late 1960's for airfield construction during the Vietnam War. Only limited supplies of the Mo-Mat and M8A1 exist. The heavy-duty truss web aluminum mat has never been purchased for military use because its weight makes it difficult to transport. SOLOCO, Ltd., purchased the Uni-Mat patent and stopped making the original Uni-Mat design. SOLOCO now manufactures another wood mat in place of the Uni-Mat.

The *sand grid*, also known as Geocell, consists of a plastic material designed to confine sand or other cohesionless materials to produce a load-distributing base layer. The plastic grids are manufactured and shipped in collapsed 4-inch thick, 110-pound sections. Each expanded grid section is 8 feet by 20 feet and contains a honeycomb arrangement of cells.

New Soil Stabilization Systems

ERDC has developed three new rapid-road-construction methods to overcome the deficiencies of truck operation over sandy soils. The road construction methods include stabilizing sand with geofibers and surfacing the soil with two types of mats. A fourth method—a combination of mat, geosynthetics, and structural material—provides an innovative solution for constructing roads over soft soils.

Geofibers. Sand-fiber road stabilization technology involves mixing hair-like, 5-centimeter-long polypropylene fibers into moist sand with a self-propelled rotary mixer. The sand-fiber layer is compacted with a smooth-drum vibratory roller. A wearing surface is added by spraying a resin-modified emulsion or an emulsified asphalt onto the road surface to bond the sand grains with the fiber filaments and protect the sand-fiber surface.

Using this method, military supply roads can be constructed quickly at remote sites over the beach or across desert sands with less equipment, manpower, and materials than other road-building methods require. Experiments conducted at ERDC indicate that roads constructed with this new technology can carry over 10,000 passes of heavy military supply traffic with very little or no maintenance required. Sand-fiber stabilization uses existing military construction equipment and requires no special construction skills. It can be used on a wide

variety of sands and silty soils found around the world.

Fiberglass-reinforced mat. This mat is a spin-off of the fiberglass-reinforced mat developed by the Air Force as part of its rapid runway repair project. The mat is made of polyester resin reinforced with four plies of woven chopped fiberglass. The weight of a 6-foot by 6-foot panel is approximately 115 pounds. Each panel has an 8-inch underlap with a downward fold for connecting panels together. A quick-install connector pin bolts the panels together. The connector pin is placed in overlapping rectangular holes and tightened. As the pin connector is tightened, a bottom plate rotates 90 degrees, locks in place, and pulls the two panels tightly together. When installed over sand, the mat will support over 5,000 truck passes with very little rutting. The mat may flex significantly under heavy wheel loads; however, it springs back to a flat position and usually suffers no damage.

Hexagonal mat. These lightweight interlocking mat panels were designed for quick installation to create parking areas and access roads. The installation rate ranges from 600 to 900 square feet per man-hour. The panels do not deteriorate from exposure to ultraviolet light and are made from recycled, high-density polyethylene. Each panel weighs 7 pounds and has a surface area of approximately 3 square feet. The factory-recommended maximum wheel load is 13,000 pounds per panel when installed over a gravel base. The panel's hexagonal form permits road angles of 30, 60, and 90 degrees.

DURA-BASE® mat. The DURA-BASE interlocking mats were designed for temporary roadway systems and construction platforms placed over soft soils and environmentally sensitive areas. These plastic mats are made by bolting together two high-density polyethylene sheets and heat-welding the periphery of the mats. Each plastic mat weighs 1,050 pounds. The mat size is 8 feet by 14 feet with a thickness of 4¼ inches. Each panel has a tread pattern that improves traction for load-bearing vehicles and equipment. A small crane or forklift and two or three laborers are needed to install the mats. Over very soft soil, two layers of mat plus a geotextile separator are required.

Sandy Soil System Comparison

Several logistics issues must be considered for these new mats and composite roadway systems. The table on page 25 shows a logistics analysis of the systems based on the construction of a 24-foot-wide and 1-mile-long section of road on sandy soil. For this analysis, it



□ Left, geofibers are mixed with sand to create a stable base for a resin-modified emulsion or emulsified asphalt surface. Right, hexagonal mats are designed for quick installation to create parking areas and access roads.

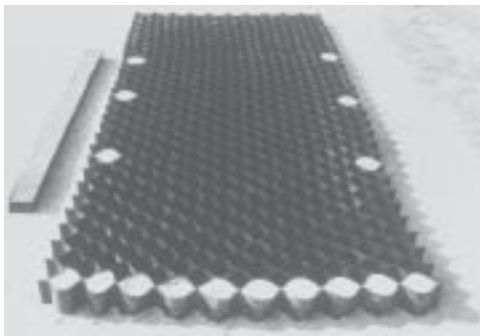
was assumed that 20-foot International Organization for Standards (ISO) containers would be used to ship the roadway systems. This size container has a capacity of 1,666 cubic feet, weighs 6,060 pounds, and can hold 68,890 pounds. The container’s weight and dimensions set limits on what type, and how much, material can be transported.

Although the new roadway systems were developed for both sandy and soft soils, the ERDC analysis only compared the new systems recommended for sandy soils—geofiber stabilization, fiberglass-reinforced mat, and hexagonal plastic mat—with the existing systems for sandy soils—Mo-Mat, M8A1, and Geocell—because the Army has no existing systems that can support heavy-truck traffic over very soft soil. The potential soft soil systems—plastic DURA-BASE mats and wood SOLOCO mats—may work for sandy soils as well.

The table shows the requirements in terms of weight, volume, cost, number of containers, and placement rates

for each system to construct the 1-mile section of road. When the existing technologies are compared to the new road systems, several advantages of the new systems can be identified. The fiberglass-reinforced mat has less weight and volume and requires fewer containers to ship enough mat panels to build a 1-mile section of road than the M8A1 mat. The fiberglass-reinforced mat also has a faster placement rate than the M8A1. These reductions represent a construction cost saving of over 35 percent. The fiberglass mat is 50 percent lighter, requires 60 percent fewer containers, and can be installed 100 percent faster than the Mo-Mat. While each Geocell grid is smaller and lighter than the fiberglass-reinforced mat, it takes 6 times longer to install.

Using geofibers for roadway construction reduces cost, weight, and containers by 87 percent, 39 percent, and 45 percent, respectively, when compared to the M8A1 and Mo-Mat. Geocell is 38 percent more expensive and 4 percent heavier than the geofibers. The hex-



□ Geocell, or sand grid, is used to provide a load-distributing base layer for a road.



□ Fiberglass-reinforced mats are bolted together to provide a resilient road surface.



□ DURA-BASE mats are very heavy and require a forklift or crane for installation.

Logistics Analysis for 1 Mile-Long-by-24-Foot-Wide Road										
Mat/System	Mat size, ft x ft x in	Panel weight, lb	Cost/panel, \$	Unit cost \$/ft ²	Unit weight, lb/ft ²	total weight, tons	Total volume, ft ³	Number of panels	Number of containers	Placement rate, ft ² /man-hour
M8A1	1.625 x 11.81 x 1.13	144	134	7.00	7.50	475	11,461	6,602	20	240
Mo-Mat	12.17 x 48.5 x .063	625	8,263	14.00	1.06	67	13,677	218	37	240
Geocell (Sand Grid) ¹	8 x 20 x 8	110	240	1.50	0.69	44	1,173	792	4	66
Plastic DURA-BASE ²	8 x 14 x 4.25	1,050	1,575	14.06	9.68	594	44,880	1,132 ⁴	57 ⁴	150
Wood SOLOCO ²	8 x 14 x 4	1,400	275	2.46	12.50	1,584	42,240	1,132 ⁴	52 ⁴	100
Fiberglass-reinforced	6.67 x 6.67 x 0.70	115	320	7.19	2.58	164	7,392	3,520	8	520
Hexagonal ³	2.9 ft ²	6.17	21	7.20	2.12	135	19,536	31,680	25	900
Fiber ³	hair-like	0.8% of dry sand weight	-----	1.03	-----	46	6	92,928 lb.	12	not available

1. Existing sandy soil systems.
2. Potential soft soil systems.
3. Potential sandy soil systems.
4. Based on sandy soils. Two layers are required for soft soil condition (2,252 panels and 123 containers are required).

agonal plastic mat costs 50 percent less and installs 225 percent faster than Mo-Mat.

Soft Soil Systems

Large quantities of plastic DURA-BASE mats or wood SOLOCO mats are needed to construct a road over soft soils. A geotextile should be placed over the soft soil subgrade to avoid mud intrusion. For a soft soil subgrade condition (CBR less than 1), two layers of DURA-BASE or SOLOCO mats are needed. (Two layers of SOLOCO mats also are needed for sandy soils.) Consequently, 2,252 DURA-BASE panels and 123 containers would be required to construct a 1-mile section of road over a very soft soil. The change of the subgrade condition to a soft soil represents a 100-percent increase in the weight, volume, number of containers, and cost of the proposed solutions over what would be needed for a sandy soil (see table above). Also, DURA-BASE and SOLOCO mats require a crane or rough-terrain forklift for installation and handling because of their weight and size. The placement rates for these mats when placed over sands, as shown in the table, will decrease for soft soils.

The soil condition will dictate which system can be used for expedient road construction. Fiberglass-reinforced mats, hexagonal mats, and geofiber stabilization are recommended alternatives to the existing

Geocell technology for sandy soils. For sandy soils, the fiberglass-reinforced mat should be used for small roadway sections (less than ½ mile) and geofibers should be used for large roadway sections (longer than ½ mile). These roadway systems are lighter, faster, and more tactically mobile. DURA-BASE and SOLOCO mats should not be used to construct roads over sandy soils because of their cost, logistics requirements, and the availability of more suitable solutions. However, for soft soil, the DURA-BASE and SOLOCO mats are the only existing alternatives that have performed successfully when tested under heavy truck traffic.

ALOG

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Flight-Safety Parts: Local Procurement Not Allowed

by Al Cooper

When weighed against the potential loss of an aircraft and its crew, neither “readiness” nor “mission requirement” justifies using an untested flight-safety part.

Certain parts are critical to the safe operation of an aircraft—a fact that was true when the Wright brothers flew the first airplane at Kitty Hawk, North Carolina, in 1903. In the mid-1960s, when the use of helicopters escalated during the Vietnam War, the Army defined which parts were critical. During the 1970s, the Army undertook a number of engineering initiatives to improve the reliability and increase the life of these critical parts. To ensure that only high-quality, tested parts—what the Army calls “flight-safety parts”—are installed on Army aircraft, local procurement of these parts is not allowed. Let me provide some background to show why this Army policy is necessary and why it must be followed.

Competitive Procurement

In 1984, Congress passed the Competition in Contracting Act (CICA), which directed the Department of Defense (DOD) to obtain all of its spare parts competitively in order to provide small and disadvantaged businesses access to lucrative Defense contracts. CICA was imposed to stimulate the economy, increase the number of small and disadvantaged businesses producing parts for the military, and provide a new source of suppliers at a reduced price.

Before CICA, the majority of aircraft parts were bought from the aircraft manufacturer. To comply with the legal requirements of CICA, numerous contracts were issued to acquire technical documentation from original equipment manufacturers. This documentation was used to build competitive Spare Technical Data Packages (STDPs).

In 1985, the term “flight-safety part” (FSP) was introduced. An FSP is any part, assembly, or installation

having a critical characteristic that, should the part fail, malfunction, or be unavailable, could cause loss or serious damage to the aircraft or serious injury or death to its occupants. Critical characteristics are features such as dimension, tolerance, finish, material or assembly, manufacturing or inspection process, operation, field maintenance, or depot overhaul requirements. Because of the FSPs’ critical importance, STDPs for them were developed in-house rather than by contract. In-house technical documentation and prime contractor sustainment engineering were used from 1985 to 1988 to identify and verify FSP critical characteristics and engineering testing requirements for fatigue, endurance, and interchangeability.

To meet the demand for spare parts required to support Operations Desert Shield and Desert Storm, procurement of both FSPs and non-FSPs was accelerated. By necessity, this procurement included both competitive procurements and off-the-shelf buys. Because of this huge influx of FSPs and non-FSPs and the need for rapid procurement to support the Gulf War, the Army acquired many unverified parts.

A Wake-Up Call

In the spring of 1985, there were two Class A mishaps (accidents that cause fatalities or permanent total disability) resulting in the total loss of two helicopters—a UH-60 Blackhawk and a CH-47 Chinook.

As a result of the findings, the Vice Chief of Staff of the Army directed surveillance testing of in-service parts and implementation of life-cycle documentation control. Surveillance testing is the testing and evaluation of used FSPs procured from the original equipment manufacturer that are in depot overhaul lines and depot stocks

and on fielded aircraft. FSPs are selected for testing based on their lifetime limits, time between overhaul, operational mission environment, and configuration. Tests performed include fatigue, endurance, interchangeability, analytical teardown, and nondestructive evaluation. Life-cycle documentation control includes identification of FSP critical characteristics in technical information, drawing revisions, technical data packages, and maintenance manual revisions.

In 1989, the Army began limited testing and qualification of manufacturers and vendors to ensure that all FSPs procured met the critical characteristic requirements. A full-scale testing program was initiated in 1993.

Buyer Beware

Due to technological advances and the similarity of aircraft, some commercial and military aircraft parts are interchangeable (dual-use). The military disposes of surplus new and used aircraft parts by selling them through Defense Reutilization and Marketing Offices. Private industry is a key participant in the excess military equipment sales program. Shady aircraft parts dealers and vendors have bought excess military parts, refurbished and cleaned the unserviceable parts, and resold them as serviceable parts.

In 1992, a Federal Aviation Administration (FAA) investigation of a civilian airliner crash revealed that used Air Force T-39 Sabreliner aircraft parts had been sold to private industry and were installed on the airliner. Now, the FAA takes great interest in the sale of dual-use aircraft parts by the military and has taken action to keep faulty aircraft parts from entering the civil aviation market. In coordination with DOD and the FAA, the Army Aviation and Troop Command (ATCOM) took a lead role in establishing policy for safe disposal or resale of FSPs.

Ensuring Parts Quality

In January 1996, ATCOM developed and coordinated with the Department of the Army an FSP policy that was CICA friendly. It reads: "The Army's policy is to acquire high-quality, proven, reliable, and safe flight-safety parts. Flight-safety parts which require engineering testing (fatigue, endurance, interchangeability) shall be procured only from sources whose part has met engineering test requirements." (ATCOM and the Army Missile Command were merged in October 1997 to form the Aviation and Missile Command [AMCOM]).

In keeping with this policy, the Army now buys only new and unused FSPs from vendors who have met stringent engineering qualifications and whose parts have met critical-characteristic testing. If the parts are not

readily available in the Army supply system, many units look elsewhere for parts so they can maintain high readiness rates and meet mission requirements. Aviation units canvass other aviation units for a part in demand and swap or trade for the needed part, which is acceptable. However, overly aggressive maintenance officers sometimes contact local aviation vendors and buy the needed parts using various methods of payment, including the Government Purchase Card.

Because of safety implications and the requirement for the critical-characteristic testing, *local procurement of FSPs is not authorized*. Buying parts outside established channels has two adverse effects. First, it does not capture the demand for the part, which means that the number of parts requisitioned by the item manager is decreased and the cost per flying hour is not captured accurately. Second, the resulting false cost per flight hour means that fewer dollars per flying hour are programmed.

Only the part's original equipment manufacturer, Corpus Christi Army Depot, or a contractor with special repair authorization from AMCOM is authorized to repair an FSP. Using renegade FSPs and parts repaired by unauthorized facilities or buying parts without AMCOM approval puts the aircraft, its crew, and your unit at unnecessary risk.

FSP critical characteristics are extremely important to safe flight. Neither readiness nor mission requirement justifies using a substitute part. If the untested part fails and the aircraft is lost or damaged beyond repair, readiness and mission are moot points. To obtain a part that is classified as an FSP, you should contact AMCOM. Engineers there will ensure that the part you receive has passed all qualification and testing requirements, has proper documentation, and is still serviceable for use on Army aircraft.

ALOG

Al Cooper is a weapon systems coordinator in the Cargo Helicopter Directorate at the Army Aviation and Missile Command (AMCOM) at Redstone Arsenal, Alabama. He previously served as branch chief in the New Equipment Training Division, branch chief and division chief in the Integrated Logistics Office, and Weapons Systems Manager for Quartermaster at AMCOM.

Incoming Commanders and Property Accountability

by Lieutenant Colonel James C. Bates

If you are assuming command of a unit, reading this article now may save you a month's pay in a year or two, when your successor inventories your unit's property.

The outgoing unit commander is sitting nervously in the brigade commander's office, and the stern eyes of both his brigade and battalion commanders are on him. His great commanding officer efficiency report was kicked back so a mention of inadequate property accountability could be added. The loss of 1 month's pay—\$3,000 or so—is minor considering the probable damage to his career. The worst part is that he knows he has done a good job, that he was productive and accomplished so much. But now it seems his two bosses speak only of property accountability and the magnitude of his change-of-command report of survey. If only he had taken the time to learn what he needed to know way back before the fateful day when he signed for all that property. It's clear he signed for property that wasn't there, and now he is paying the price—a very heavy price indeed.

The greatest single contributor to change-of-command reports of survey is a misunderstanding of component hand receipts and shortage annexes by unit commanders. Most unit commanders are warned, "Don't sign for it unless you see it." Good advice! However, each commander also should be forewarned: "If you don't fully understand component hand receipts and shortage annexes, you will sign for property that you don't even know you are signing for."

Components

Component hand receipts and shortage annexes are used to depict additional property associated with end items. This additional property is known as components and can be worth thousands of dollars. Components can be grouped into four categories—

- A subsidiary end item. A radio, for example, can be both a stand-alone end item or a component of a higher level end item like a truck.
- A component of an end item (COEI).
- A basic issue item (BII).

- An additional authorization list (AAL) item.

All end items are nonexpendable, but COEI, BII, and AAL items can be classified (through the Accounting Requirements Code) as nonexpendable, durable, or expendable. [It is customary Army usage to use the acronyms "COEI" and "BII" in both plural and singular cases.]

Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, defines an end item as "a final combination of end products, component parts, and/or materials that is ready for its intended use, e.g., ship, tank, mobile machine shop, aircraft." Army Regulation (AR) 725-50, Requisitioning, Receipt and Issue System, defines COEI as "spare/repair parts identified in technical publications, e.g., technical manuals, that make up the sum total of the end item." AR 310-25, Dictionary of United States Army Terms, defines BII as "those essential ancillary items required to operate the equipment and to enable it to perform the mission and function for which it was designed or intended." AAL items can be ordered to support an end item but do not have to accompany the end item when it is transferred or turned in.

A clearer understanding of the terms COEI, BII, and AAL can be gained by reviewing technical manuals (TMs). There is a slight difference between COEI and BII. According to the TM for the M978 heavy, expanded-mobility, tactical truck (HEMTT) fuel tanker with winch—

COEI are part of the End Item, but are removed and separately packaged for transportation or shipment. As part of the End Item, they must be with the End Item whenever it is issued or transferred between property accounts. The Technical Manual is not authority to requisition replacements.

The TM goes on to describe BII as follows—

Basic Issue Items are the minimum essential items required to place M978 vehicles in opera-

tion, to operate them, and to perform emergency repairs. Although shipped separately packaged, BII must be with the vehicle during operation and whenever it is transferred between property accounts. The Technical Manual is the authority to request/requisition replacement BII, based on the TOE/MTOE [table of organization and equipment/modification TOE] authorization of the End Item.

In other words, all COEI and BII are considered part of the end item for inventory purposes and must be transferred along with the end item whenever the “owner” of the end item changes.

Units are not required to have AAL items, unlike COEI and BII. However, if the unit does purchase them for a particular end item, they should be included on component hand receipts or shortage annexes and should accompany the end item whenever it is transferred within the unit. If the end item is transferred outside the unit, the AAL items can be retained within the unit and used with other end items. In such cases, the revised end item and AAL item relationship should be reestablished through component hand receipts or shortage annexes.

Components and the Primary Hand Receipt

Far too many newly assigned commanders mistakenly believe that they will be held responsible only for those end items clearly shown on the primary hand receipt given to them by the property book officer (PBO). In fact, they also will be held responsible for thousands of components (both nonexpendable and durable) that are not actually listed on the hand receipt but for which accountability implicitly is passed to them when they sign for the end items.

The chart at right shows a single page from a unit commander’s primary hand receipt. (Most primary hand receipts are 10 to 20 pages long.) The primary hand receipt depicts end items only; no COEI, BII, or AAL items are shown.

The last end item on the page is an M978 HEMTT fuel tanker with winch. For unit soldiers to be able to use this end item as intended, they also must have in their possession all of the corresponding COEI and BII. The chart on page 30 is a page taken from TM 9–2320–279–10. It is only one page of the seven in Appendix B of the TM that display COEI for this HEMTT fuel tanker. The same TM also includes a 10-page listing of BII and a 5-page listing of AAL items. The commander must obtain this TM on his own since the PBO provides neither the TM nor a listing of COEI or BII for the end item.

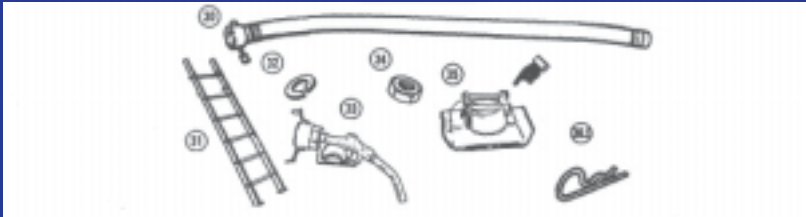
Moreover, the TM does not indicate the

Accounting Requirements Code for the components. As a result, the unit commander or his soldiers must determine if each item listed on the COEI or a BII list is nonexpendable, durable, or expendable and then prepare the unit-level property accounting documents accordingly.

Fortunately, in recent years the Department of the Army (DA) has produced TM hand receipts for most end items. These TM hand receipts contain “overprinted DA Forms 2062.” (The term “overprinted” means that some of the data already have been completed by DA to assist the user.)

For example, TM 2320–279–10–HR is available for unit commanders to use to inventory the COEI, BII, and AAL items associated with the HEMTT fuel tanker. This TM lists all of the COEI, BII, and AAL items in the exact same order as they are identified in TM 2320–279–10–1. The overprinted DA Forms 2062 depict whether the item is nonexpendable, durable, or expend-

DATE PREPARED: 8/13/88		ISSUE RECEIPT		PAGE 1		PCN: ALV-111	
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	0412481			0412481			
10000		EA	300.00	TYPEWRITER MANUAL HP R		3	
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	204000071445			TRAP-DOWNS FITTING			
	204000071445			TRAP-DOWNS FITTING			
41200		EA	382.00	ALARM CHEN ASST M8		2	
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41200		EA	4.00	ANTENNA GROUP: OC-254 (1) K9RC		4	
	41200			41200			
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(1) Item Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) UM	(5) Qty Recd
30	4725-01-188-4067	HOSE ASSEMBLY, FUEL, 15 ft (right side, in tube along tank module) (43152) 1379060	H02,7	EA	1
31	2948-01-156-1384	LADDER, Vehicle (on left side over fuel tank) (on right side over batteries) (on walkway going) (43152) 1766890W	EA H01,5, 6,9 H02,7,80 H03	1 EA EA	1 1 1
32	5315-05-637-8541	LOCKWASHER, (on acetylene tank straps) (on oxygen tank straps) (95906) MS35338-46	H40 H40	EA EA	2 2
33	4928-01-318-6091	NOZZLE, FUEL, 2.5 in., AUTOMOTIVE (storage box, left front) (81718) 311A01	H02,7	EA	2
34	5315-05-732-0558	NUT, PLAIN, HEX (on acetylene tank straps) (on oxygen tank straps) (95906) MS01907-8	H40 H40	EA EA	2 2
35	2990-01-184-1502	PAD, OUTRIGGER (on outrigger beams) (12381) 2-156-1-00028	H01,5, 6,8,40	EA	2
36		Deleted			
36.1	5315-01-258-0313	PIN, COTTER (95952) 21-07		EA	2

□ This page is one of the seven in Appendix B of TM 9-2320-279-10. The TM displays COEI for the M978 HEMTT fuel tanker with winch.

able and the item's controlled inventory item code (CIIC). (However, the appropriate column heading still uses the obsolete abbreviation "SEC" [security code], which was the precursor of the CIIC.) The overprinted DA Forms 2062 also display the unit of issue and the quantity authorized.

Users of the TM hand receipts must be careful to consider only those components shown on the overprinted 2062s that are authorized for the specific national stock number (NSN) of the appropriate end item. Like the basic TM, the TM hand receipt includes the data for multiple NSNs that have identical line item numbers (LINs).

Liability for Missing COEI and BII

Whenever property is transferred from one individual to another—for instance, during a change-of-command inventory—all of the authorized COEI or BII listed in the TM must be on hand physically along with the end item. If components are missing, and if there is no accounting paperwork on file at either the PBO or the unit that correctly documents those component

shortages, a cash collection voucher, statement of charges, or report of survey will have to be processed.

This is what normally occurs. Before he assumes responsibility for the primary hand receipt, the incoming commander ensures that the outgoing commander prepares the proper inventory adjustment documents in accordance with AR 735-5, Policies and Procedures for Property Accountability (which describes cash collection vouchers, statements of charges, and reports of survey). The outgoing commander or one of his sub-hand receipt holders probably will have to pay for the component shortages. However, if the incoming commander signs a primary hand receipt thinking that he is signing only for end items (in this case, a HEMTT fuel tanker), and neglects to properly review the COEI and BII depicted on the shortage annexes and component hand receipts, he (rather than the outgoing commander) probably will be held pecuniarily liable when he subsequently transfers responsibility for the property to his replacement.

DA Form 2062

An important aspect of property accounting is the multiple uses of DA Form 2062. (See the chart at right.) This form can be used as a hand receipt, a sub-hand receipt, a component hand receipt, and a shortage annex. Users of the form must be sure that the 2062 is completed in accordance with its intended purpose. [For a description of the specifics involved in completing DA Form 2062, consult DA Pamphlet 710-2-1, Using Unit Supply System (Manual Procedures).]

When DA Form 2062 is used as a hand receipt or sub-hand receipt, it lists only end items; COEI and BII are not shown. When DA Form 2062 is used as a component hand receipt, it lists all of the COEI, BII, and AAL items that pertain to an end item. In contrast, a shortage annex is the opposite of a component hand receipt. It lists only those components (either COEI or BII) that are known to be missing. The PBO tracks nonexpendable COEI and BII using a shortage annex. (PBOs do not track durable items.)

At the unit, component hand receipts should be used to track components delegated to sub-hand receipt holders. The incoming unit commander, who soon will be-

HAND RECEIPT NUMBER		ITEM		QUANTITY	
For use of this form, see DA FORM 710-2-1. The program agency is DCS/CSG.					
ISSUE ONLY	END ITEM STOCK NUMBER SEE SERIES BELOW	END ITEM DESCRIPTION HEMTT TRUCKS/LHS	PUBLICATION NUMBER TM 9-2320-279-10-HR	PUBLICATION DATE	QUANTITY
STOCK NUMBER	ITEM DESCRIPTION				QUANTITY
A	B				C D E F
(COEI) - Continued					
6220-01-217-8318	EMERGENCY TOW LIGHTS (45152) 1462290U	H40	N	Z	EA 1
2540-01-246-6218	EXTENSION, low adapter (LH) (45152) 1543440W	H40	N	Z	EA 2
5315-01-161-2696	HAIRPIN: cotter (96652) 21-08	H40	X	N	EA 4
6150-01-180-8035	HARNESSES: worklamp (45152) 1419776U	H40	D	Z	EA 1
4720-02-185-6067	HOSE ASSEMBLY: fuel, 15 ft (45152) 1378080	H02, 7	D	Z	EA 1
2540-01-166-1364	LADDER: vehicle (45152) 1796990W	H01, 2, 3, 5, 6, 7, 9, 40	D	Z	EA 1
5440-01-342-0700	LADDER: vehicle (45152) 12019940	LHS, LHW	D	Z	EA 1
5310-00-637-5541	LOCKWASHER (96906) MS36336-46	H40	X	U	EA 4
4830-01-318-6091	NOZZLE: fuel, 2.5 in., automotive (81718) 311AG1	H02, 7	D	Z	EA 2
5310-00-732-6558	NUT: plain, hex (96906) MS51907-8	H40	X	U	EA 4
2590-01-184-1802	PAD: outrigger (12361) 2-188-09325	H01, 5, 6, 9, 40	D	Z	EA 2
5315-01-259-8313	PIN: cotter (96652) 21-07		X	U	EA 2
5315-01-258-8581	PIN: quick release (45152) 1536450U	H40	X	U	EA 1
5315-01-257-4512	PIN: low adapter (45152) 1532880	H40	N	Z	EA 2
5315-01-257-7852	PIN: low adapter (45152) 1532890	H40	N	Z	EA 2

DA FORM 2062, JAN 82 EDITION OF JAN 58 IS OBSOLETE USAPFC V2.10

DA Form 2062 can be used as a hand receipt, a sub-hand receipt, a component hand receipt, or a shortage annex.

come the primary hand receipt holder, has the implied, and time-consuming, task of converting shortage annexes into component hand receipts. These will list all of the TM-authorized, nonexpendable and durable COEI and BII for the end item. (Expendable items do not need to be included.) DA Form 2062 also has a column that shows the quantities of each of the authorized components that actually are on hand.

Component hand receipts can be tens of pages long. If there were five HEMTT fuel tankers on the incoming commander's primary hand receipt, the unit commander or his designated representative would have to prepare five separate component hand receipts. Although all five would have the same authorized component quantities, the actual on-hand balances most likely would be slightly different. Component hand receipts are issued by the primary hand receipt holder in conjunction with the issuing of sub-hand receipts to sub-hand receipt holders.

Key Players in Property Accountability

The automated primary hand receipt and the DA Form 2062 represent two of the key property accounting documents. Similarly, there are several key individuals involved.

The first key player is the PBO, who, of course, maintains the property book. He is the accountable officer and typically is a warrant officer holding military occupational specialty 920A, Property Accounting Technician. The PBO delegates responsibility for property to the unit commander through the primary hand receipt. Unless he has shortage annexes on file identifying miss-

ing components, the PBO will hold the unit commander responsible for all components identified in the applicable TM (even though those components are not identified explicitly anywhere on the primary hand receipt).

The second key player is the unit commander. A captain, he is the primary hand receipt holder. He has direct responsibility for all of the items shown on the primary hand receipt, and for all of those components of end items that are not shown but are implied.

The unit commander should delegate all of the property he has signed for to his platoon or section leaders (the third key player) using DA Form 2062 sub-hand receipts. The platoon or section leaders are lieutenants or noncommissioned officers (NCOs) and, of course, are the sub-hand receipt holders.

The platoon or section leaders, in turn, should prepare additional DA Forms 2062 as sub-hand receipts and assign the intended users of the property (the fourth key player) responsibility for the end item. The intended users, usually junior enlisted soldiers, become sub-hand receipt holders.

The fifth key player, the unit supply sergeant, is the subject-matter expert and the commander's representative in all supply matters. He helps prepare supply-related documents and ensures their accuracy. All key players keep copies of the appropriate property accounting documents that affect them.

The PBO and Shortage Annexes

The first key player, the PBO, maintains the original copy of the primary hand receipt and any applicable shortage annexes; PBOs do not maintain component

hand receipts. If an end item's TM indicates that there are 100 different COEI and BII but the shortage annex identifies only two components as missing, the PBO assumes that the other 98 components are physically on hand at the unit.

Moreover, the shortage annexes maintained by the PBO contain only nonexpendable property; durable property is not accounted for at the PBO level. If the PBO does not have a copy of a shortage annex for nonexpendable property, any copies that the primary or sub-hand receipt holders may have are invalid.

Unit Accounting for Missing COEI and BII

Responsibility for accounting for durable property, through either a shortage annex or a component hand receipt, rests at the unit level with the primary hand receipt holder and the sub-hand receipt holders. Note again that unless valid shortage annexes or component hand receipts indicate otherwise, the Army assumes that all COEI and BII pertaining to each end item listed on the primary hand receipt are on hand physically at the unit.

For shortage annexes or component hand receipts at the unit level to be valid, they must be on file well before an incoming commander begins his inventory. These documents result from the previous change-of-command inventory, when the current outgoing commander was the incoming commander and the shortages of nonexpendable and durable COEI and BII were documented. Once shortages are identified, units must order the items that are missing, and property records must be adjusted using a cash collection voucher, a statement of charges, or a report of survey.

Component Hand Receipts and Intended Users

Because junior enlisted soldiers are unfamiliar with Army property accountability, the primary hand receipt holder or the sub-hand receipt holder must provide the user of the end item with the DA Form 2062 sub-hand receipt (indicating that the intended user is assuming responsibility for the end item) and a DA Form 2062 component hand receipt (listing all of the components for which the intended user also will be held responsible).

Although the PBO only provides the unit commander with the primary hand receipt and the nonexpendable shortage annex, AR 710-2, Inventory Management Supply Policy Below the Wholesale Level, prohibits the use of a shortage annex to account for components when property is delegated to the level of the intended user. According to the regulation, "when property is issued to the intended user, responsibility for components will be assigned using a Component Hand Receipt. The actual quantity of components on hand will be shown."

Therefore, someone—either the unit commander, the unit supply sergeant, or the first sub-hand receipt holder—must develop the component hand receipt. The

unit commander and the first sub-hand receipt holder are the ones primarily responsible for developing the component hand receipt because they, not the unit supply sergeant, signed a hand receipt for the property. Incoming commanders who discover that proper component hand receipts have not been developed should work with their sub-hand receipt holders and supply sergeant to produce component hand receipts for every piece of end item equipment. (Fortunately, not all end items have components.)

When supply catalogs, TM hand receipts, or component hand receipts produced by the Unit Level Logistics System-S4 are available, commanders should use them during the change-of-command inventory process. The component hand receipts should be checked for completeness and accuracy by comparing them to the COEI and BII listings in the appropriate TM and to the shortage annexes provided by the PBO.

Unit Level Logistics System-S4

The Unit Level Logistics System-S4 (ULLS-S4) automates many supply functions at the unit level that previously were performed manually. ULLS-S4 lists hundreds of components in its database. However, since ULLS-S4 does not automatically incorporate any changes to the publications from which component listings are derived, unit commanders must ensure that all component listings—including those produced by ULLS-S4—reflect the most recently published data.

ULLS-S4 also produces a component shortage report (AWE-227). This report lists components that are missing based on the information that has been entered into the ULLS-S4 database.

Delegating Property Responsibility

Incoming unit commanders can help themselves avoid change-of-command reports of survey by properly delegating property responsibility to their subordinates. All items that are signed for from the PBO on the primary hand receipt should be listed on unit-level sub-hand receipts and then signed over to an appropriate sub-hand receipt holder. Unless a unit commander actually has physical control of an item—for instance, the commander's computer or furniture in the commander's office—he should sub-hand-receipt property to his platoon or section leaders.

Blankets, pillows, and sheets stored in a unit supply room should be sub-hand-receipted to the unit supply sergeant; property accountability for all nuclear, biological, and chemical (NBC) gear should be delegated to the NBC NCO; dining facility equipment should be delegated to the food service NCO; and so on. As a general rule, all of the end items listed on the commander's primary hand receipt should be delegated to about 10 to 20 sub-hand receipt holders. The chart on

page 35 is a master sub-hand receipt. It shows only 5 of the 100 or so end items listed on the primary hand receipt. An actual master sub-hand receipt would list every single end item from the primary hand receipt.

An Excel spreadsheet is one of the best methods for portraying this information. The end item name, the LIN, and the unit total should be obtained directly from the primary hand receipt. The quantities shown in each of the sub-hand receipt columns (“HR” on the chart) should correspond to the quantity for which each sub-hand receipt holder has signed. Using this chart will assure the commander that he has delegated all of his end items to sub-hand receipt holders.

ULLS-S4 produces a similar report called the Asset Visibility Report (PCN AWE-115). Just as PBOs insist that thorough inventories be conducted when one of their primary hand receipt holders changes (in a unit-level change of command), unit commanders should ensure that a thorough sub-hand receipt holder inventory is conducted when one of their sub-hand receipt holders changes. Similarly, incoming sub-hand receipt holders should update all of the sub hand receipts they have with the intended users of the end items.

Publications Data

An incoming unit commander cannot adequately inventory an end item with components without the appropriate publications data. The only way to determine which end items have components is by researching TMs. When the incoming commander obtains a draft copy of the primary hand receipt that he eventually will sign, he should look under the column “PUB DATA.” This column alerts the unit commander to some of the publications he must use to inventory the end item correctly. Unfortunately, the primary hand receipt does not always list all of the manuals required to conduct an inventory.

To determine all of the publications needed to inventory an end item thoroughly, the incoming commander should be familiar with the derivation of publication identification numbers. Besides TMs, there are other publications that deal with end items: lubricating orders (LOs), technical bulletins (TBs), supply bulletins (SBs), supply catalogs (SCs), and TM hand receipts. Commanders do not need to have LOs, TBs, or SBs to conduct an inventory, but they must have the SCs, TM hand receipts, or TMs that relate to the end items for which they will be signing.

The last two digits of a publication’s identification number are important for supply purposes. For instance, the last two digits of TM 9-2320-211-10 are “10,” and the last two digits of TM 2320-211-20 are “20.” These digits indicate the level of maintenance that applies to the publication. In the Army, there are five levels of maintenance: 10, operator; 20, organizational; 30, di-

rect support; 40, general support; and 50, depot.

For inventory purposes at the unit level, the incoming commander is concerned with the operator level (10 level) of maintenance. So the commander needs the manual with “10” as its last two digits. Some equipment, however, does not have a TM for each level of maintenance. For instance, the TM for a 7,500-gallon fuel semitrailer has “14” as its last two digits. The “14” indicates that this one TM covers the first four levels of maintenance (operator through general support, or 10 through 40).

The letter “P” in a TM identification number indicates that the manual assists the user in ordering repair parts. Because repair parts are not considered components, incoming commanders can ignore the letter “P” when conducting property accountability research. An “HR” in the TM identification number indicates that the TM contains an overprinted hand receipt. Publications that begin with the letters “SC” (supply catalog) or end with the letters “HR” can be used to make inventorying components easier. So commanders should have all of an end item’s supply catalogs (“SC”), TMs with “HR,” and 10-level TMs.

End Items With SCs or TM Hand Receipts

The accounting process is simplified for the unit commander when end items have corresponding SCs. An SC is presented in a format similar to that of a component hand receipt and has most of the relevant data already filled in, including the Accounting Requirements Code. Most end item tool kits, for instance, have a related SC. TMs that have hand receipts are similar to SCs. Both SCs and TM hand receipts use the format of a DA Form 2062 to record data. Both list all of the end item’s authorized components and their authorized quantities.

For each NSN, the incoming commander enters the quantity actually on hand in the appropriate column of the preprinted DA Form 2062. If an item is authorized but not on hand, the commander places a diagonal slash in the corresponding box to indicate that the item is missing. If the actual on-hand quantity is different than the authorized quantity, the commander indicates the actual quantity in the appropriate box.

When the primary hand receipt authorizes more than one of an end item, the incoming commander completes an overprinted DA Form 2062 for each item. Outgoing commanders must adjust nonexpendable and durable items that are authorized but not on hand in accordance with AR 735-5.

End Items Without SCs or TM Hand Receipts

For those end items that have components but no corresponding SCs or TM hand receipts, an incoming commander has to use the appropriate TM to prepare a com-

ponent hand receipt. All of the items listed in the TM under COEI and BII (usually found in Appendix B or C of the TM) should be copied manually onto a hard-copy DA Form 2062 or electronically onto an ULLS-S4-generated 2062.

Because one TM can describe a dozen or so NSNs, incoming commanders should ensure that they only include those components in the TM applicable to the specific NSN being researched. For instance, the TM on HEMTTs has data for 12 different NSNs, and each NSN requires different COEI and BII. The actual on-hand quantities must be compared with the authorized quantities depicted in the TM, and missing items must be accounted for under AR 735-5.

Determining Publications for an Inventory

How can an incoming commander determine what publications he needs to conduct an inventory? One method is requesting assistance from the Army Materiel Command's Logistics Support Activity (LOGSA). Commanders who provide LOGSA with a copy of their primary hand receipts will receive an "Equipment Oriented Publications Data Base List." This list provides a "Publication to End Item Cross Reference" that notes all of the publications associated with the end items shown on the primary hand receipt. LOGSA can be contacted by writing to Commander, USAMC Logistics Support Activity, ATTN: AMXLS-AP (EOPDB/LIDB), Redstone Arsenal, Alabama, 35898-7466, or by sending an e-mail to eopdb@logsa.army.mil. LOGSA also publishes a helpful booklet, Unit Publications Guide (LOGSAP 25-35), which can be downloaded from www.logsa.army.mil. This booklet helps explain the Army's publications system.

Another method of determining the publications required for inventory purposes involves using DA Pamphlet 25-30, which is one of the Army's most important references. It is disk one of a four-disk set called the Army Electronic Library. Since this CD ROM set is updated quarterly, unit commanders should ensure that they are on the automatic distribution list. The Army Electronic Library CD ROM set is identified as EM 0001-IDN 040803. Although there are over a thousand ARs and DA Pamphlets included within this invaluable CD ROM set, there are no TMs.

The most relevant portion of DA Pam 25-30 for inventory purposes is the section "LIN to Publication Cross Reference Index," which is arranged in LIN sequence. For the HEMTT fuel tanker with winch, DA Pamphlet 25-30 shows that there are 14 different basic publications and 34 other publications pertaining to what the pamphlet describes as "components." Here, the term "components" refers to additional end items, such as radios, chemical alarms, and air purifiers, that are part of the larger end item (in this case, the HEMTT). Fortu-

nately, an incoming commander does not need to have all of these publications to inventory the HEMTT fuel tanker; he just needs SCs, TM hand receipts, and 10-level TMs.

Obtaining Publications

Once an incoming commander determines the publications he needs to inventory his property, he must obtain the publications his unit does not have and ensure that outdated publications are thrown away. Since many publications are no longer available in hard copy, two of the best ways of obtaining them are the Internet and CD ROM. There currently are five official Army Publications web sites—

- "www.logsa.army.mil" has Army technical and equipment publications (except engineering and medical publications), including TMs, TBs, and SCs. This is the best site for obtaining publications pertaining to property inventory.

- "www.usapa.army.mil" has administrative publications and forms such as ARs, circulars, pamphlets, optional forms (OFs), and DD [Department of Defense] and DA forms.

- "www.adtdl.army.mil" has Army doctrinal and training publications (except engineering and medical publications), including field manuals (FMs), PBs, training circulars (TCs), and soldier training publications (STPs).

- "www.usace.army.mil/usace-docs" has Army engineering publications (except those concerning administration), including engineering-related TMs and FMs.

- "www.armymedicine.army.mil" has Army medical publications (excepting administration), including medical TMs, FMs, and SB 8-75-series publications.

To access LOGSA's catalog of TMs from the Internet, users may have to set up an account in advance.

LOGSA produces a "Consolidated Publication of Component Lists" on CD ROM semi-annually; some but not all TM hand receipts are included. However, this CD ROM does contain almost all SCs.

Publication Changes

Frequent updating of publications can complicate a commander's inventory efforts. In DA Pamphlet 25-30, the column labeled as "DATE" indicates the date the manual was initially published. The "CHS IN FORCE" shows the number of changes to the publication currently in force. For example, TM 9-2320-279-10-1, the operator-level manual for the HEMTT, initially was published on "21 NOV 86," but to date it has been changed "5" times, the last occurring on "15 DEC 98."

Incoming commanders who are not able to acquire the latest publications should inform their PBOs and then use the most recent publications available to them to conduct their inventories. Because there are frequent

Item	Line Item Number	Unit Total	HR 1	HR 2	HR 3	HR 4	HR 5	HR 6	HR 7	HR 8	HR 9	HR 10
Body armor	A29008	20	5	5	5	5						
Camo system	C89145	50	10	10	10	10			10			
Compass	E63317	25	5	5			5	5				5
HEMTT	T58161	3					1		1		1	
M8 alarm	A32060	2								1		1

□ In most cases, all of the end items listed on the commander’s primary hand receipt should be delegated to 10 to 20 sub-hand receipt holders. The master sub-hand receipt lists the end items from the primary hand receipt and their recipients. This example shows only 5 of the 100 or so end items listed on a typical primary hand receipt.

regulation changes, incoming commanders should record the publication date of each manual they use on the respective primary hand receipt, sub-hand receipts, component hand receipts, and shortage annexes.

An incoming commander also should keep copies of the pertinent pages of the TMs he used in his inventory as a means of documenting the components that were authorized the day he signed for the unit’s property. This is necessary because publication changes released during the commander’s tenure might authorize additional COEI or BII, and complications could arise if the commander’s successor uses more recent publications to conduct his inventory. Unless both commanders realize that additional components that are not on hand were only recently authorized (meaning that the components were not lost, just not ordered yet), the outgoing commander inadvertently could be held responsible for the newly authorized COEI and BII not on hand. In other words, the incoming commander may mistakenly insist that these components be included in the outgoing commander’s change-of-command report of survey. The PBO probably will not catch the error since the primary responsibility rests with the unit commanders.

Receiving End Items Through the Supply System

Unit commanders frequently receive end items directly from sources other than their PBO. Usually the PBO is aware of all transactions involving nonexpendable property and therefore can assign accountability when property is fielded. However, if unit commanders receive nonexpendable property without the PBO’s knowledge, they have both a legal and an ethical responsibility to inform the PBO.

Unit commanders who receive newly fielded end items through the supply system should work with their PBOs to inventory the end items and their accompanying COEI and BII properly. Commanders should review the packing list of the end item carefully; this list details any accompanying components. A copy of the packing list should be kept at the unit level.

In addition to comparing the components listed on the packing list with the components actually shipped, commanders also should conduct their own component inventory. They should compare the components actually on hand with the components that are supposed to be on hand (as described in the appropriate manuals). It is not unusual for a higher level supply source to inadvertently “short” a unit. In these rare instances when a new piece of equipment arrives in the unit and no TM has been published for that equipment, the commander should record all of the items listed on the packing list on a DA Form 2062 Component Listing Hand Receipt and provide a copy of it to the PBO.

Incoming unit commanders who understand the complexities involved with components of end items, basic issue items, component hand receipts, shortage annexes, and the Army’s publications system will be prepared to conduct a thorough change-of-command inventory. They also will be able to ensure that Army property is accounted for effectively, and they will avoid having to pay a month’s pay for “lost” property that they never had to begin with.

ALOG

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The author thanks Chief Warrant Officer (W-4) Pablo Brown and Chief Warrant Officer (W-4) Jeffrey Brehmer, both senior property book technicians, and their students in Quartermaster Warrant Officer Advanced Course Class 501–2001 for their help in refining this paper.

The Expando Van: TOC on Wheels

by Peter Sakalas

In the September-October issue of *Army Logistician*, the article, “Establishing the Optimal CSS Tactical Operations Center,” by Captain Michael Kunzer, compared the expansible van, or expando van, with the International Organization for Standardization (ISO) container for possible use as a tactical operations center (TOC). The author presented what he felt were shortcomings in using an expando van as a TOC. I’d like to introduce the reader to the new family of medium tactical vehicles (FMTV) 5-ton expando van that incorporates improvements that will make it the optimal vehicle for use as a mobile office in a tactical environment. Many of these improvements address the shortcomings identified by Captain Kunzer and will make the expando van a good choice for use as a TOC.

The 5-ton expando van was developed as a variant FMTV truck in which an expansible box is mounted on a 217-inch-long wheelbase chassis. This chassis also is used for the long wheelbase cargo truck with materials-handling equipment. The physical characteristics of the expando van are—

- Overall vehicle length: 383 inches.
- Box internal length (nonexpanded): 174 inches.
- Box internal length (expanded): 219 inches.
- Box internal width (nonexpanded): 80 inches.
- Box internal width (expanded): 160 inches.

Program Manager, Platforms, at Fort Monmouth, New Jersey, provided significant input on improvements to the expando van design meant to enhance its value as a TOC and for other Army applications. Some of these improvements not only are being incorporated into the new expando vans on the production line but also are being added to the old M934 expando vans as they are upgraded.

The center section of the van’s box has a reinforced floor of ¼-inch-thick aluminum to which tables, desks, chairs, and heavy machinery can be bolted. Electrical, telephone, computer, and fax lines can be attached along the center of the ceiling and dropped down to the equipment when the center section is used as a work area. There would be no need to move this equipment before closing the box. In addition, there is adequate room to walk around the equipment in the center section when the van is expanded and operational.

The walls on each side of the box have three electrical outlets with manual on-and-off switches. These outlets are suitable for connecting computer equipment and remain “hot” in blackout situations. If blackout integrity is compromised, any computer connected to the outlets will

not crash, which will allow the operator time to download his work before manually turning off the outlet.

Outside, the box has integral retracting steps from the rear platform to the roof of the center section. The roof can support a soldier affixing a camouflage net or clearing snow and will support up to 6 inches of wet snow.

The expando van was designed so that the box can be removed from the truck chassis for transport on a C-130 aircraft. The box is attached to the vehicle by four ISO locks—one on each lower corner of the center section. All electric and hydraulic fluid connections between the truck chassis and the box have a quick-disconnect feature.

The subframe of the box consists of two rails that are spaced to fit onto a K loader (a lift used to load cargo onto an aircraft). The front end of each rail is curved up—akin to the front of a snow ski—so that it will not bind on the rollers of the K loader. The box center section has lift points at each top corner and tiedowns on each bottom corner to facilitate moving the box and securing it once it is separated from the truck.

Preparing the van for transport on a C-130 or C-141 requires only a few minutes to disconnect the electrical wiring and disengage the ISO locks. The box then will be ready to be lifted onto a K loader by forklift or crane.

Because the van uses an FMTV chassis, it passes all mobility requirements for combat support and combat service support missions with a proven capability to drive horizontally across a 30-degree side slope. In addition, the vehicle has a central tire-inflation system and enhanced traction that will enable it to be driven over wet and muddy terrain. It has an antilock braking system for stopping on wet pavement, snow, and ice.

The entire van can be expanded, leveled, and set up for operations in less than 15 minutes. It has a leveling capability and ground plates to hold it in soft soil, which prove to be great advantages on rolling or muddy terrain.

The expando van is designed with a door on each side and a double door in the rear. Each door has its own platform and ladder, so vans could be placed next to each other, either side by side or rear to rear, with a connecting structure (the platforms) between them. Occupants would not need to descend to the ground when moving from vehicle to vehicle.

The FMTV expando van is C-130 transportable and is configured for use as a TOC. Other functions it could support include maintenance, direct support electronic test systems, and command and control. Production of the updated version of the van is scheduled for fiscal year 2004, with delivery beginning in fiscal year 2005. **ALOG**

Peter Sakalas is the Assistant Project Manager, Family of Medium Tactical Vehicles Special Vehicles, where he worked with the design and development of the FMTV expando van. He has an M.B.A. degree from the University of Detroit Mercy.

Combat Service Support Communications Challenge

by Lieutenant Colonel Dennis D. Saltzman

Imagine soldiers huddled around a crackling campfire somewhere in Northern Virginia. They draw closer to the fire in an attempt to keep out the night and the chill. Their commander, a white-bearded gentleman, walks up and stretches out his hands over the fire. “Gentlemen, the fight we face is difficult. I believe that, with God’s help, the outcome of this battle will be this . . .”

Although we live in a time of instant communication by cellular phones, pagers, and e-mail, personal communication from the senior commander is as important today as it was during the Civil War. An article in a January 2000 *Army Times* reported that some senior commanders never set foot in the company areas. Instead, they communicate and command with e-mail directives sent from their office computers. As vital as immediate electronic communication is, our soldiers still need direct contact that provides lasting ideas and thoughts about how to react to any situation that is presented to them.

Effective logistics commanders rely on personal communication, not on personal e-mail. One way for commanders to convey information to their subordinates is by using overarching command documents such as a statement of intent, a vision statement, or both. A commander’s statement of intent is a guide for the actions of his subordinates. By providing this document, the commander develops a military cultural norm in his unit that assists and supports independent initiatives and actions. A vision statement strengthens the development of the cultural norm by providing a link to the commander’s strategic thoughts and long-range goals.

These documents have faded slowly from use, probably because they take a considerable amount of time and thought to prepare. However, they can convey a lot of information about the makeup and personal philosophy of the senior commander. They are the best documents a new commander can use to start his command.

Logistics commanders are required to exercise command and control over much larger areas than ever before. The area of operation for an Army of Excellence corps is 21,000 square kilometers. The size of the proposed Force XXI corps area is 120,000 square kilometers. This is a very large area when you consider, for example, that the state of Virginia is only 105,586 square kilometers. How can commanders exercise command and control over such a

vast area of operations? Out of necessity, they often resort to communicating informational or instructional messages in writing, by telephone or e-mail, or through a combination of methods.

Today’s environment makes strategic decision makers of our young officers. Their training must be technical, tactical, political, diplomatic, and people-sensitive. Even though their schedules do not provide them enough time to become fully trained in all of these areas, their assignments sometimes place them in situations where they must make critical strategic decisions. Senior commanders can improve a subordinate’s ability to make tough decisions by providing direction, insight, vision, and intent in a written statement of intent or vision statement.

Few plans are implemented as they originally were written. A written statement of intent or vision statement helps junior commanders to make prudent judgment calls when changes occur in an operation. Subordinate commanders must be able to draw from the experiences of senior commanders to help them make sound decisions when executing an operation.

What does better communication mean to you as a logistics commander? Written direction helps you to mentor the officers in your command. Mentorship strengthens your relationship with subordinate commanders and prevents problems from arising so you won’t have to correct them after they occur.

The Revolution in Military Logistics has begun. The logistics footprint has become smaller with the adoption of a new corps size for Force XXI. Logisticians now must contend with an area of operations six times larger than before. The physics of exercising command and control over such an area is daunting. Any experiences and guidance senior commanders can impart to their junior officers will enhance any operation. The best way to do that is still the commander’s statement of intent or vision statement.

Lieutenant Colonel Dennis D. Saltzman is a combat support/combat service support analyst on the Objective Force Task Force for The Army Transformation, Office of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology. He is a graduate of the Army War College, Inspector General School, and Army Force Management School.

Is There a Need for Multinational Logistics Training?

by Major Edward C. Weatherill, Canadian Army

As the Government of the United States engaged the range of options open to it to counter the international scourge of terrorism that erupted on 11 September, we watched the birth of a coalition unparalleled in magnitude and resolve. To be sure, we have seen military coalitions in the past. In fact, in recent years we have witnessed coalition operations on a scale never before considered, from Bosnia to East Timor to Kosovo, to name a few.

However, the coalitions that we have seen up to now had one remarkable difference from the one formed to eradicate terrorist threats. They involved a primarily military force deployed to make or preserve peace between other opposing military forces. But the horrific events of 11 September introduced a new variable—an enemy who does not play by the rules, an enemy who regularly uses suicide as a tactic, an enemy who has no compassion for human life and does not differentiate between military and civilians or among men, women, and children. The arsenal of the new coalition formed to combat this enemy includes a wide range of weapons: diplomacy; information systems security; and legal, military, and economic action.

Now we have to determine the effect the world war on terrorism will have on our “conventional” military future. Will we continue to observe and be engaged in the type of conflict that has characterized the world since the end of the Cold War? I, for one, think we will. Are we likely to be involved in multinational military operations? I believe we are. At some point, the war on terrorism and conventional operations will merge. Are we, as logisticians, trained and ready to meet the challenges that may be presented, wherever in the world we may be called to serve, and working with whomever the United States may be aligned militarily or diplomatically? I’m not sure.

In past issues of *Army Logistician*, there has been supportive commentary on the need for multinational logistics education. In fact, most people with whom I’ve spoken on this subject have been in complete agreement that formal multinational logistics training would be welcomed. However, training should not jump to the head of the line just because we agree that it is necessary. The first step has to be development of doctrine, especially when the content of the new training may potentially involve coalition and alliance policies and procedures that are not always compatible with U.S. national interests.

Joint Publication 4–08, Joint Doctrine for Logistics Support of Multinational Operations, has been in the development stage for several years. It was in the final coordina-

tion stage in the spring of 2001, when it was reclassified as a joint test publication so its content could be validated during the fall Focused Logistics Wargame (FLOW). (FLOW is an assessment tool used to evaluate the capability of U.S. joint forces to support the warfighter). It is anticipated now that the doctrine will be approved and published by July 2002. Training could reasonably be expected to follow soon after that.

Germane to any discussion on multinational logistics training is the fact that it is a new concept. Over the past several years, the Army Logistics Management College (ALMC) at Fort Lee, Virginia, has prepared articles, collected and analyzed information, processed administrative requirements, and taught overview blocks of instruction on multinational logistics. The concept is now well defined, but that is only part of the equation. A parallel step is defining the personnel training requirements in the field. Identified training will translate into actual numbers at the Army’s Structure Manning Decision Review, held annually in Washington, D.C., and at its sister service equivalents. If the need for multinational logistics training is considered critical, it may be included on the agenda at the J4 Logistics Conference of Logistics Directors, also held annually in the Washington, D.C., area.

If you feel that you require more formal multinational logistics training than is currently provided, either now or for a future assignment, you must identify that requirement through your chain of command. In these days of doing more with less, it is difficult to justify devoting resources to something that has not been established clearly as a bona fide requirement. Therefore, if additional multinational logistics training truly is needed, as is apparently the case, then it is our collective responsibility as logisticians to say so. Failure to speak up may result in U.S. logisticians deploying to multinational operations around the globe with less than optimal knowledge of coalition and alliance logistics policies and procedures. This deficit could potentially hamper operations, as well as have a negative impact on the projection of U.S. forces into an area of operations.

Major Edward C. Weatherill is a Canadian Exchange Officer at the Army Logistics Management College at Fort Lee, Virginia. A graduate of the Royal Military College of Canada, he is a Supply Officer (Quartermaster) who has over 28 years of active-duty service in the Canadian Army.



NEWS

(News continued from page 1)

To support the military's transformation, DOD will establish an Office of Force Transformation, the director of which will report directly to the Secretary and Deputy Secretary of Defense. The director will evaluate the services' transformation programs and recommend ways to integrate their efforts.

To strengthen joint operations, DOD plans to establish a standing joint task force headquarters in each of the regional unified commands. The headquarters "will have mechanisms for a responsive integrated logistics system that provide warfighters easy access to necessary support without burdensome lift and infrastructure requirements."

To provide the logistics the transformed force will need—

DOD will pursue actions to sustain the force more effectively and efficiently. Specific areas will include a dramatically improved deployment process and accelerated implementation of logistics decision support tools. DOD must also accelerate logistics enterprise integration, reduce logistics demand, and reduce the cost of logistics. In addition, conducting industrial vulnerability assessments and developing sustainment plans for the most critical weapons systems and preferred munitions will help ensure effective sustainment.

The QDR emphasizes the need for DOD to transform its business operations and reduce its infrastructure in order to "enhance the capabilities and creativity of its employees and free up resources to support warfighting and the transformation of military capabilities." To improve support, DOD will "remove layers that no longer provide value added." It will do this through four initiatives—

- Streamlining overhead structure and flattening organizations. "The goal . . . is to reduce the complexity of the Department of Defense . . . [and] to increase measurably the tooth-to-tail ratio over the next five years."

- Focusing DOD resources on excellence in those areas that contribute directly to warfighting. "Only those functions that must be performed by DOD should be kept by DOD. Any function that can be provided by the private sector is not a core government function . . . DOD will assess all [of] its functions to separate core and non-core functions . . . To improve the business practices of the Defense Agencies, DOD will begin a review of the

Agencies to seek efficiencies."

- Modernizing the DOD-wide approach to business information. "DOD will create a Department-wide blueprint (enterprise architecture) that will prescribe how the Department's financial and non-financial feeder systems and management processes will interact. This architecture will guide the development of enterprise-level processes and systems throughout DOD."

- Consolidating and modernizing DOD facility infrastructure. To help implement this initiative, DOD has created an Efficient Facilities Initiative to "match facilities to forces, meet the threats and challenges of a new century, and make the wisest use of limited defense dollars." DOD will improve supply-chain management and reduce inventories by implementing "Performance-Based Logistics to compress the supply chain and improve readiness for major weapons systems and commodities." To reduce financial, supply, and acquisition cycle times, DOD should look to private-sector benchmarks to "set the standard for government providers."

The outgoing Chairman of the Joint Chiefs of Staff, General Henry H. Shelton, summarized the QDR in these terms—

In my view the defense strategy outlined in the QDR 2001—if matched with resources over time—will adequately address the current and emerging challenges of the strategic environment. . . . Particularly noteworthy, the QDR calls for the capability to respond to overlapping major crises and defeat adversaries or their efforts in more than one region.

General Shelton also specified logistics as an area needing "work beyond the QDR"—

Logistics capabilities—including strategic mobility, sustainment, and the repair and reengineering of our infrastructure—remain immediate concerns. A comprehensive analysis of all requirements must be completed and appropriate priority of resources established. As for strategic lift, we must aggressively achieve the capabilities called for in the Mobility Requirements Study 2005, as a minimum. Further, we must accelerate the restoration, modernization, and replacement of our mission-essential and quality-of-life facilities, even as we seek authority to eliminate excess infrastructure. These near-, mid-, and long-term logistics needs have significant implications for all levels of risk and must be given appropriate attention.

ARMY SECRETARY HEADS DOD HOMELAND SECURITY EFFORT

Secretary of the Army Thomas E. White has been designated as the interim Department of Defense (DOD)

Executive Agent for Homeland Security. He will serve in this position until a permanent selection is made and confirmed by the Senate.

In his role as executive agent, the Secretary will work with the Director of the new Office of Homeland Security, Thomas Ridge. Aside from combat air patrols, the DOD role in homeland security largely will be supporting other agencies. As Secretary White observed—

We're not the lead agency for the homeland security task. And so, we follow and support principally [the Federal Emergency Management Agency], but [also the Department of] Health and Human Services and others as well, depending what the nature of the problem is. And there are 11 million first responders in this country that have the primary duty to deal with emergencies, and we are backup to them.

While serving as Executive Agent, Secretary White will continue to perform his duties as Secretary of the Army.

GENERAL KERN BECOMES AMC COMMANDER

General Paul J. Kern became the Commanding General of the Army Materiel Command (AMC) on 30 October, replacing General John G. Coburn, who retired. General Kern was the military deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology. He previously served as commander of the 4th Infantry Division (Mechanized) and as senior military assistant to the Secretary of Defense and the Deputy Secretary of Defense. He is a graduate of the U.S. Military Academy and holds master's degrees in both mechanical and civil engineering from the University of Michigan.

As AMC commander, General Kern is a member of the *Army Logistician* Board of Directors.

RESERVE LOGISTICS UNITS ANSWER CALL

Army Reserve component logistics units figure prominently among the units called to active duty for Operation Enduring Freedom. Army Reserve logistics units include—

- Detachments 1, 2, and 3, Joint Transportation Reserve Unit, Belleville, Illinois.
- 465th Transportation Company, Bristol, Pennsylvania.
- 311th Quartermaster Company (Mortuary Affairs), Aguadilla, Puerto Rico.
- 355th Supply Company, Barbourville, Kentucky.

- 733d Ordnance Company, Canton, Illinois.
 - 1179th Deployment Support Battalion, Brooklyn, New York.
 - 2122th Garrison Support Unit, Tacoma, Washington.
 - 250th Transportation Company (Medium Truck), El Monte, California.
 - 257th Transportation Battalion, Headquarters and Headquarters Detachment (Movement Control), Gainesville, Florida.
 - 871st Transportation Detachment (Movement Control), Belleville, Illinois.
 - 321st Theater Materiel Management Center, Detachments 1 and 2, Baton Rouge, Louisiana.
 - 647th Transportation Company (Medium Truck), Laurel, Mississippi.
 - 300th Transportation Detachment (Movement Control), Tacoma, Washington.
 - 1101st Garrison Support Unit, Detachment 20, Honolulu, Hawaii.
 - 1079th Garrison Support Unit, Fort Dix, New Jersey.
 - 5025th Garrison Support Unit, Detachment 2, Colorado Springs, Colorado.
 - 4003d Garrison Support Unit, Detachment 3, Norman, Oklahoma.
 - Headquarters Element, Defense Logistics Agency, Support Detachments 1 and 3, Fort Belvoir, Virginia.
 - 310th Chemical Company, Biological Detachment, Fort McClellan, Alabama.
 - 421st Quartermaster Company (Light Airdrop), Fort Valley, Georgia.
- Army National Guard units include—
- 167th Theater Support Command, Detachment 1, Birmingham, Alabama.
 - Company D, 109th Aviation Maintenance, Boone, Iowa.
- As of 9 November 2001, a total of 14,277 soldiers of the Army National Guard and Army Reserve had been called to active duty out of 54,688 Reserve component personnel from all of the armed services.

SOLDIERS JOIN AIRMEN TO SUPPORT OPERATION ENDURING FREEDOM

Members of the 5th Quartermaster Company, 21st Theater Support Command, and the Air Delivery Flight, 37th Airlift Squadron, U.S. Air Forces in Europe, joined forces to build Tri-wall Air Delivery (TRIAD) system boxes and pack them with humanitarian daily rations for airdrop into Afghanistan in October. The 2 units filled 2 C-17 Globemaster transports with approximately 17,000 humanitarian daily rations each. The aircraft



□ A soldier from the 5th Quartermaster Company helps load a C-17 Globemaster III with TRIAD boxes full of humanitarian daily rations.

had flown from Charleston Air Force Base, South Carolina, to Ramstein Air Base, Germany, to provide support for Operation Enduring Freedom. This was the first time the airmen and soldiers had used the new TRIAD system.

The TRIAD uses reinforced cardboard boxes designed to come apart in the air. Gravity is used to get the boxes out of the aircraft. The system does not use parachutes; the static line pulls and cuts the gate attached to each box as it exits the aircraft. The box bottom and top then fall away from the main box, allowing the approximately 410 rations to float to the ground.

ARMY JOINS IN TESTING OF HIGH-SPEED VESSEL

Twenty-one soldiers from Fort Eustis, Virginia, were part of the crew when a new wave-piercing catamaran called the Joint Venture High-Speed Vessel (HSV-X1) arrived in October at Norfolk, Virginia, from Tasmania. The 18-day test voyage signaled the beginning of an 18- to 24-month period of experimentation to be conducted by a partnership of the Army, Navy, Marine Corps, U.S. Special Operations Command, and Coast Guard.

The HSV-X1 was manufactured by Incat of Hobart, Tasmania, and modified for military use as an experimental platform. Modifications included installation of a helicopter pad suitable for large military helicopters such as the SH-60 Seahawk and the CH-46 Sea Knight and a two-part, hydraulically operated vehicle ramp that allows rapid loading and discharge of vehicles from the stern of the vessel or alongside it.

The Army Tank-automotive and Armaments Com-

FLOAT-ON-FLOAT-OFF OPERATION CONDUCTED AT FORT MONROE

The 7th Transportation Group from Fort Eustis, Virginia, conducted a float-on-float-off operation in the waters off Fort Monroe, Virginia, in September. In executing the Army watercraft pre-positioning strategy, several vessels from the 10th and 24th Transportation Battalions, along with Army Reserve component and Navy watercraft, were uploaded onto the *American Cormorant*, a commercially owned vessel contracted by the Military Sealift Command.

Unlike the usual vessel upload, which uses cranes, the watercraft were floated onto the deck of the *American Cormorant*. The ship has the unique ability to sink into the water, submerging its deck enough to allow vessels to be pushed and pulled into place by tugboats and winches. When all the vessels are in place and secured, the *American Cormorant* rises and heads out.



mand (TACOM) signed a \$20.5 million contract with Bollinger-Incat USA, Limited Liability Company, of Lockport, Louisiana, for the lease of the HSV-X1. The contract has optional extensions and covers operations through fiscal year 2003. TACOM will test the vessel's ability to perform in specific mission scenarios and limited operational experiments and to move troops, heavy military vehicles, and equipment.

The Army Combined Arms Support Command; Navy Warfare Development Command; Office of Naval Research; Marine Corps Plans, Policies, and Operations Department; Navy Special Warfare Command; and Coast Guard Deep Water Project Program will conduct joint experiments to explore and develop the HSV-X1's new technologies that promise highly desirable mission capabilities, such as—

- Speed of more than 40 knots.
- High payload fraction.
- Longer and more useful ranges.
- The ability to tailor the payload for optimal mission success.

Experiments will focus on validating and assessing the vessel's capability to meet the needs of Army Transformation. Concepts that will be considered are simultaneous deployment and employment of the Objective Force; fight on arrival; en route mission planning and rehearsal; passengers and equipment moving together; bypassing strategic and operational chokepoints; and entry operations at multiple points.

NEW DOD COUNCIL APPROVES BETTER BUSINESS PRACTICES

Secretary of Defense Donald H. Rumsfeld wants the Department of Defense (DOD) to make greater use of commercial business practices to improve readiness and save money. In a significant step toward achieving this goal, DOD's new Business Initiative Council has approved its first set of initiatives to change the department's business operations.

Among the 10 initiatives are the following—

- Allowing the service secretaries to waive the 180-day waiting period for hiring retired military personnel for civilian positions.
- Increasing the flexibility of personnel management by eliminating civilian full-time-equivalent targets from DOD programming guidance.
- Directing DOD components to work with the Defense Finance and Accounting Service and contractors to develop Web-based invoice and receipt processing.
- Negotiating local or regional cell phone contracts to consolidate users into buying pools.
- Seeking congressional approval to give program managers greater authority to reprogram procurement

and research and development funds.

- Implementing the Enterprise Software Initiative to streamline the software acquisition process.

According to Under Secretary of Defense for Acquisition, Technology, and Logistics Edward C. Aldridge, Jr., who is the council's chairman, "Approval of this first set of initiatives is only the beginning of a phased effort by the [council] to identify and implement promising ideas to improve the way we conduct our business." The council's other members include the three service secretaries and the Chairman of the Joint Chiefs of Staff.

NEW SPACE HEATERS AVAILABLE

Two additions to the Army's family of space heaters—the space heater small and the space heater convective—are now available for unit fund purchase through Defense Supply Center Philadelphia. These new heaters join the space heater medium and space heater arctic in providing efficient, safe heat to deployed soldiers.

The space heater small is designed to provide heat for the soldier crew tent and other small tents. It operates without electrical power, using a new vaporizing S-tube burner technology to generate 12,000 BTUs of heat. The space heater small weighs 20 pounds, is completely self-contained, and functions in temperatures from minus 60 to 60 degrees Fahrenheit. The national stock number is 4520-01-478-9207.

The space heater convective is designed for use in modular command post systems, tactical operations centers, or other tents housing costly electronic equipment. Powered by various fuels, the space heater convective generates 35,000 BTUs of heat. Unlike other Army space heaters, it requires electricity but produces its own electricity through an internal thermoelectric generator. The electricity is used to power forced hot-air circulation. The heater increases combustion efficiency 60 percent over currently fielded nonpowered heaters and burns diesel fuel more cleanly. It weighs 70 pounds and is operational between minus 40 and 60 degrees Fahrenheit. The national stock number is 4520-01-431-8927.

The Army's family of space heaters is designed to vent exhaust outside shelters, making them safer to use than commercial space heaters.

HEATER FAN WARMS FEET, CUTS FUEL COSTS

Soldiers required to live in tents this winter will stay warmer, thanks to a newly available thermoelectric fan (TEF). The TEF, developed by the Soldier Systems Center at Natick, Massachusetts, can be used with stand-



□ A TEF on top of an H-45 heater.

ard SHA and H-45 military tent heaters to circulate heated air, improve comfort, and significantly reduce fuel consumption while generating its own electrical power.

The TEF is a silent, compact, rugged fan unit (14 inches in diameter and 10 inches high) that is placed on top of the heaters. A built-in thermoelectric module converts heat from the top of the heater into electricity to power a 450-cubic-feet-per-minute fan. The fan moves heated air to the floor and corners of the tent, providing more even heat distribution throughout the entire shelter.

Testing indicates that the TEF can increase the temperature at the floor level of the tent by over 20 degrees. This allows the soldiers to operate their heaters at much lower firing rates, thereby increasing comfort levels in the tent while cutting fuel costs in half.

Field units can purchase the TEF by sending funded requisitions to Defense Supply Center Philadelphia (DSCP). The national stock number for the TEF is 4520-01-457-2790 (line item number F51430). The price is approximately \$520.

For more information, call the DSCP item manager at (215) 737-8249 or DSN 444-8249, or send an e-mail to ddilossi@dsep.dla.mil.

MICRO RAPPEL SYSTEM DEVELOPED

Soldiers now have a compact, lightweight rappel system to use when entering or escaping buildings. The micro rappel system (MRS) can be used in lieu of the heavy, bulky standard military rappel system. The MRS was developed by the Army Soldier Systems Center at Natick, Massachusetts, for use by military police special reaction teams and special operation forces.

To use the MRS, the soldier puts on a nylon belt that has a strap at each end. The straps pull out and wrap around each thigh to form a seat. Attached to the belt is a nylon container about the size of an ammunition pouch that holds a descender, a carabiner (an oblong ring with one hinged side), and 80 feet of 5-millimeter rope made of Kevlar™ surrounded by a nylon shell. The tensile strength of the rope exceeds 5,000 pounds. Users have the option of letting the rope slip through the eyelet at the top of the bag or unzipping the top and dropping the entire length of rope. The entire system weighs less than 3 pounds.

The Army standard 11-millimeter climbing rope still will be used in planned operations where bulk and weight are not factors.

ADVANCED BOMB SUIT WILL KEEP SOLDIERS SAFER

An improved bomb suit for explosive ordnance disposal (EOD) personnel will replace the legacy PS-820 bomb suit beginning in the summer of 2002.

The advanced bomb suit (ABS) is designed to withstand fire, heat, and impact from high-speed fragmentation when EOD personnel are rendering safe or disposing of unexploded ordnance, such as artillery shells or grenades, or improvised explosive devices, such as pipe, letter, or car bombs. The new suit has enhanced these capabilities by adding tougher upper leg and abdominal protection than the PS-820, along with impact protection to the head and spine.

The ABS is expected to weigh slightly more than the 61-pound PS-820. However, because it is made of a new generation of ballistic material, the ABS will protect EOD personnel better, and the weight will be distributed better, making it more comfortable to wear. It can be removed in 20 seconds to facilitate transport of an injured soldier for medical treatment.

The ABS uses a compact face shield attached to a ballistic and impact-protective helmet, unlike the chest plate with a contoured face shield attached on top used on the PS-820. A ventilation system helps keep the ABS visor clear and provides fresh air for the wearer. A soldier intercom system is integrated into the helmet for hands-free communication with the command post and other team members. The new suit can accommodate the personal ice cooling system, which circulates cold water through a vest to lower core body temperature, or it can be worn over a chemical and biological protective suit.

The ABS was developed by the Product Manager-Soldier Equipment at the Army Soldier Systems Center, Natick, Massachusetts, in collaboration with the Army Combined Arms Support Command at Fort Lee, Virginia.

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ISSN 0004-2528
DEPARTMENT OF THE ARMY
ARMY LOGISTICIAN
US ARMY LOGISTICS MANAGEMENT COLLEGE
2401 QUARTERS ROAD
FORT LEE VIRGINIA 23801-1705

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