Engineer

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April 1997

FORCE XXI



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CLEAR THE WAY

By Major General Clair F. Gill
Commandant, U.S. Army Engineer School

These are exciting times for our Army and *our* Engineer Regiment. I recently was privileged to spend a few days in the Mojave Desert at the National Training Center (NTC) with our engineers of the Experimental Force (EXFOR). They were helping to create history through their participation in the Army's digital experiment.

Let me tell you how magnificent those soldiers of the 299th Engineer Battalion, 4th Infantry Division, are. They have spent almost a year in reorganizing themselves; equipping their vehicles; and training, training, training to get ready to prove or disprove the functionality of adding digital technologies to our systems and tactics, techniques, and procedures. We provided as much support as we could from the schoolhouse (often via TNET—satellite-based training), and there was enormous support at Fort Hood from waves of contractors and a powerful EXFOR Coordination Cell. Many others contributed from across the Engineer Regiment. Our Corps laboratories provided functionality and equipment; and the 29th Engineer Battalion "loaned" a detachment of four topographic soldiers to operate our most modern Digital Topographic Support System (DTSS) and demonstrate its potential utility to the brigade combat team. But the real work was done by the soldiers and their leaders on the ground.

What I witnessed on the ground at the NTC was a true revolution in situation awareness. Leaders *know* where their soldiers are on the battlefield without having to fight through often broken communications links. Small units and equipment teams can be directed and moved efficiently and semi-independently across the battlefield to new work sites, with high assurance that they will get to the right spot—under battlefield conditions. Work progress reports can be made timely and posted automatically to higher headquarters. Obstacles can be located and confirmed, and their locations and conditions posted in moments to all units with a need to know. (This capability does not work as well as we want it to yet, but the potential is clearly there.) DTSS offers great promise: Engineers can provide extremely valuable terrain-visualization tools to the maneuver commander and his planners to vastly increase their ability to "see" the battlefield and reduce risks to the force. Future battles fought over terrain not as well mapped or digitized as Fort Irwin may have to rely heavily on the terrain team's capability to customize and download terrain data from the National Imagery and Mapping Agency and many other sources.

As grand as this Army experiment was, I left with another major conclusion—that we engineers must still master our basic tactical skills to a high degree of efficiency and rehearse them with our maneuver brethren at every level. Continuous operations, such as those envisioned in the future, allow little room for error. We must do our important work correctly the first time. We continue to have difficulty siting obstacles properly so they fit with the commander's intent. Much of this problem is due to a lack of engineer training of/with the maneuver leaders.

To address this and similar problems, it is critical that the maneuver commander and his engineer develop and maintain a powerful command relationship. The engineer must be on the maneuver team, building bonds of trust and able to sense where the combined arms team will fight its next battle. I am utterly convinced that our present ERI (engineer restructure initiative) alignment is critical to success. In this alignment, the engineer battalion commander and staff support the maneuver brigade, and the engineer company commander is part of the maneuver task force. Digitization adds to our efficiency, but it cannot resolve the relationship imperative.

I'm sold on what I saw in the desert—digitization is the wave of the future, and we will embrace it across the Corps of Engineers. Many engineer units will not be as well equipped as our ERI combat engineers were in this experiment for years to come, but we all must start thinking "out of the box" to find better ways of adapting the wonders of modern technology. The physics of this earth are not likely to change soon, and we continue to struggle with overcoming natural forces. But, we can learn how to do things smarter and more efficiently by embracing change and adapting to it. Our motto is right on target—Essayons.

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Front Cover: *Drawing of Fort Leonard Wood's schoolhouse and engineer assets, by Jeanni Wilson.*

Back Cover: *Two American soldiers look down on a long row of "dragon's teeth" concrete devices installed to halt invading tanks at the Siegfried Line. American troops moved through a break in the vaunted defense line and passed into Germany in September 1944.*

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The Fulcrum for the Full-Spectrum Force: The Engineer Regiment

By Colonel Philip F. Federle and Lieutenant Colonel Robert S. Kirsch

This article briefly traces the past two ENFORCE conferences, where we defined the regimental vision and a unified regimental theme. It also highlights the release of the Army and Joint Vision 2010 blueprints, which describe the future roles and views of the Army and respective services. To date, the Engineer Regiment's role and contributions have not been articulated in many of the key documents that define the future force (e.g., TRADOC Pamphlet 525-5, *Army Vision 2010*, and *Joint Vision 2010*). These documents do not address the roles of engineers, per se. Instead, they infer that engineers are part of logistics operations. This inference is unacceptable. To secure our place as a relevant member of the land component of the joint warfighting team, we engineer leaders must forge a strategy that will harness the collective and collaborative strengths of our regiment to shape the battlespace of engineer opportunities. We must build and sustain a campaign to ensure that engineer capabilities are considered in the future development of force structures, doctrine, materiel requirements, research and development, and training. In this way, we will preserve the traditions of the regiment that effectively enable the Army to execute its role in our nation's strategy and achieve full-spectrum dominance in the 21st century.

To many people, the word *fulcrum* conjures up the mental image of a playground teeter-totter and the physical relationship of a point of support on which a lever turns in raising or moving something. In this article, the word *fulcrum* is used to mean an entity that supplies the capability for action. Ideally, our Engineer Regiment will be modernized and knowledge-based—a conventional and digitized force with the ability to conduct the full range of engineer operations promptly and to enhance the Army's ability to execute land warfare and serve our nation throughout the entire spectrum of crises.

The Road Traveled

In 1995, Major General Joe Ballard, the Engineer School commandant, focused the purpose of the Senior Engineer Leader Training Conference (SELTC) toward preparing the regiment to meet 21st century Army requirements. Accordingly, he renamed the conference *ENFORCE XXI*. This conference focused on the initial concepts, composition, characteristics, and roles of the Engineer Regiment as a key enabler, or *fulcrum*, of the Army's vision for Force XXI. A cornerstone was set with the publication of the pamphlet *Engineer 2010*, which started the regiment down the road of change and modernization. It provided a new construct to describe engineer missions:

- ***Portray Terrain to the Force.*** Provide the terrain picture (terrain visualization) for battle command and mission planning and rehearsal, tie video-mapped images to actual ground, and update the terrain picture in real time.
- ***Allow the Force to Go Where It Wills.*** Build an entry base in any environment, find or build routes through any terrain, eliminate obstacles to free maneuver, break into defensive structures, and fight through defended terrain.
- ***Allow the Force to Fight Where It Wills.*** Build fighting and support positions, hide and protect the force, convert existing structures for support and defense, and occupy and fight defensive positions.
- ***Wield Terrain as a Weapon Against the Enemy.*** Employ obstacles before and during battle to attack and frustrate the enemy, fight lethal ground, and disguise terrain reality—confuse the enemy and unhinge his plan.

ENFORCE XXI energized the process of change and initiated how engineers must view their roles and missions within Force XXI.

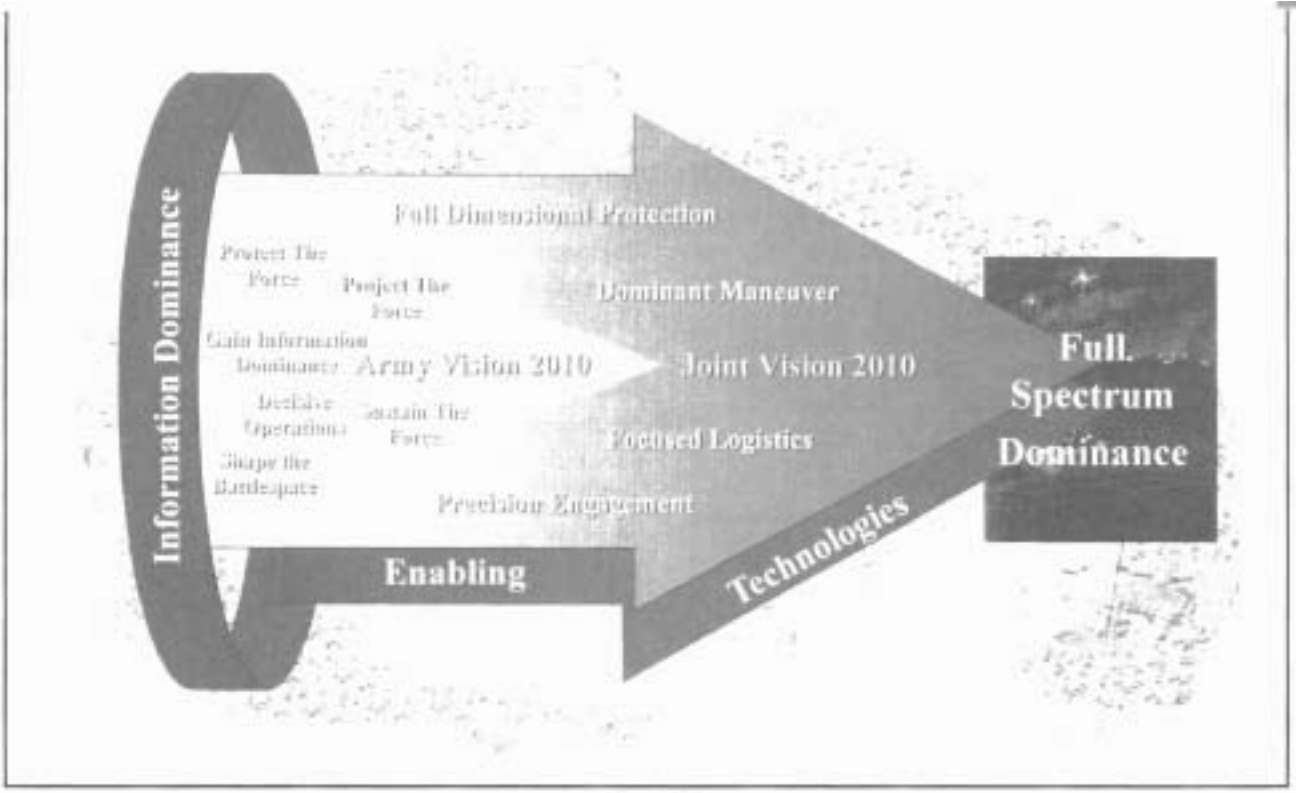


Figure 1

In early 1996, a newly revised FM 5-100 was published. It significantly expanded the doctrinal focus of the engineer force and described the full capabilities of every component and segment of the Engineer Regiment.

During ENFORCE XXI-96, the senior engineer leadership reflected on the question of relevancy of the Corps of Engineers and whether our regiment can remain relevant to the Army as it transitions to Force XXI. Major General Clair Gill, the current Engineer School commandant, challenged the senior leadership to get involved. Regimental leaders must contribute to the modernization process and maintain the engineer vision. More importantly, each leader must become a high-impact regimental team player. We must demonstrate confidence and competence, aggressively portray the Corps' capabilities to supported commanders and customers, and be there to deliver on our promises.

The term "unified regiment" was coined during the 1996 conference. Generals Genetti and Anderson noted that, as the force continues to draw down, it is absolutely critical to get every element of the engineer family into the fight to win tomorrow's victories. Each member of the regiment brings unique capabilities that can be applied throughout the spectrum of crises. The Engineer Regiment must unify into a cohesive team that includes USACE divisions, districts, laboratories, and the Directors of Public Works; troops and units of the Active and Reserve Components; and Department of the Army civilians and civilian contractors.

Joint and Army Visions 2010

Joint Vision 2010 (JV 2010) set the baseline and provides a coherent view of the future (Figure 1). Implications for joint operations are expressed in the following terms of emerging operational concepts:

- ***Dominant Maneuver.*** Multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish assigned operational tasks.
- ***Precision Engagement.*** System of systems that enables joint forces to locate the objective or target, provide responsive command and control, generate the desired effect, assess the level of success, and retain the flexibility to re-engage with precision when required.
- ***Focused Logistics.*** The fusion of information, logistics, and transportation technologies to provide rapid crisis response; track and shift assets, even while en route; and deliver tailored logistics packages and sustainment directly to the strategic, operational, and tactical levels of operations.
- ***Full Dimensional Protection.*** The control of the battlespace to ensure that our forces can maintain freedom of action while providing multilayered defenses for our forces and facilities. All components of the joint force must evolve concepts and technologies that can be easily coordinated and synchronized.

In October 1996, the Army Chief of Staff, General Dennis Reimer, released Army Vision 2010 (AV 2010). This document is the blueprint for the Army's contributions to JV 2010, and it reinforces the relevancy of the Army in the 21st century. Army elements will execute their responsibilities as the land-force component of the joint force through a deliberate set of patterns of operations. These patterns of

operations are neither phases nor sequential. They serve to focus the many tasks armies perform in war or other military operations. The patterns of operations follow, with their engineer-enabling technologies shown in parentheses:

- ***Project the Force.*** (Automated laser sensors and the global positioning system for precise construction; information-based construction techniques; lightweight, high-strength construction materials; and automated construction management.)
- ***Protect the Force.*** (Construct defenses with fortifications, protective structures, obstacles, and dams and levies.)
- ***Shape the Battlespace.*** (Terrain visualization, split-based operations, stand-off minefield detection systems, robotics, digitized assault bridging and breaching, tele-engineering, and environmental stewardship.)
- ***Decisive Operations.*** (Artificial intelligence and sensors for mine avoidance and detection, intelligent munitions, and natural disaster relief.)
- ***Sustain the Force.*** (Accurate infrastructure maintenance predictions and robotics applied to precision construction tasks.)
- ***Gain Information Dominance.*** (Split-based terrain visualization operations, tele-engineering, and cyber-engineering.)

General Reimer's goal in executing AV 2010 is to create evolutionary changes that will achieve revolutionary results. His aim is to create an Army that possesses the capabilities to operate across the full spectrum of conflict—an Army that can accomplish the range of missions predicted to be most prevalent during the early decades of the 21st century. The range of missions in AV 2010 are organized in seven general areas:

- ***Defending or Liberating Territory.*** Major regional contingencies and lesser regional contingencies.
- ***Punitive Intrusion.*** Counterdrug and counterterrorism.
- ***Conflict Containment.*** Military operations other than war.
- ***Leveraging Technology.*** Space applications; command, control, communications, computers, and intelligence; systems integration; and battlefield awareness.
- ***Reassurance.*** Forward presence.
- ***Core Security.*** Counterdrug, illegal immigration, and crime in the streets.
- ***Humanitarian Operations.*** Disaster relief, population evacuation, and refugee protection.

The U.S. military will be tasked to respond to numerous crises in the years ahead. Although the magnitude and frequency of crises are unpredictable, it is certain that the full spectrum of Army (and engineer) capabilities will be required to support each of these general mission areas. Engineers will have a key enabling role in the successful accomplishment of each mission.

In answering his own question—"Why an Army?"—General Reimer stated that conflict and instability are now land- centered (there are no competitors for the skies or seas). Land-centered conflict is people-focused. The ability to decisively control the land, populations, and valuable resources is essential to the resolution of conflict and depends on boots on the ground. Army engineers must be relevant, critical, and full participants in achieving Army objectives to resolve land-centered conflicts and instability.

Implications for the Engineer Regiment

Just as JV 2010 provided the benchmark for AV 2010, AV 2010 provides a definitive azimuth for senior engineer leaders to set our course to 2010 and beyond. AV 2010 orients the Engineer Regiment to address, in an Engineer Force XXI strategy, the doctrine, training, leader development, organization, and materiel required to successfully accomplish land-force operations in the 21st century. This action is critical! Significant effort and commitment by our senior engineer leadership are required to apply the time, patience, and discipline needed to develop, fund, and manage this strategy (Figure 2, page 5).

We have built a good foundation during the past two ENFORCE conferences. We developed an inspiring vision that identifies where we, as a regiment, want to go. We began the task of building our team and unifying the regiment. The Engineer Regiment represents a rich repository of capabilities that are the essential enablers for the decisive success of the force across the spectrum of conflict. Our regiment is integrated across the heavy, light, special operations, and technical segments of the Army, and it is comfortable with joint, multinational, and nongovernment partnering. The engineer force is versatile and can respond on short notice to support the full spectrum of military operations. We demonstrate every day that we are relevant, although we have yet to be fully recognized in the Army's key documents or funding stream for change and modernization with Force XXI strategies.

The Way Ahead

It is time to develop an Engineer Force XXI strategy that will encapsulate and articulate the engineer requirements necessary to enhance, enable, and contribute to AV 2010 and JV 2010 goals. Senior engineer leaders must develop an overarching strategy that will be proactive, relevant, and prescriptive in meeting the needs of the future.

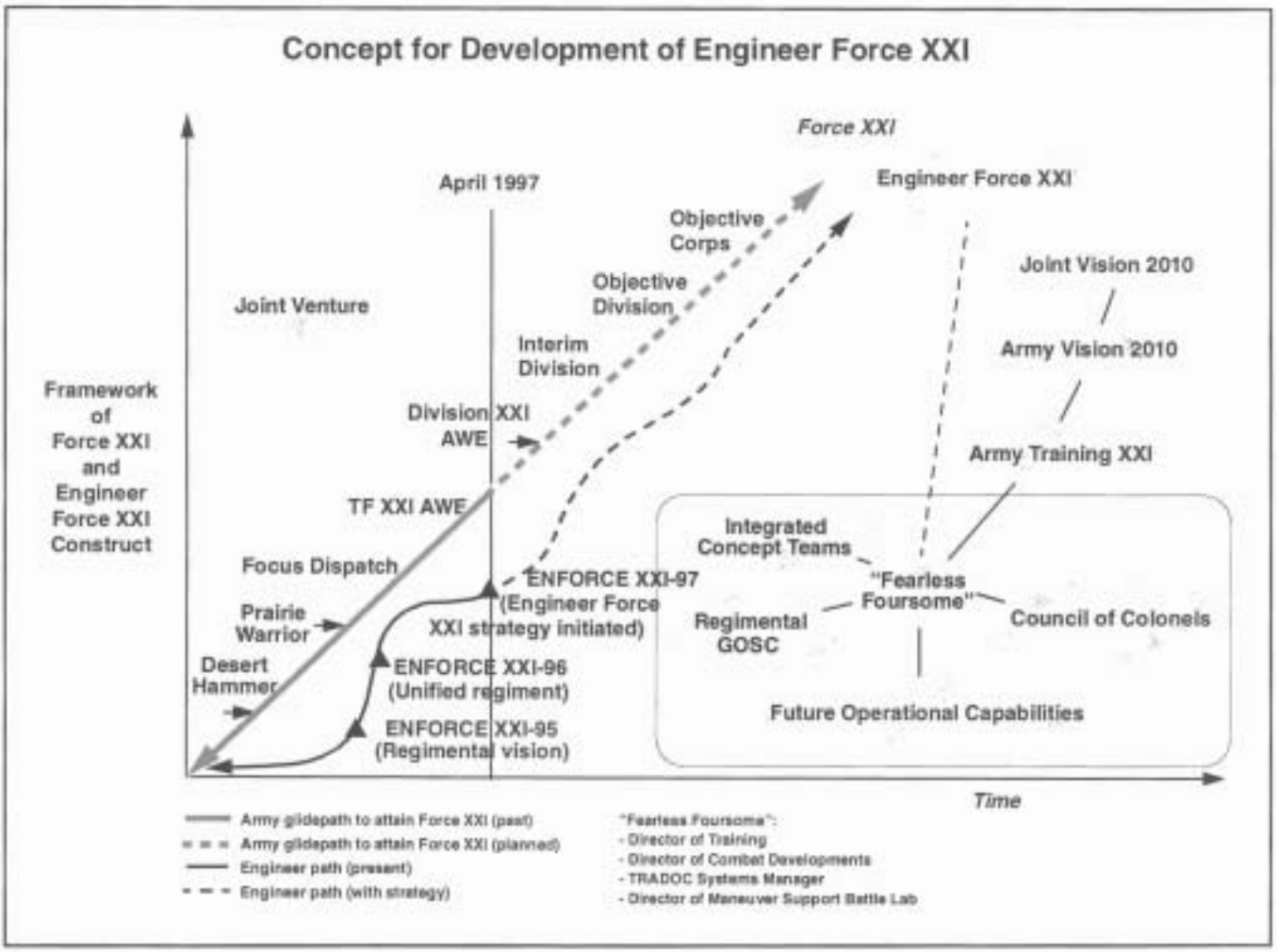


Figure 2. The lack of a comprehensive engineer strategy has resulted in a meandering and reactive response to Force XXI requirements. A collaborative effort is required to develop a relevant and proactive strategy for the Engineer Regiment that complements and parallels the Army's lead.

Just as TRADOC is the architect for the Army's future, the Engineer School, as the engineer proponent, will lead the effort to develop the "Engineer Force XXI Strategic Plan." Guided by the commandant, the "Fearless Foursome" (the Directors of Combat Developments, Training, and Maneuver Support Battle Lab, and the TRADOC Systems Manager) will be the central core of the team. Other mechanisms exist to support this effort. They include the Council of Colonels, the Regimental General Officer Steering Committee (GOSC), and the requirements determination process (see "A New Way of Doing Business," page 24, *Engineer*, March 1997). A key piece of the strategy is to develop a construct to cross-walk engineer requirement solution sets to the Army's patterns of operations. Engineer solutions to concepts, enablers, and/or technologies that support patterns of operations further enhance the regiment's relevance and assist in securing the requisite resources to modernize our regiment.

At ENFORCE XXI-97 we will continue to build our team and frame the outline of the Engineer Force XXI strategic plan. The Engineer Regiment is as relevant today as at any time in our 200-year history. We will remain relevant, contribute as a key combat multiplier, and be responsive to our nation's needs. Engineers are the *fulcrum* to effect the guidance and aims in JV 2010 and AV 2010. We have the expertise, organization, and equipment to fulfill General Ballard's and General Gill's visions for an Engineer Force XXI strategy. We've been told how wide, how deep, and in what direction — now we have to start digging!

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The Unified Regiment—A Progress Report

By Brigadier General Phillip R. Anderson and Brigadier General Anders B. Aadland

The *One Corps, One Regiment, One Fight* concept is about one year old. Introduced at ENFORCE XXI-96, the concept of a unified regiment electrified the Army engineer community. As participants listened, the light slowly dawned that we have a great opportunity to touch the future. The concept described the vision of our regiment as a cohesive force, part of a shrinking Army in transition, and compelled to change some "old ways" that are no longer relevant. However, the implied issue, the one that hit the center of our collective souls, was commitment among the components of the Engineer Regiment to mend the schisms that have crept into our relationships and to work as a team, transcending the "warrior" and "civil" associations that have so deeply branded each camp. We rearticulated our bonds and pledged to set our house in order collectively. It was a great week!

The enormity of coming to resolution with the concept became apparent quickly. There was far too much at stake to let the expectations wither and die. One manifestation of those expectations was that the term *One Corps, One Regiment, One Fight* was cropping up everywhere (sometimes cited as *One Corps, One Regiment, One Team*). Words are nothing without actions and the concept was a call to action. We engineers quickly identified the key axes:

- Delineate "ownership" of functional responsibilities.
- Expand participation in the doctrine-development process.
- Develop a self-sustaining mechanism to keep our training relevant and effective.
- Inspire the regiment by promoting common values and understandings.
- Demonstrate to the Army and the nation that the Corps of Engineers can speak, work, and develop as a single team.

Working on the future is tough when you are fully committed with problems in the present. We realized that we had to maintain a high level of progress toward meeting the expectations created at ENFORCE XXI-96. It's now obvious that achieving full closure will take more than a year. So, it's time for an in-progress review!

The first step of our action plan was to establish a senior oversight committee—a Unified Engineer Regiment General Officer Steering Committee (GOSC). Figure 1 shows the GOSC charter and members. The committee first met at Fort Belvoir in July 1996, then again in November 1996 and in March 1997. The GOSC decided to appoint Process Action Teams (PATs) with appropriate subject matter experts to address specific issues and develop solution sets. Major General Albert J. Genetti Jr. noted that the Engineer Regiment has the perfect tool in this GOSC process to resolve several key responsibilities in preparation for the Quadrennial Defense Review (QDR). Both a QDR process briefing and a unified regiment update briefing will be presented during ENFORCE XXI-97.

General Officer Steering Committee	
Charter: to take optimum advantage of the synergistic and complementary relationships among all parts of the unified Engineer Regiment	
Members	
■ Director of Military Programs, USACE	■ Deputy Chief of Staff for Engineers, USAREUR
■ Assistant Commandant, USAES	■ Chief, Research and Development, USACE
■ Assistant Deputy Chief of Staff for Combat Developments, TRADOC	■ Chief, Public Works, USACE
■ Assistant Chief of Engineers, Reserve Affairs	■ Honorary Colonel of the Regiment

Figure 1

Functional Responsibilities Process Action Team	
Charter: to make significant improvements in the manner in which the unified Engineer Regiment develops organizations and doctrine	
Members	
■ Deputy Commander, 412th Engineer Command	■ Commander, Waterways Experiment Station
■ Director of Combat Developments, USAES	■ Director, Office of the Chief of Engineers (Pentagon)
■ Director of Training, USAES	■ Director, Engineer Strategic Studies Center
■ FORSCOM Engineer	■ Chief of Staff, USAES

Figure 2

By the third meeting of the GOSC (on 24 March 1997), the requirements for background information had been established, and the members moved directly into substantive debate on major issues. Much of the discussion concerned preparation for the update presentation during ENFORCE-97. The GOSC made major changes to the draft script. It wanted more emphasis on future initiatives to strengthen cooperation among constituent parts of the regiment. The title "Topographer of the Army" was among the "bump-up" issues that received lively debate. The GOSC was concerned about the "looseness" of the boundaries of duties associated with the title as well as the somewhat anachronistic-sounding name itself. The GOSC also wanted more specifics concerning potential DOD-level disagreements over Engineer School humanitarian demining initiatives.

Communicating the *One Corps, One Regiment, One Fight* story is critical to achieving our goal of a truly unified regiment. Toward that end, action officers at the U.S. Army Engineer School's Directorate of Combat Developments and the U.S. Army Corps of Engineers' Engineer Strategic Studies Center created a Unified Regiment home page on the Internet. This home page includes a summary of the original *One Corps, One Regiment, One Fight* briefing. About 300 "guests" view the page monthly. You can locate it on the Fort Leonard Wood home page at http://www.wood.army.mil/DCD/Regiment/regiment.htm.

Figure 2 shows the first and most challenging PAT chartered by the GOSC. The Functional Responsibilities PAT recognized that no other branch of the Army has such a dual mission as does the Engineer Regiment. The regiment keeps itself trained and equipped to respond to worldwide military challenges during Army, joint, and combined operations. Engineers are also responsible to the president and Congress for many civil engineering functions that directly contribute to our national well-being and that of our friends.

The actual work of the PAT was to—

- Collect, rate, and synthesize positions and policies on functions and issues across the Engineer Regiment.
- Develop an action plan for assigning or migrating functional responsibilities.
- Recommend actions to the Unified Engineer Regiment GOSC.

Specific tasks of the Functional Responsibilities PAT were to—

- Set up common frames of reference for those engineering functional responsibilities that are subtasks for military contingency and stability and support operations. Determine which elements have the lead and which have support responsibilities for specific functional areas.
- Identify specific responsibilities for the functional areas in order to coordinate subject matter expertise from various elements within the regiment.
- Recommend, as appropriate, shifts of responsibilities for specific functions and/or force structures across the regiment.
- Develop a draft Unified Regimental Strategy for the Total Army Analysis process.

The Functional Responsibilities PAT used the Internet and a September 1996 meeting at Fort Leonard Wood to accomplish its mission. It described the various functions of Army engineers and determined which component of the regiment is the responsible advocate for each function. Figure 3 is a condensed version of the matrix developed by the PAT. The full version with 59 tasks is shown on the Unified Regiment home page. The matrix and a suggested implementation plan will be presented at the ENFORCE XXI-97 Conference.

The GOSC reviewed the results of the Functional Responsibilities PAT at its November meeting and acknowledged this work as the "dynamic baseline to portray functions within the regiment." The Functional Responsibilities PAT also identified several additional issues and recommended that the GOSC form PATs to examine them. These issues and the steering committee's decisions on which PATs to form are summarized below.

Tele-Engineering

To meet future demands for engineer support, we must find innovative ways to leverage the regiment's capabilities. Tele-engineering will provide some of

Engineer Functions Matrix—*One Corps, One Regiment, One Fight*
(predominant responsibilities)

Function/ Number of tasks	Element						
	Active	*USAR*	*ARNG*	*USACE*	*DPW*	*HNS*	*Other*
Project the Force (15)	P1/S2	P2/S2	P2/S2	S1	P1	HNS	ACSIM USAF/USN
Protect the Force (9)	P1	P2	P2	S1			
Gain Information Dominance (6)	P1	P2	P2	S1			NIMA (DMA)
Shape the Battlespace (4)	P1	P2	P2	S1			
Decisive Operations (7)	P1	P2	P2	S1			
Sustain the Force (10)	P2	P1	P1	S1			
Civil Support to the Nation (8)				P1			FEMA/EPA DOE/DOI

Legend:
P1 = primary responsibility for function execution
P2 = increased responsibility for execution as theater matures
S1 = direct support responsibility
S2 = supplemental support responsibility

Figure 3

that leverage. Advanced communications provide unprecedented opportunities to link members of the Engineer Regiment. Operation Joint Endeavor gave us a real-world taste of what is coming. For example, soldiers and airmen in Bosnia measure snow depth, record weather conditions, and take river gage readings every 2 hours. Engineers relay these readings electronically to military and civilian experts at the USACE Cold Regions Research and Engineering Laboratory and the Waterways Experiment Station. These experts combine the data with imagery and hydrologic models to produce daily forecasts on the Sava River level and river basin snow maps. Then they send the unclassified results directly to the field via the Internet. This sort of "split-based operation," where technical products and advice are transmitted from the continental United States to deployed forces, greatly enhances our ability to support contingency operations. However, engineers must continue to provide on-site support to ensure that the expertise of the entire Engineer Regiment is effectively applied during contingency operations. Tele-engineering includes enhancing the deployability of USACE and Directorate of Public Works (DPW) soldiers and civilians and developing timely operational plans that effectively use rapid response teams such as the USACE Contingency Real Estate Teams operating in Bosnia. The GOSC quickly marked this initiative as a "winner" for our future effectiveness and chartered a Tele-Engineering PAT. This PAT will give a status report at ENFORCE XXI-97.

Army Topography/ Terrain Visualization

The GOSC discussed the concept, implications, and identity of the "Topographer of the Army." They noted that topography was a prime candidate for re-engineering. We must articulate the penalties associated with the status quo—which is a confusing dichotomy of responsibilities caught between two elements of the Engineer Regiment and the intelligence contingent under the Deputy Chief of Staff for Intelligence. The GOSC recommended, as a first step, that a PAT composed of Engineer School and USACE representatives develop a matrix of topographic functions and responsibilities. The next step will be a memo to the Deputy Chief of Staff for Intelligence inviting the intelligence community to join the PAT. This expanded regimental effort would help design the future of Army topography. The PAT will report the status of their effort at ENFORCE XXI-97.

Demining and Unexploded Ordnance—Engineers and Explosive Ordnance Disposal (EOD)

The GOSC discussed how to design a synergistic vision of battlefield cooperation between combat engineers and EOD units to deal with explosive devices (such as mines, booby traps, unexploded ordnance, and cluster munitions). Engineers clearly have the lead for breaching operations. Ordnance EOD units clearly have the lead for all "render-safe" procedures. The gray area is in

One Team—Focused!

By Major General Sam Kem (Retired)

Let's stay grounded and focused. That is tough to do these days, with bursting technology, exponentially expanding demands for information, and missions that seemingly change daily. New enthusiasms "dictate" new priorities that press against already strained resources. There are many distractions—aggressively worked by energetic people—that vie to dissipate the Engineer Regiment's focus and the focus of those who care so deeply for our regiment's future.

The value of *One Corps, One Regiment, One Fight* is that it must be a clarion call for all: To be one team, focused to—

- Ensure that we best serve our nation and our Army.
- Provide the engineer soldier and civilian the tools he/she must have to do the job.
- Grow and nurture our leadership to contribute effectively in our changing Army.
- Develop our soldiers and civilians to be all they can be.

In short, that means we must ensure that our Army engineer organization (One Corps, One Regiment) remains relevant to the Army's mission; responsive to both battlefield and national needs; and organized, equipped, and trained for the fight.

Success sometimes is measured by battlefield victory, a project constructed, or a major economic/physical disaster avoided or mitigated. Unseen and unnoticed in such dramatic times are those who fight the other battles—budgets, force structure, doctrine, national priorities, reorganization, material fielding, and personnel training and development—that allowed the big victory to happen.

The joint effort initiated by USACE and the Engineer School under the *One Corps, One Regiment, One Fight* banner can be an exercise in words—or it can provide the focus on what is important. Determining what is important—what is *vital*—is an essential task in today's rapidly changing environment. That and marshaling the resources to bring a solution is the task of our leaders.

It is right that we be *One Corps, One Regiment, One Team.* There is work to be done. Let's do it!

Major General Sam Kem (R) is the Honorary Colonel of the Engineer Regiment. He served as commandant of the Engineer School from 1984 to 1987.

clearing operations and support to civilian demining operations. To resolve this issue, we must clearly delineate the roles and missions based on the type and scope of operations. The GOSC recommended that Colonel Steve Hawkins, Commander of the 1st Armored Division Engineer Brigade, examine the issue from his Bosnian perspective. As part of this issue, the GOSC was briefed on the Engineer School's initiative to establish a resourced national Humanitarian Demining Operations Training Center. They discussed the problems USACE faced in cleaning up formerly used defense sites and the likelihood of some technology and procedural exchanges. The GOSC requested additional information on this initiative.

Engineer Doctrine Improvement

The GOSC concluded that our Engineer Regiment does as well as other proponents in creating doctrine. The problem is the current slow "industrial-age" process of writing, reviewing, editing, and publishing doctrine. They noted that engineers habitually use U.S. Army captains, allied officers, and Department of Army civilians to write doctrine. We now can electronically enlist the help of the broader engineer community, including many outside the Engineer School with a depth of appropriate experience. The Engineer School has noted that conventional doctrine development suffers from a whip-saw effect from changing priorities and resource levels. The GOSC recommended that the Engineer School develop a strategy to use our "distinguished alumni" to expand the base of doctrine expertise.

Inspire the Regiment

An observation from many who have served on the Army Staff is that engineers typically do not promote their interests or "stand together" within the key decision nodes in the national capital area. There is also a perceived sense of "distance from the proponent" expressed by our students at senior service colleges. The school's *Engineer* magazine is a well-established way to get guidance out and discourse started. The Engineer Regiment has about 200 retired general officers; we must ensure that they receive *Engineer* magazine. The same holds true for our retired Senior Executive Service retirees. Other means of distributing information include:

- U.S. Total Army Personnel Command's *Engineer Officer Bulletin*
- Army Engineer Association's *The Army Engineer* magazine
- Engineer School "Staff Notes to the Field"
- USACE Program Analysis and Evaluation "Questions and Answers" sheets

The GOSC approved a PAT to examine this issue and directed it to develop a comprehensive platform for discussing sensitive issues among the regiment.

Training is the glue that holds the Army together. Not an original observation on our part by any account, but it's just as important for our civilian components as for our soldiers. To be able to respond to our nation's needs, from warfighting to coping with natural disasters, the Engineer Regiment must develop a relevant and flexible training strategy. As our doctrine evolves, so must our training strategy change to produce meaningful individual and collective training. It does no good—indeed, it does great harm—for us to devote time and other resources to train on irrelevant processes. Only through a cooperative and collective effort across the regiment can we determine our essential training needs.

The U.S. Army Engineer Regiment has many constituent parts: TOE units in Active Army, Army Reserve (USAR), and Army National Guard (ARNG); and TDA elements, which include the engineer training base (Engineer School), the Directorate of Public Works, and USACE. These elements employ Department of the Army civilians and contractors, who are part of our team. USACE operates divisions, districts, and laboratories throughout the world. Army engineers are assigned to the Department of Defense and commands such as the National Imagery and Mapping Agency (NIMA). Finally, an important part of our team is our alumni—our retired community. It is all too easy to polarize the components of such a diverse organization, especially during a budget war in which each component tries to protect its own turf. We must not let that happen! *One Corps, One Regiment, One Fight!*

The first step toward organizational health is acknowledging the problem. We have taken this step. Now, we must go beyond that and energize the processes that will eventually become self-sustaining. Prior to ENFORCE XXI-96, we created a vision for the Engineer Regiment: *"Trained and ready, a rapidly deployable and versatile member of the strategic force...combining efficiencies of information with physical and technical capabilities, to master terrain in support of decisive victory."* We must press on to achieve this vision. The spirit of *One Corps, One Regiment, One Fight* will ensure success for the engineers, the Army, and our nation!

Brigadier General Anderson is the Assistant Chief of Engineers for Military Programs, U.S. Army Corps of Engineers. He previously served as the assistant commandant of the Engineer School.

Brigadier General Aadland is the assistant commandant of the Engineer School. He previously served as the chief of staff of the Engineer School and Commander, 2nd Armored Division, Engineer Brigade, Fort Hood, Texas.

The Commander's Thought

By Major General Clair F. Gill

Is SHE an Engineer?

The engineer branch expanded the opportunities for its female officers back in October 1994. Today, all engineer officer positions, except combat line company commanders and platoon leaders, are open to women. However, many maneuver officers, as well as officers within our own corps, are still unaware that the Corps of Engineers fully supports placing women in units that directly support the front-line commander. The title question—*Is SHE an Engineer?*—is still sometimes asked when maneuver commanders receive support from bridging, construction, and even their own habitually associated combat engineer units.

The versatility of the engineer officer is one of our branch's greatest strengths. All engineer officers receive the same training. The responsibility for providing these trained officers opportunities to develop their diverse skills rests squarely on the shoulders of our field commanders. Female engineer officers have served successfully in all of the major deployments in the last several years—and they will continue to do so. Today's engineer commanders must invest in their junior female officers and expose them to the full range of corps capabilities. This investment will ensure that all of the corps' future leaders have the full range of skills required to meet our branch's diverse mission.

The face of the engineer officer may have changed, but the quality of support provided to the commander has not. How do the maneuver officers that you work with react when a female engineer officer shows up at the tactical operations center ready to meet the challenge of *ESSAYONS*?

Force XXI Engineers:

New Organization Misfires in the Breach

By Lieutenant Colonel Bruce Porter

The Army is experimenting with options for a new heavy (armored and mechanized) division design, called *Division XXI*, as part of the Force XXI program. One significant option, promulgated by Training and Doctrine Command (TRADOC), involves reducing the number of mechanized engineer battalions in each heavy division from three to two. This "new" design is not based on innovative concepts or breakthrough technologies. It is a retreat to Cold-War thinking in a myopic attempt to save manpower spaces. The new design replicates a structure that failed in both World War II and the Cold War and was fixed only with tremendous effort during the Persian Gulf War. More importantly, when the principles of *Army Vision 2010* and *Joint Vision 2010* are used as a basis for analysis, the new engineer design proves to be a poor, perhaps catastrophic, choice for the combined arms team of the future.

Background

Army force structures in World War II and the Cold War authorized one engineer battalion to be organic to each division. The resulting task organization of just one engineer company to each ground maneuver brigade (or its equivalent) was absolutely insufficient in close combat operations. The corresponding "fix" in both World War II and the Cold War was doctrinal—to task organize a corps combat engineer battalion to the division. The technique worked well in World War II when the mission involved construction. It did not work for missions requiring synchronized infantry-tank-engineer combined arms operations. To remedy this weakness, the official after-action report for World War II called for a full engineer regiment in each armored division. That recommendation was not acted upon in the rush to demobilize after the war.

The various types of divisions established during the Cold War experienced similar problems with insufficient division engineers. Again, they relied on a corps engineer battalion for augmentation. Task organization of two engineer battalions across three ground maneuver brigades (a matchup of eight engineer companies against 10 ground maneuver battalions), plus a cavalry squadron, was highly problematic. There was no way to coherently organize a division-level staff and three battalion staffs out of two standard battalion staffs.

Evolutionary Progress

The revolution in training inspired by the National Training Center (NTC) resulted in an unintended evolution of the maneuver/engineer task organization throughout the 1980s. Over time, maneuver units established that the "natural" pattern of operation was one engineer company per maneuver battalion task force (to include cavalry squadrons). When the NTC first opened, one engineer platoon usually was task organized to each deployed battalion task force. After a few years, a full three-platoon engineer company became the norm for each rotation to the NTC. After another few years, each battalion task force arrived at the NTC with a full engineer company (a total of two engineer companies). By 1988, each brigade deployment included major pieces of the engineer battalion headquarters. In the NTC's close-to-combat environment, even when not a main division effort, the natural evolutionary process resulted in one engineer company per battalion task force and one engineer battalion headquarters per maneuver brigade headquarters.

This relationship was fully recognized by commanders at all levels at the start of Operation Desert Shield. Each heavy division deployed with its organic engineer battalion, plus two corps engineer battalions and some type of colonel-level headquarters. (The exception was the 1st Cavalry Division, which was placed in theater reserve.) For example, the 24th Infantry Division deployed to Operation Desert Shield with its organic 3rd Engineer Battalion, the 5th Engineer Battalion from Fort Leonard Wood, the 299th Engineer Battalion from Fort Sill, and the 36th Engineer Group headquarters from Fort Benning.

The practical process of force modernization leads to equipment fielding at uneven rates across the Army. Corps units are almost always out of step with any specific division with regard to modernization. For most corps units, the problem is one of inconvenience rather than actual danger, because corps units reinforcing a division typically don't engage in direct combat. The problem is more critical for combat engineers. For the 24th Infantry Division, the result was almost catastrophic: Corps engineer battalions had older rifles (with incompatible ammunition) but newer (and also incompatible) communications equipment than the divi-

sion. Perhaps worst of all, neither of the corps engineer battalions had started the mechanization process—the spectacle of engineers in dump trucks fighting alongside Bradleys and tanks was heroic but institutionally shameful.

Maneuver units receive artillery support via small fire-support cells using remote communications (the artillery is out of sight and well to the rear). Combat engineer units, however, execute missions from *within* the maneuver formation. Engineers, infantrymen, Bradleys, and tanks operate side by side in virtually every task from squad through battalion levels. Sapper teams are integrated into dismounted infantry squads. Tanks with mine plows operate as part of breaching engineer platoons, which in turn are task organized to infantry companies. Comprehensive tactics, techniques, and procedures must be developed at every echelon to coordinate and blend the talents and capabilities of specific commanders and their units.

Synchronizing a combined arms breach is arguably the most complex, difficult operation a commander can undertake. Engineers, infantrymen, and tankers must have absolute trust and confidence in one another, trust and confidence born of repetitive training and habitual relationships. Those capabilities cannot be assumed when some unknown unit from outside the organization arrives on the battlefield. Mutual trust and confidence certainly were not present when corps engineer battalions joined the 24th Infantry Division during the initial deployment for Operation Desert Shield. They were built over a 4-month period *after* the units deployed and intensively trained together in Saudi Arabia. Given that extended training period, strong motivation based on the certainty of imminent combat, and lack of distracters, the corps engineer units effectively became "divisional" units.

Almost immediately after American ground forces departed from Iraq, the Chief of Staff of the Army approved a new heavy division engineer structure that included a brigade headquarters and three lean engineer battalions. That approval was based on years of analytic study and modeling by the Army. Additionally, the approval affirmed what had evolved over years of training at the NTC and acknowledged what had been proven to work in combat during Operation Desert Storm. The resulting force structure used no more manpower spaces than the previous two-battalion ad hoc design. It may be called the Army's first Force XXI organization.

Future Challenges

In contrast, the Division XXI engineer design now promulgated by TRADOC is just a rehash of already discounted concepts, disproven theories, and flawed Cold War designs. In fact, problems will be worse than those experienced in the Cold War. While engineer mobility assets decrease in the Division XXI design—

- Organic mobility capabilities of the maneuver unit remain constant.
- Requirements for maneuver unit mobility increase drastically.
- Enemy countermobility capabilities increase significantly.

The command and control problem of two engineer battalions applied against three ground maneuver brigades grows worse in Division XXI. The Division XXI engineer battalions are smaller and less capable than current battalions. The ability of corps engineer units to reinforce contingency divisions for close-combat synchronized operations has virtually evaporated due to the downsized Active Component force. (Almost 100 percent of all corps mechanized engineer battalions now are in the Reserve Components.)

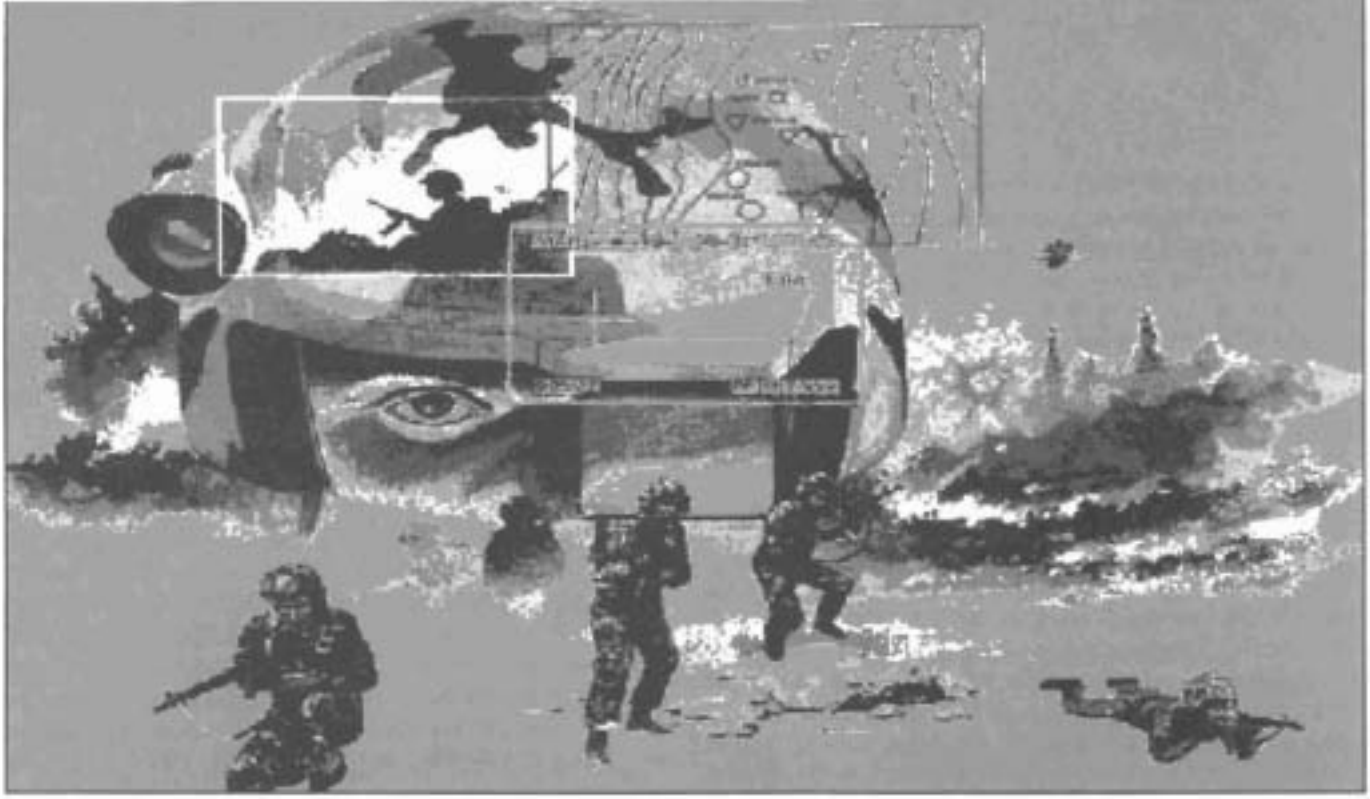
The new division, to be fielded by 2010, will include only "product improvements" in the way of major weapons systems, with no improvement in the maneuver unit's mobility. Improved electronics will give commanders better intelligence about the enemy and terrain—but they will be unable to use it, because they will lack the engineer mobility assets to maneuver across the battlespace and overcome complex, dynamic enemy obstacles. Yet, the theme of "Dominant Maneuver" in *Joint Vision 2010* is clear:

> *Through a combination of asymmetric leverage, achieved by our positional advantages, as well as* ***decisive speed and tempo****, dominant maneuver allows us to apply decisive force to attack enemy centers of gravity at all levels and compels an adversary to either react from a position of disadvantage or quit ... Dominant maneuver will require forces that are adept at conducting sustained and* ***synchronized operations from dispersed locations****. They must be able to apply overwhelming force... These forces must have the ability to* ***outpace and outmaneuver the enemy****. Current systems, enhanced by information superiority, will provide a clearer picture of enemy and friendly locations. Information superiority also will allow joint commanders to* ***coordinate widely dispersed units****, receive accurate feedback, and execute more demanding, higher precision requirements. [Emphasis added.]*

Army Vision 2010 establishes "Decisive Operations" as the Army's equivalent of "Dominant Maneuver." The vision specifies the concept of "simultaneous, brief, violent attacks" enabled by "simultaneous application" and "mobility, speed, and agility."

These visions provide a clear concept of tomorrow's battlefield: battalions that must disperse and fight autonomously on an increasingly nonlinear battlefield. Commanders will be expected to act quickly based on near-real-time intelligence. Implicit in this requirement is the need to preserve freedom of maneuver for the task force commander, to allow him to maneuver *where he wills* to best accomplish his mission, then to emplace dynamic

(Continued on page 34)



Maneuver Support Battle Lab:
Integrating Maneuver Support Into Force XXI

By Vern Lowrey and Captain Bryan Green

The year was 2005. At the National Training Center, the sun was just breaking the horizon. SFC Strader chewed his cold fast ration as the incoming variable-message-format message blazed dull green on his heads-up display.

The lieutenant was sending the morning status report. SFC Strader thought the lieutenant had 1st Platoon spread a little too thin. Each engineer squad was supposed to dominate a 10-square-kilometer area. Under normal circumstances the five engineers in their heavy wheeled engineer armored vehicle (HEAVY) could handle it.

Another message scrolled across the heads-up display; this time it blinked in crimson. SFC Strader read the message as he told the driver to start the vehicle and retract the low observable screen system and false image generator. It looked as though the opposing forces (OPFOR) were trying to force them off the airhead. The OPFOR would attack the flank where only one Mobile Strike Force company, his engineer platoon, and a squad of military police in armored security vehicles were holding an economy-of-force mission.

The lieutenant sent each squad the digitized master obstacle and chemical contamination overlay. The OPFOR were on the move, but they were still four hours out. There was still time to reinforce the autonomous combat security outpost and other dynamic obstacles they had posted the day before.

Strader ordered SPC McKinney to launch two Night Owl unmanned aerial vehicles to recon the route to their obstacle release point. As the Night Owls' saucer-like bodies lifted off the top of the HEAVY, SPC McKinney received infrared, ground-penetrating radar and acoustic images from their sensors as he guided them along the HEAVY's intended path to the obstacle release point. PVT Roberts drove the HEAVY out of its hiding position and followed the Night Owls down the combat trail.

SPC McKinney's voice came over the intercom, "Hey, the OPFOR laid some mines at the fork." The Night Owl transmitted targeting data to the on-board laser-munitions neutralizer. Without slowing, the laser-munitions neutralizer fired five bursts powerful enough to raise the buried mines' temperatures to a point that effectively neutralized them. Everyone prepared for a blast, because the laser sometimes missed a mine. Sure enough, the ModSAF simulation caused one to detonate right under the HEAVY...

This vignette describes a conceivable future virtual and live experimentation scenario where no one gets hurt but where soldiers and combat developers gain valuable insights regarding maneuver support DTLOMS (doctrine, training, leader development, organizations, materiel, and soldiers) programs. TRADOC's newest battle lab, the Maneuver Support Battlefield Laboratory (MSBL) provides direction, oversight, and horizontal integration of experiments related to the maneuver support enduring battlefield function. Maneuver support encompasses those actions taken to protect the force from the

effects of enemy/adversary action, provide the force freedom of movement during military operations, and inhibit the enemy/adversary's ability to move.

The Maneuver Support Battlefield Laboratory was officially organized at Fort Leonard Wood on 1 October 1996. Major General Clair Gill, commander of Fort Leonard Wood and commandant of the Engineer School, serves as the director. Colonel Ed Arnold serves as the deputy director for day-to-day operations. The commandants of the Army's Chemical, Engineer, and Military Police Schools form the battle lab's board of directors.

The MSBL coordinates the efforts of other TRADOC battle labs and schools in the maneuver support experimentation arena. It also exchanges information with industry, academia, major Army commands (such as the U.S. Army Intelligence and Security Command), Army components of the combatant warfighting commands (such as the U.S. Army Europe and Seventh U.S. Army component of U.S. European Command), various governmental laboratories and Department of Defense agencies, and other nations' battle labs (such as the German Army Battle Lab).

Experiments

The primary function of the MSBL is to conduct experiments on potential systems, techniques, and concepts and then input the most promising ones across Army DTLOMS programs. Most experiments are based on direct soldier and leader interaction with emerging technologies and materiel initiatives. The experiments support future materiel acquisition and assist with the development of future operational capabilities. They may be discrete, single events or progressive, iterative simulations (constructive, virtual, or live) designed to assess the military use and potential for new or revised concepts.

MSBL-led teams plan, conduct, and provide proponent evaluations to TRADOC. These teams focus on specific capabilities or technology opportunities. The experimentation process consists of design, planning and reviews, approval, execution, and the decision to invest or discard. The MSBL is the clearing house for all experiments within the maneuver support arena, including those related experiments that are to be conducted elsewhere.

Maneuver support experimentation produces one of the following recommendations:

- ***Invest in the Warfighting Rapid Acquisition Process (WRAP).*** Performed to accelerate fielding when mature technology fulfills an urgent need and experiments demonstrate compelling success.
- ***Invest in non-WRAP.*** Performed when the technology is successful and the normal requirements-determination process is satisfactory for fielding.
- ***Experiment further.*** Initiative appears to have merit, but further experimentation is needed to refine the DTLOMS requirements or develop the technology.
- ***Discard.*** Initiative does not meet the needs of the Army and merits no further investigation.

Types of Simulations

Most maneuver support experiments are conducted through iterative simulations that evaluate new ideas and technology. Modern simulations allow the Army to evaluate current and future force capabilities, determine requirements, and compare the contributions of alternative solutions. Simulations are divided into the following three categories, each with characteristic strengths and weaknesses:

Constructive simulations replicate warfare through computer-modeled war games. In some constructive simulations, the computer presents the participants with a graphic showing the operational situation and allows them to make decisions that influence the situation. Most constructive simulations employ models that war-game against a competent and active opponent. Others run independently of human interaction once the initial parameters and data are established. Constructive simulations replicate live exercises; simulate prototype technologies not currently available; vary the mission, threat, terrain, and weather; and repeat events until participants gain confidence in the outcomes.

Virtual simulations are conducted with electronic mock-ups of real weapons systems. The mock-ups use computers to replicate onboard systems and the external combat environment. Flight and tank-gunnery simulators are representative of this type of simulation. Virtual simulations allow man-in-the-loop assessments of new DTLOMS programs. Simulators at various locations can be linked to offer a common warfighting picture for multiple elements of the force. Insights are derived at both operational and systems levels. The advantage of virtual simulations is the ability to have soldiers make warfighting decisions while computers analyze the effects.

Live simulations are exercises conducted by units in the field, preferably against a tactically competitive OPFOR. Live simulations are useful to experiment with new DTLOMS programs. They offer the advantage of using soldiers and equipment in an actual training environment. The advantage of realism in live simulations must be balanced against their expense and the inability to repeat training events.

The optimal solution in experimental analysis probably is to use a combination of the three simulation types. Live simulations offer the most realistic environment for analysis, but the cost may be prohibitive. Ideally, experiments should maximize the use of live and virtual simulations and augment them with constructive simulations. The ability to link live, virtual, and constructive simulations through the use of distributed interactive simulation (DIS) links facilitates the best use of all three types.

Fort Leonard Wood is working to establish a *Core Distributed Interactive Simulations Facility* by the year 2000. This facility will provide state-of-the-art simulation for experiments and exercises in a synthetic environment using distributed interactive technologies. The facility will be physically and electronically secure and have fully integrated, validated, and accredited simulators, models, and tools. State-of-the-art reconfigurable, virtual simulators will represent the full functionality and capability of a battalion task force. The facility will provide realistic command, control, communications, computers, and intelligence (C4I), including battlefield effects. Users will have

access to repositories of standard databases, representations, algorithms, symbols, scenarios, and other data. They can access realistic resolution terrain databases with a variety of terrain types, conditions, and climates. The facility will support concept evaluation; requirements determination; crew, unit, command, and battle staff training; technology development and evaluation; system development; test and evaluation; tactics and doctrine development; and force modernization.

Current Experiments

The MSBL currently is involved with Force XXI and Army After Next tests and experiments. (Force XXI is concerned with operations between the years 2000 and 2010. Army After Next is concerned with operations after 2020.) The battle lab focuses experiments and analysis efforts to—

- Analyze operational impacts of various Force XXI and Army After Next designs of maneuver support forces.
- Leverage emerging technology to improve digital terrain data acquisition, storage, updates, dissemination, and exploitation on the battlefield.
- Provide an integrated joint force-protection strategy against nuclear, biological, and chemical (NBC) weapons and associated threats. This effort spans the spectrum of conflict from chemical and biological counterterrorism and industrial hazards during military operations to NBC defense during full-scale combat operations.
- Enhance counterproliferation initiatives for weapons of mass destruction.
- Enhance NBC defense capabilities in operations other than war.
- Integrate NBC defense into the passive sensors of the theater missile defense system.
- Provide an NBC defense battle management system that is integrated into Army command and control systems to leverage information technology in Force XXI and Army After Next operations.
- Identify military technologies that can be applied in military and civilian counterdrug operations.
- Provide capabilities needed to conduct land countermine operations.
- Analyze physical security requirements and capabilities for Force XXI operations, including nonlethal technologies and land mines, robotics, and antiterrorist activities.

The battle lab began limited experiments during 2nd quarter FY97, including several Concept Evaluation Program experiments. It is now the sponsor of the Autonomous Remote Chemical and Biological Agent Sensor—Advanced Concepts and Technology (ACT) II program and will receive sponsorship of the Biological Detection—Advanced Technology Demonstration (ATD) on 1 October 1997. The Dismounted Battlespace Battle Lab continues current proponent efforts involved with the Task Force XXI and Division XXI Advanced Warfighting Experiments (AWE) and Prairie Warrior 97. Insights gleaned from FY97 experimentation include:

- The Hornet (wide-area munition) is a clear "winner."
- The proposed Division XXI engineer group design is inadequate to support full-spectrum division operations.
- Collecting, storing, updating, and disseminating high-resolution digital terrain data are critical elements of the commander's battlefield visualization program.
- Maneuver brigades require dedicated terrain analysis capability.
- An automated NBC early warning system is required for force protection.

Experimentation in FY97 resulted in the following recommendations:

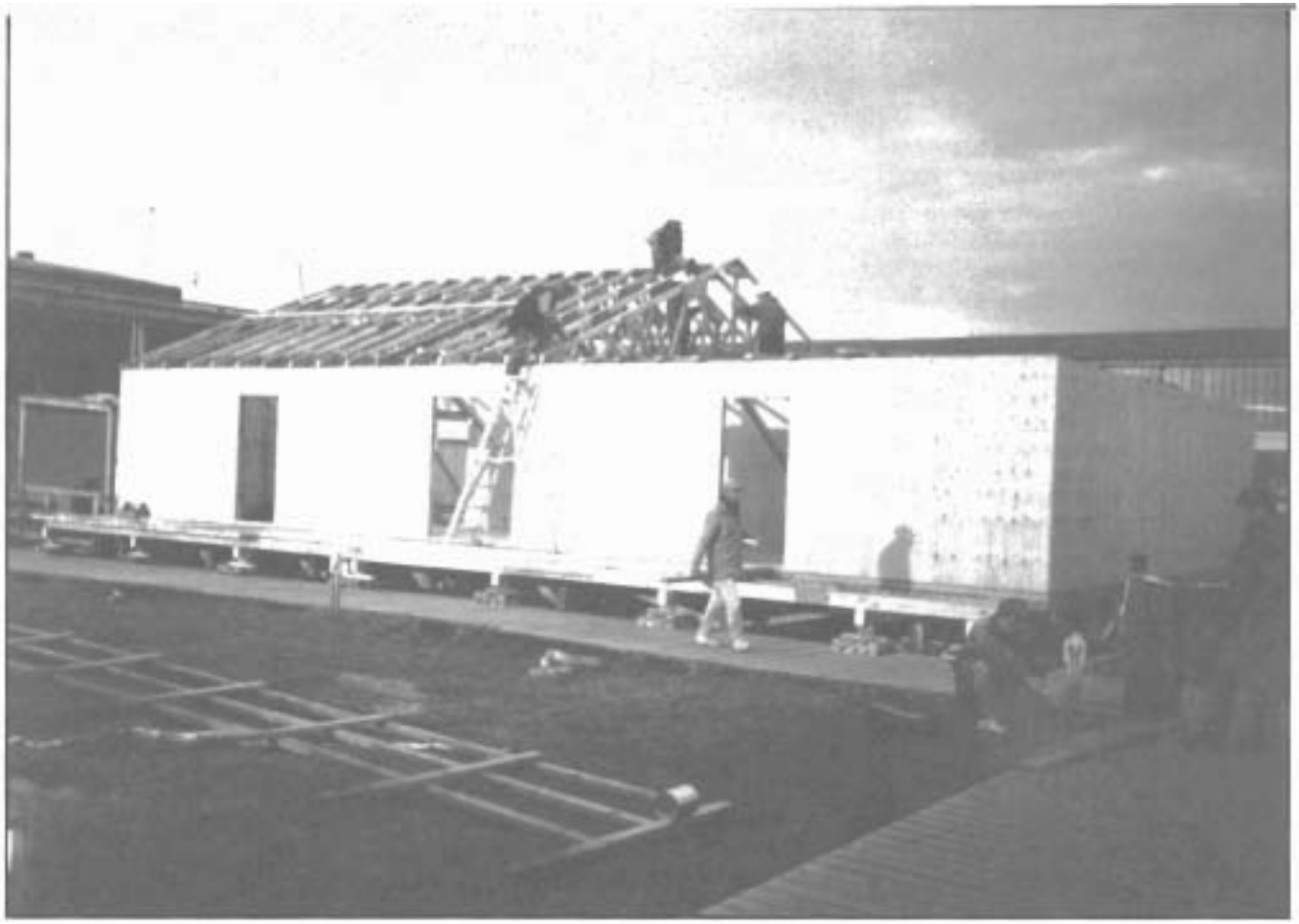
- Possible WRAP investment systems include: Assault Breach Marking System (ABMS), Downsized Digitized Topographic Support System (DTSS), Digital Reconnaissance System (DRS), and Miniflail Mine-Clearing System.
- Requirements to be documented include: Antipersonnel Obstacle-Breaching System (APOBS), intelligent minefield (IMF), and vehicle teleoperation capability (VTC).
- Systems requiring further experimentation include: Ground and Hand-Held Standoff Mine-Detection Systems (G-STAMIDS and H-STAMIDS), biological detection systems, digital terrain data dissemination through long-range communications systems.
- No experiments currently are scheduled to be discarded.

For further information, contact the Maneuver Support Battle Lab: Colonel Ed Arnold, Lieutenant Colonel Bill McCoy, or Mr. Vern Lowrey (573) 563-4082, DSN 676-4082, fax 4089. e-mail: arnolde@wood-vines.army.mil,mccoyw@wood-vines.army.mil,lowreyv@wood-vines.army.mil.

Mr. Lowrey serves as technical director of the Maneuver Support Battle Lab at Fort Leonard Wood. He is commander of the 1138th Engineer Battalion (First Missouri), Missouri National Guard.

Captain Green is the integration officer in the Maneuver Support Battle Lab at Fort Leonard Wood. Previous assignments include commander of B Company, 3/10 Infantry Battalion, Fort Leonard Wood, Missouri. CPT Green holds a master's degree from the University of Missouri at Rolla.





Thriving on Base Camps

By Lieutenant Colonel John R. Jones

It was a privilege as well as professionally rewarding to have supported the soldiers and civilians involved in Operation Joint Endeavor in the former Yugoslavia. This is the largest military operation in the history of the NATO alliance. The initial U.S. portion of this 60,000-troop contingent was about 20,000 soldiers, who formed Task Force Eagle. The 1st Armored Division formed the core of the task force.

To support U.S. forces, base camps were quickly planned, constructed, and sustained. This was accomplished by the U.S. Army Corps of Engineers (USACE), the 1st Armored Division Engineer Brigade (DIVENG), the Logistics Civil Augmentation Program (LOGCAP) contractor, and the Base Camp Coordinating Agency (BCCA). The BCCA served as the focal point for building, sustaining, and decommissioning all U.S. base camps in Bosnia-Herzegovina and Croatia.

This article describes how the BCCA supported the base camp mission from June through October 1996 during my tenure as the BCCA chief. Included are some insights and "flashes of the obvious" that I believe are key ingredients to successful mission execution in the Balkans. My intent is that these insights and flashes of the obvious will help others in the years ahead.

Command and Control

Task Force Eagle formed the nondoctrinal BCCA early in the deployment (January 1996) to plan, coordinate, and execute the urgent base camp construction mission. The BCCA was at the confluence of various organizations, to include USACE, DIVENG, U.S. Army Europe (Forward), and the LOGCAP contractor. To ensure functional interdependence, the BCCA coordinated extensively with all of these organizations while simultaneously taking direction from the 1st Armored Division Assistant Division Commander-Support (ADC-S).

Organization

The BCCA, a hybrid of a Directorate of Public Works and a USACE resident field office, was organized into five branches.

- The ***Plans and Operations Branch*** focused on both current and future operations. BCCA planners ensured that camp perspectives were integrated into all future Task Force Eagle operations. This included task force reshaping, support for national elections, redeployment, and transition of mission responsibilities to the covering force (1st Infantry Division).
- The ***Environmental Branch*** administered USACE environmental contracts and facilitated the education and assessment of environmental programs at each base camp.
- The ***Base Camp Assistance Team (BCAT)***, an "over-the-road" team, focused on training, assisting, and assessing all base camps.
- The ***Project Management Branch,*** formed late in the operation, was responsible for funding, customer interface, project monitoring, troubleshooting, and reporting.
- The ***Real Estate Branch*** acquired, managed, and disposed of land and facilities. To improve responsiveness, reduce over-the-road time, and provide continuity of care, the BCCA established two field offices and positioned them in the northern and southern halves of the U.S. sector.

Special staff in the functional areas of preventive medicine, safety, ammunition storage, and fire safety augmented the BCCA.

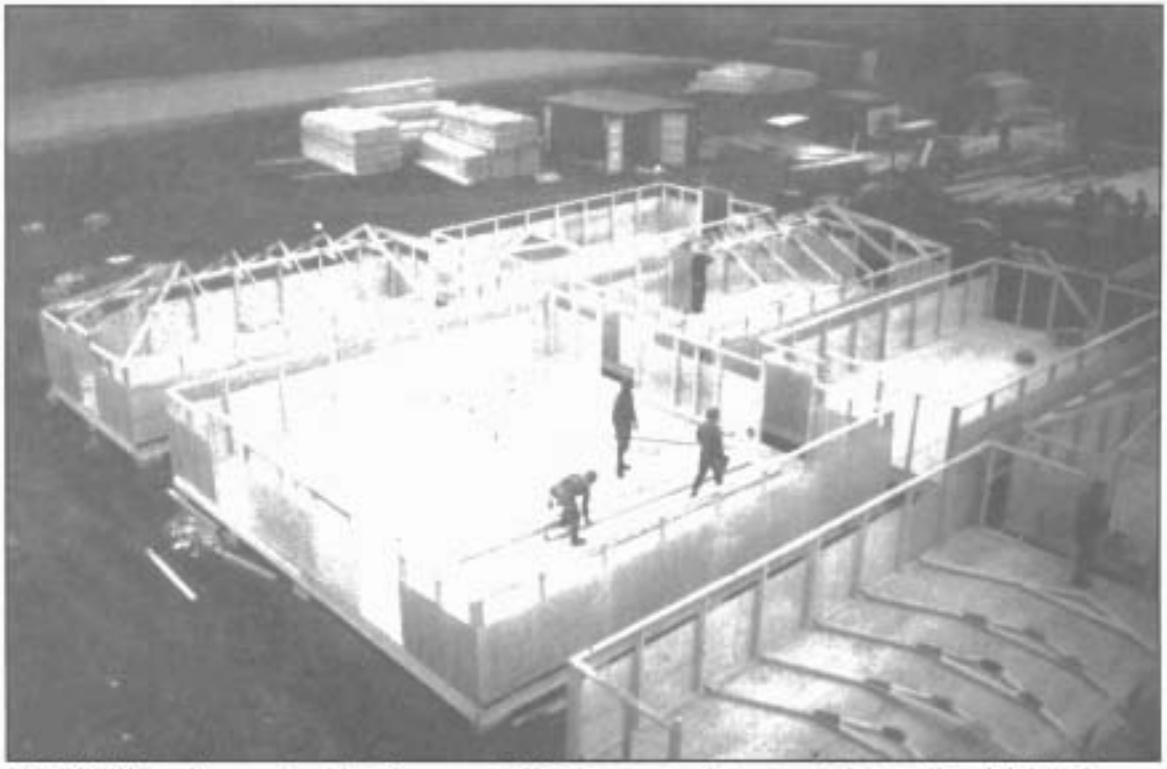
Staffing

BCCA staffing at its peak totaled 40 personnel. It included USACE active duty officers and individual mobilization augmentees, 412th Engineer Command personnel, U.S. Army Europe and 1st Armored Division augmentees, and Department of the Army (DA) civilians. The civilians provided expertise in real estate, safety, ammunition storage, and environmental engineering. Beginning in August 1996, the Army Audit Agency assisted the BCCA in process development and validation. As U.S. force levels were reduced from October through December 1996, the BCCA evolved into a leaner organization.

Base Camp Standards

Task Force Eagle established standards up front that addressed living and support facilities as well as force-protection measures. Both *interim standards* (less than 30 days) and *duration standards* (more than 30 days) were established. The goal was to improve safety and provide consistent and prudent quality-of-life levels throughout the U.S. sector.

Interim and duration living standards for the general-purpose, medium, tents were 15 and 10 soldiers per tent, respectively. Other accommodations included fixed facilities and living containers. Additionally, a total of six Force Provider sets (each housing and supporting 550 soldiers) were installed on three base camps. For hasty insertions, Force Provider sets are convenient; however, maintenance is high as are costs to decommission, clean, and repackage them for reuse. The duration standard for showers and latrines was one shower head and latrine per 25



1AD DIVENG units construct tent frames at a U.S. base camp in support of Operation Joint Endeavor.



Twenty-two U.S. base camps were scattered throughout the U.S. sector in Bosnia-Herzegovina. One U.S. base camp was located in Croatia, along the Sava River.

soldiers. Lighting, heating, and hard floors were in all duration standard tents. There were facilities on each base camp for dining; a chapel; a laundry; and morale, welfare, and recreation (MWR) activities. Base camp population determined the number of tents for support and administrative facilities.

Task Force Eagle's force-protection standards ensured that every soldier had access to a bunker or fighting position. The task force also developed standards for perimeter lighting, fencing, guard towers, ammunition holding areas, and helipads. Base camp site selection criteria addressed items such as trafficability, living and motor park space, defendability, communications, water source, and main supply route accessibility.

Base Camp Construction

U.S. Army engineer battalions, a U.S. Navy Seabee battalion, a U.S. Air Force RED HORSE battalion, and the LOGCAP contractor (Brown & Root Services Corporation) shared responsibility for constructing 23 base camps in the U.S. sector. USACE (specifically the Transatlantic Program Center in Winchester, Virginia) administered the LOGCAP contract (*Engineer*, March 1997, page 2).

LOGCAP, an Army program, uses a civilian contractor to perform selected services to augment U.S. forces during a military operation. Tapping into this program allowed the best use of our engineer resources. For Operation Joint Endeavor, Brown & Root provided base camp construction and sustainment services as well as some logistics support services (i.e. transportation, maintenance, supply, laundry, and dining facilities). Each base camp had a Brown & Root manager and staff to fulfill construction, sustainment, and decommissioning contractual requirements. Herculean efforts by the entire engineer team ensured that construction was executed to standard with no compromise of the soldiers' safety or quality of life.

Base Camp Leadership

Senior base camp leaders, the BCCA, and Brown & Root shared responsibility for operations and maintenance. There were 22 base camps in



Organizational structure of the Base Camp Coordinating Agency (BCCA)

Bosnia-Herzegovina and one in Croatia, each housing from 200 to 2,500 soldiers. Each senior base camp tactical commander appointed a "mayor" to assume camp leadership responsibilities. The mayors worked closely with the Brown & Root camp manager, the DIVENG direct support unit, and the BCCA. Since mayors required the knowledge to "run" a base camp, the BCCA developed and sponsored necessary training. One course focused on operations and maintenance and the other on decommissioning. Topics included real estate, environmental programs, operations and maintenance, local contracting practices, LOGCAP rules, DIVENG roles, civil-military affairs, safety, property accountability, force protection, preventive medicine, ammunition storage, and MWR responsibilities.

Town Hall Meetings

The BCCA facilitated regional town hall meetings every two weeks at various base camps throughout the sector. These meetings provided a forum for discussion and problem solving. Attendees included the ADC-S, the BCCA chief, base camp mayors, and senior tactical commander representatives (usually brigade and battalion executive officers), the Task Force Eagle G4 and Property Book Officer, Brown & Root camp managers, BCCA project managers and real estate specialists, force-protection and safety experts, and representatives from DIVENG and MWR. These command-sponsored events encouraged dialogue, built trust, and allowed issues to be addressed quickly.

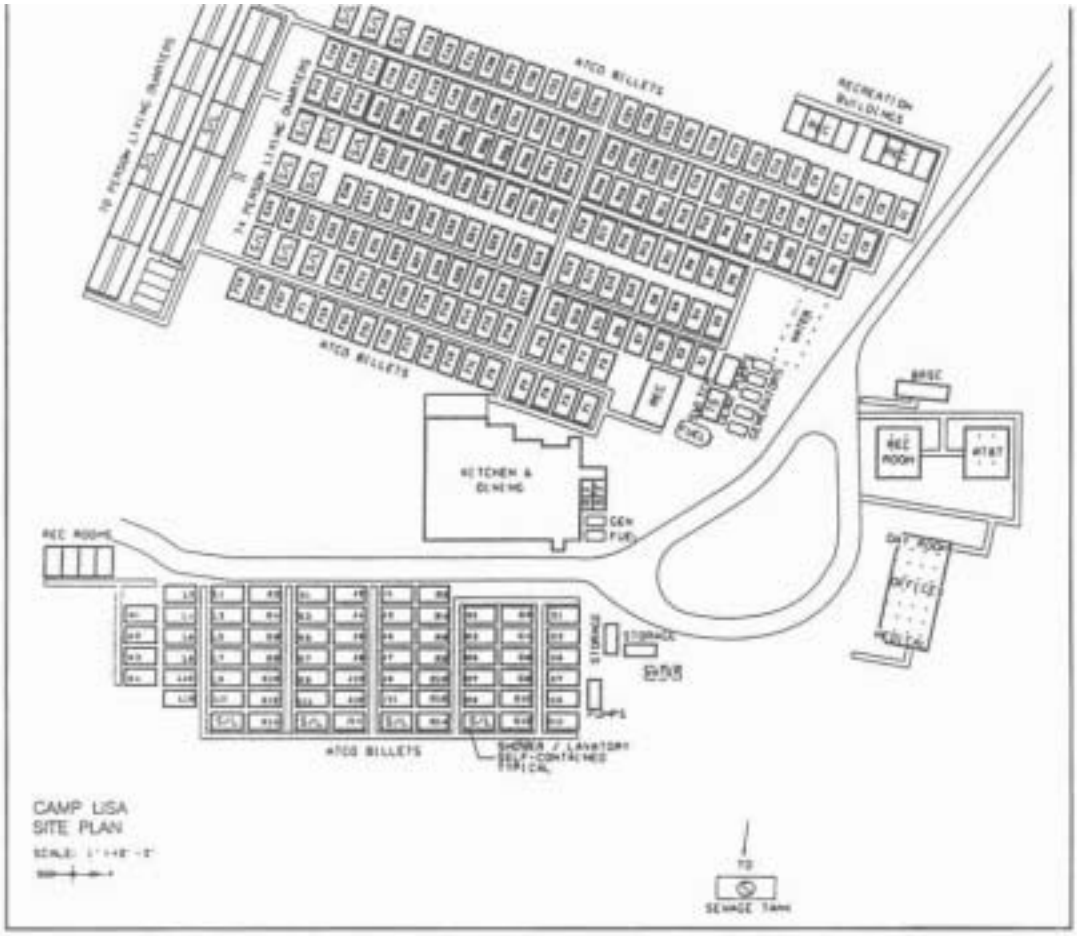
Business Practices

Task Force Eagle established a Joint Acquisition Review Board (JARB). This common-sense, better-business-practices group included the BCCA chief (the JARB president) and the Task Force Eagle resource manager, G4, G3, and a Staff Judge Adjutant advisor. All new base camp work required JARB review and ADC-S approval. Any soldier or unit could initiate a work order. Then it went to the base camp mayor for approval and on to DIVENG (usually the engineer battalion in direct support to that base camp) for review and action. DIVENG could recommend disapproval, execute the work order, or forward it to the JARB. Work orders costing more than $2,500 required JARB review and approval; those less than $2,500 were acted on by the BCCA chief. The task force review process saved money, standardized procedures, developed practical low-cost solutions to requests, and promoted safety and consistent quality of life on base camps.

Base Camp Assistance Visits

The Base Camp Assistance Team (BCAT) visited sustainment camps every four weeks and de-commissioning camps every two to three weeks. On these visits, the team concentrated on education, training, and assistance, although it also conducted a base camp assessment and reported to the Task Force Eagle command group after every visit. Based on published standards and approved definitions, the BCAT assessed four major areas:

- ***Force protection***—local national screening, perimeter integrity, risk assessment, ammunition storage, and weapons security.
- ***Environmental program***—spill prevention, spill response, hazardous-waste and hazardous-material disposal, and petroleum, oil, and lubricants (POL) transfer operations.
- ***Preventive medicine***—dining facility operations, water supply, and vector and rodent control and repellent systems.
- ***Safety***—fire safety, living area safety, motor pool safety, and accident prevention program.



An example of a U.S. base camp facilities site plan, exclusive of site perimeter and force protection measures.

Coupling outstanding base camp leadership with BCAT visits ensured that all base camps complied with established Task Force Eagle standards.

Environmental Program

The Task Force Eagle environmental program was proactive and highly effective. BCAT team visits always included a BCCA environmental representative who promoted, trained, and enforced the established environmental standards (*Engineer*, March 1997, page 12). Every BCAT visit and town hall meeting stressed items such as spill prevention, hazardous-waste and hazardous-material management, safe POL transfer point operations, and spill response capabilities. Before a base camp was occupied, an environmental baseline survey was done to acquire a benchmark. A final survey was conducted when the camp was decommissioned. Task Force Eagle then took appropriate actions to mitigate differences between the two surveys.

Proof of this effective environmental program was reflected in the minimal corrective environmental actions required when base camps were decommissioned.

Base Camp Decommissioning

As the U.S. reduced its presence in Bosnia-Herzegovina, it decommissioned base camps in a deliberate, safe, and disciplined manner, using a process developed by DIVENG and BCCA. Force protection and stewardship of government property were critical. The senior base camp tactical commanders responsible for decommissioning their camps applied lessons that were learned early in the operation. Base camp complexity, location, and size determined the decommissioning time and effort, but the phased process usually took about six weeks. The decommissioning team consisted of tenant units, DIVENG assets, and the LOGCAP contractor. Base camp leaders, with the advice and assistance of BCCA and DIVENG, orchestrated the work.

The phased decommissioning process collapsed the camp in on itself. Soldier support facilities (the shopette, chapel, library, and MWR facilities) were removed first, followed by life-support facilities (dining facilities, tents, showers, and latrines). Bare essential life-support facilities and force-protection infrastructure (concertina wire, guard towers, and fighting positions) were removed last. BCAT closure team visits to base camps anticipated and solved problems as they arose and assessed and monitored progress. On the final visit, a clearance checklist (similar to a range control checklist) served as the clearance document. Harvesting material from decommissioning base camps was deliberate and saved money. Essentially, all base camp expansions and improvements after June 1996 were completed at little cost using harvested materials (gravel, lumber, tents, shower and

latrine facilities, force-protection material, and electrical and plumbing equipment) from decommissioning base camps. BCCA served as the clearing house for all harvested materials. Once items were identified as base camp excess, they went on the harvest list for transfer to a base camp with a valid need.

Base Camp Transition

The outgoing 1st Armored Division and the incoming 1st Infantry Division developed a memorandum of agreement that addressed which base camps would be kept, their respective capacities and capabilities, transfer dates, and which unit would accept responsibility for each camp. The BCCA played an important role during the transition process to ensure that incoming 1ID leaders understood the base camp mission.

The units developed transition plans for each base camp to be retained. Outgoing and incoming leaders executed these plans to standard, which included training (sponsored by BCCA), a 100-percent property inventory between mayors, transitioning the base camp smart book, and conducting a joint walk-through.

Flashes of the Obvious

- When your boss asks you to go do great things in a far-away land, go for it.
- Nothing is more important than applying common sense and keeping things simple—so tired and confused people can understand and quickly get on with the task at hand.
- Bad news seldom improves with age. If you have a problem you cannot resolve, surface it. Task Force Eagle rarely shot the messenger and quickly addressed issues.
- View obstacles as a transient state—something to be solved along the pathway to excellence. Press the fight.
- Establish base camp standards early, and enforce them consistently. The desire to improve base camps above established standards was immense, but established and understood standards helped squelch that desire.
- Underwrite honest mistakes. Perfectionists in the Balkans did not do well. Planning, preparing, and rehearsing paid dividends and eliminated most mistakes. Don't demand exactness. Don't chisel decisions in stone. Be willing to change as time unfolds and circumstances change.
- Gather information and critical items of interest by talking to people and visiting base camps. Don't hide behind your computer or telephone. Get near the action to listen and learn, but don't micromanage the action. Base camp assistance visits and town hall meetings encourage dialogue and build trust.
- Make decisions quickly. Often there isn't time to sleep on an issue. Working in this environment brings a new meaning to decision making.
- Plan ahead. Focus your attention on the next few days, not the next few minutes. This advice is not always possible, but focus on the important things.
- Military operations cost a lot of money. Implement cost-saving measures such as joint acquisition boards, better business processes, and material-harvesting programs.
- Three equals one in the Balkans. It usually took three times as much effort, persistence, and time to execute missions in Bosnia-Herzegovina as in other places I have served. Plan accordingly and get over all the obstacles!
- Remember, a task is not finished until the soldier is living in it or using it.
- Teamwork is crucial—it's an attitude.
- Estimates are only estimates to the person making them; everyone else hears a fixed price or absolute schedule. The listener hears only the low end.
- Stay proactive. The champion-to-chump cycle can be short in this type of environment. Keep your head in the game.
- Activated reservists, DA civilians, and the LOGCAP contractor did a superb job.

Summary

Base camp accomplishments were many. Efforts by Task Force Eagle, USACE, DIVENG, and Brown & Root were extraordinary as they constructed, sustained, and decommissioned base camps—safely, quickly, and to standard. The safety and quality of life in these camps received high marks. Engineer efforts have played a large part in the success thus far of Operation Joint Endeavor, but another factor deserves a significant portion of the credit: the professionalism and selfless service of Task Force Eagle soldiers, DA civilians, activated reservists, and contractors. The men and women who are serving proudly and tirelessly are true patriots who have made a lasting difference to this war-torn region.

Lieutenant Colonel Jones is the Deputy Commander, St. Louis District, U.S. Army Corps of Engineers. In addition to serving as chief of the Base Camp Coordinating Agency in support of Operation Joint Endeavor, he has completed tours with the 3rd Armored Division, Germany; New York District, USACE; the 130th Engineer Brigade; and Operation Desert Shield/Desert Storm. LTC Jones holds a master's degree in civil engineering from Pennsylvania State University and is a registered professional engineer in Missouri.

Readiness:

DPW Supports Power Projection

By Colonel R. O. Buck

Fort Benning, Georgia, is one of the Army's 15 power-projection platforms. It is home to three combat units that have very short deployment "strings": the 3rd Brigade of the 3rd Infantry Division (headquartered at Fort Stewart, Georgia); the 75th Ranger Regiment headquarters and its 3rd Ranger Battalion; and the 36th Engineer Group. The rapid deployment of any of these units requires teamwork between the deploying unit and a host of post staff elements, as well as such off-post entities as the Corps of Engineers Savannah District. Fort Benning's Directorate of Public Works (DPW), with an in-house staff of 700 individuals, is a key member of the team. The following summary of DPW activities shows how critical the organization is to the smooth and rapid deployment of power-projection forces.

Master Planning. The DPW's involvement in power projection begins with master planning. Well before any deployment operation, the DPW master planning staff ensures that a myriad of up-to-date replacement facilities are properly documented and sited. Fort Benning currently is reaping the benefits of the Army's drive to place all permanent party soldiers in 1+1 barracks. (That is the desired new standard for enlisted unaccompanied personnel in permanent party barracks.) Several battalion barracks sets, valued at $69 million, are under construction. The directorate's master planners also orchestrate the development of other supporting power-projection projects under the Army Strategic Mobility Program (ASMP). Included in this program is a $4.6 million deployment warehouse (scheduled to be completed in May 1997) and a new $9.4 million railhead facility (construction to start in the fall of 1997).

Facilities. Maintenance of existing facilities is vital to the ability of Fort Benning's power-projection units to deploy on a moment's notice. As on most Army installations, our operation and maintenance (O&M) funds are at a premium. Their expenditure reflects the priorities of Major General Carl Ernst, commandant of the Infantry School and commanding general of Fort Benning: safety, training, power projection, and quality of life.

Barracks. Many of Fort Benning's O&M dollars are programmed to repair existing barracks, which have an average age of 40 years. Virtually all of their major components (roofs; electrical, plumbing, and heating/cooling systems; and latrines) gradually are being repaired or replaced. Augmenting this effort is a robust U-Do-It program,



The new dining facility for the 3rd Infantry Brigade, 3rd Infantry Division, is currently ahead of schedule.



A renovated barracks complex soon to be occupied by soldiers in the 36th Engineer Group.

which allows soldiers to perform projects ranging from painting and wall papering to installing ceiling fans and tile floors.

Airfield. Sometimes, all the repair efforts in the world will not keep a system up and running. A case in point is the Lawson Army Airfield's electrical system. This airfield can support the largest military and commercial planes in existence. Keeping the electrical system (which powers all the navigational aids) in operating condition became a problematic undertaking, despite the best efforts of the airfield staff and DPW craftsmen. The solution? Another ASMP project that we put together in relatively short order.

Supplies and Materials. Another facet of the DPW's power-projection mission is acquisition and maintenance of material to support deployment operations. The DPW maintains a large stockpile of tie-down equipment and chock blocks for use in rail movements. (This remains a mission even though the use of modern rail cars is steadily diminishing the need for such material.) The DPW also keeps a large inventory of plywood on hand. It is used to preclude metal-to-metal contact on pallets and to lay on airfield ramps for tracked vehicle movement. A stockpile of 4 x 4 material is used as shoring under pallet loads.

Time-Phased Actions. The extensive preparations and constant effort expended by units and many staff elements across the post prove their worth when a deployment operation kicks off. The choreography is remarkable and teamwork exceptional as all involved, including the DPW, focus on the mission at hand. The DPW has its own time-phased sequence of events, which includes activating established contracts for generators and portable toilets, hooking up light sets at the ammunition supply point and staging area, and issuing tie-down material, plywood, and timbers.

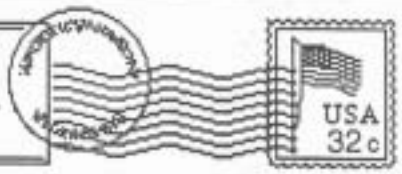
Short-Fused Taskers. Like all staff elements on post, the DPW responds quickly to each deploying unit's needs. We do our part to keep "Murphy" under control by, for example, repairing hanger heaters that suddenly fail, replacing blown light bulbs, and providing experienced forklift operators to load CONEXes on flatbed trailers. The DPW workforce also stands ready to tackle unique, short-fused taskers. For example, during Operation Just Cause in Panama, the directorate enlarged architectural drawings of the palace for use by the 75th Ranger Regiment.

Seaport. The DPW's power-projection responsibilities extend beyond post boundaries. If a large deployment operation requires additional seaport capabilities, the DPW is part of a 250-person contingent from Fort Benning that proceeds to Jacksonville, Florida, to operate the military seaport. DPW missions include on-site contracting for housing and subsistence (to support the port support activity contingent) and acquiring and installing fencing needed to secure marshaling and holding areas at the port.

Fort Benning's DPW staff is an integral part of the post's power-projection mission. Working hand-in-hand with deploying units, the installation's many staff agencies, and various off-post organizations, the DPW helps ensure that Fort Benning is ready to project combat power on a moment's notice.

Colonel Buck is the Director for Public Works at Fort Benning, Georgia. Prior to assuming this position, he commanded the Detroit Engineer District. COL Buck is a graduate of the Army War College.

Letter to the Editor



National Training Center Notes: "Using Obstacle Group Designs," (*Engineer*, December 1996, page 52).

Major Buning contends that the only key to successful countermobility support at the task force level is to go back to individual obstacle planning—what I used to call the "green measles sheet." Before we take a step back to the Cold War General Defense Plan approach, we need to understand the impact and reasons for the lack of synchronization at the task force level. Major Buning states: "...it is a lesser training challenge to make lieutenants and platoon sergeants understand that they must site obstacles and adjust a given design to the terrain than to generate the design itself." He has successfully identified the problem: training. The solution, however, is not to centralize and remove responsibility for obstacle group execution from the platoon leaders' and sergeants' hands.

We have come a long way with the echelons of obstacle planning, obstacle intents, planning factors, and individual obstacle designs tied to lethality (probability of kill). The platoon leader and platoon sergeant must understand, in detail, obstacle groups. They must be trained. Critical for the platoon leader's success in supporting the combined arms team with countermobility is—

- Taking the obstacle intent (target, effect, and relative location) and tying that to the direct- and indirect-fire systems.
- Understanding the minefield density (lethality) and obstacle effects.
- Understanding the theory behind the obstacle designs.

Ask a recent graduate of the Engineer Officer Basic Course (EOBC) or the Advanced Noncommissioned Officer Course (ANCOC) why a fix or disrupt minefield is 250 meters wide and why a block or turn minefield is 500 meters wide. Ask them how the resource planning factors are derived or why certain minefields have irregular outer edges. You probably will see a "deer-in-the-headlights" look. Many combat engineers cannot answer those questions or do not understand the basis of the theory. This is unacceptable. If the problem is training, attack the problem. We do not throw away troop-leading procedures or the military decision-making process because soldiers cannot meet the standard. We do not institute company/team planning and execution requirements for the task force commander because subordinate unit commanders cannot execute their assigned missions. We train to overcome deficiencies/shortfalls and to accomplish the mission or meet the standard. Platoon leaders and sergeants must be ready and able to not only "talk the talk" but "walk the walk." The challenge is there: Determine the weaknesses of EOBC and ANCOC and ensure that the program of instruction and doctrinal manuals address the problem. Then review home station training requirements. More than likely, the platoon leaders and sergeants were not held to standard by the engineer battalion and company commanders. Does the task force engineer get on the ground with the platoon leaders as they coordinate the obstacle group with the maneuver team commanders? Is it an Engineer Officer Advanced Course (EOAC) problem? Does EOAC provide the necessary instruction for potential company commanders so they can answer the questions (above) about obstacle theory? The Corps of Engineers must have the engineer platoons plan and execute obstacle groups in order to have a synchronized maneuver plan.

Much like the lessons learned by our maneuver counterparts, drawing a goose egg and some target reference points (TRPs) on an overlay will not ensure the proper positioning and synchronization of weapon systems. The maneuver team commander uses the graphics and task force commander's intent to properly place his weapons systems. He focuses on the TRPs with the task force commander and S3. Adjustments/movement of the actual battle position are the norm. Until the weapons systems are placed (especially to turn, fix and block), individual minefield planning is a waste of paper. The intent of the obstacle group symbol is to provide the flexibility needed for general top-down guidance and bottom-up detailed planning/execution. Obstacle resource factors are the planner's (the task force engineer's) tool to determine the necessary Class IV/V obstacle material requirements.

Major Buning has his fingers on the pulse for recurring engineer tactics, techniques, and procedures, and planning deficiencies. My concern is that we overreact to a training deficiency and create a paper drill for the task force engineer. The task force engineer who plans individual obstacles wastes his time and hinders his time management in getting with his platoon leaders and task force S3 to ensure that obstacle groups are constructed to standard and synchronized with direct- and indirect-fire systems.

Major Robert E. Wray, Jr.
Special Troops Battalion
USARAK, Fort Richardson, AK

Author's Reply

I appreciate Major Wray taking the time to write. His comments represent a healthy desire to fix a critical problem. They provide an opportunity for me to clarify once again what was not only my last article from the NTC but probably the most important one to date. My intent was not to cause an overreaction to an observed trend in training deficiencies in the tasks of company planning and platoon execution. Nor did I call for a return to the days of overpromising engineer capabilities fictitiously delivered in training, using textbook platoon planning factors and red and white engineer tape. I hope that this discussion causes all combat engineer leaders to review these articles (*Engineer*, CTC Notes, August and December 1996) in detail and to use them as part of their unit professional-development discussions.

My proposal that engineers use the obstacle group design as a planning tool is based on a well-founded appreciation of the problem and its causes, as well as suggestions from the NTC combat engineer training team. Whether units adopt this proposal is not as important as the wake-up call this idea represents. All combat engineers must assess their unit's ability to effectively and efficiently employ their combat engineer platoons. Solutions ultimately are generated by platoons that are proficient in battle drills and by company commanders who drill their staffs to produce executable plans.

I did not propose absolving any leaders from training to the highest standard of combined arms obstacle integration. I did state that the obstacle group design offers an effective planning tool that focuses on the weakest link in platoon execution—company planning products. Platoon leaders must receive an executable order that is rich in details, no matter what the form or how much time is available to produce it, if there is to be any hope of emplacing a synchronized obstacle system prior to the ordered defend time.

The bottom line is that doctrine drives our force structure. Engineer platoons are equipped and manned to be executors; that is our doctrine. There are no internal planning or significant logistical capabilities within the platoon; they must be provided by the company headquarters. Any effort the platoon directs toward planning and outside coordination to site obstacles to the terrain and the defender competes with the platoon's time and capability to emplace obstacles. Combat engineer leaders must establish a bedrock understanding of this concept in their organization. The level of their contribution to the combined arms team in preparing to fight the defense is directly proportional to the productivity of the engineer platoons. Commanders and their staffs maximize the efficiency and effectiveness of their engineer platoons by keeping their energy and focus on the doctrinal role of executing the plan.

Major Tom Buning



CTC Notes



Joint Readiness Training Center (JRTC)

The Engineer Platoon Sergeant

By Sergeant First Class Bernard Westover

Units rotating to the JRTC often do not use the engineer platoon sergeant to his fullest potential. Frequently, the platoon sergeant stays in the tactical operations center during the attack and in the mine dump during defensive preparation. This poor use of personnel reflects the "old days," when the platoon sergeant just provided the "beans and bullets" as his unit went on the attack or the defense.

On today's battlefield, the demands on leaders to provide purpose, direction, and motivation are greater than ever. The platoon sergeant is the keystone of the platoon. The most knowledgeable and experienced soldier in the unit, he must lead by example and shoulder more than his share of the headquarters' responsibility every day. The platoon sergeant is the link between the squad leader and the platoon leader. In the absence of the platoon leader, the platoon sergeant serves as the task force engineer (a staff officer) to plan and execute mobility, countermobility, and survivability missions anywhere in the world. Unit leaders must not overlook the tactical value and experience of a platoon sergeant when planning a mission or to assist the platoon leader when executing a mission.

Today, subordinate leaders are selected for promotion earlier and have less experience in key leadership-developing positions like squad leader and team leader. The platoon sergeant must be decisively engaged in training battle drills and unit standing operating procedures (SOP). He coaches and mentors in garrison and provides that much-needed warrior spirit to junior leaders on simulated battlefields like those conducted at the combat training centers. Aggressive, take-charge leadership styles are not taught in the Noncommissioned Officer Education System schools and can only be instilled by a great role model—the noncommissioned officer (NCO).

In light, airborne, and air assault units, the platoon sergeant must be prepared to assume the duties and responsibilities of the task force engineer at any time. He must be ready to plan the next fight and lead the platoon into combat. The job of a sergeant at any level goes beyond teaching soldiers how to fight and survive. NCOs must forge the warrior spirit in soldiers and motivate them to do the hard right over the easy wrong. This motivation is a missing ingredient in some leadership styles observed at the JRTC.

Specific areas needing improvement and leader emphasis are—

- Writing squad orders with specific tasks and a clear purpose.
- Adhering to troop-leading procedures.
- Performing precombat inspections.
- Performing combined arms rehearsals.
- Providing security on mounted and dismounted movements.
- Executing missions effectively and in a timely manner.

The presence of an experienced platoon sergeant will solidify a platoon when soldiers are faced with fear, chaos, deprivation, hunger, or fatigue. Units that can overcome these physical factors and have platoon sergeants who lead by example and apply the skills and knowledge learned in training will overcome any opponent or obstacle in combat.

The platoon sergeant must train the platoon leader to be a task force engineer and train squad leaders to become platoon sergeants. During every rotation, platoon sergeants ask, "If we went on the attack, wouldn't I just micromanage the squad leaders?" The answer is a resounding "No!" At the JRTC, the platoon sergeant can clearly assess how subordinates react under stress. He is a link between the infantry company commander and the engineer squad leaders at the breach point. There he can control the breach forces and elements of SOSR (suppress, obscure, secure and reduce) while squads conduct the breach. When soldiers' lives are threatened, his experience is the greatest asset on the battlefield. He can make that split-second decision that means the difference between success and failure.

At the objective, the platoon sergeant supervises the reorganization and redistribution of ammunition and equipment. He tracks the status of personnel, evacuates the wounded and killed, and reports those missing in action to higher headquarters. If necessary, the platoon sergeant also prepares for the countermobility effort to defend the objective. He quickly reorganizes the platoon to clear routes into the objective for resupply, casualty evacuation, and reinforcements.

The engineer platoon sergeant has a unique job because the engineer field is diverse and demanding. He provides leadership to squad leaders and trains the platoon leader to effectively accomplish his mission. The platoon sergeant does not accompany every squad leader on every mission. His presence, however, is critical when the task force conducts a mission where the platoon is task organized with the main effort. His tactical and technical experience cannot be transmitted over the radio. When the platoon is in the heat of battle, conducting a breach or route clearance mission, the platoon sergeant must be on the ground to provide the direction and leadership needed to accomplish the mission.

Sergeant First Class Westover served as an engineer platoon observer/controller at the Joint Readiness Training Center, Fort Polk, Louisiana, from 1994 through 1996.

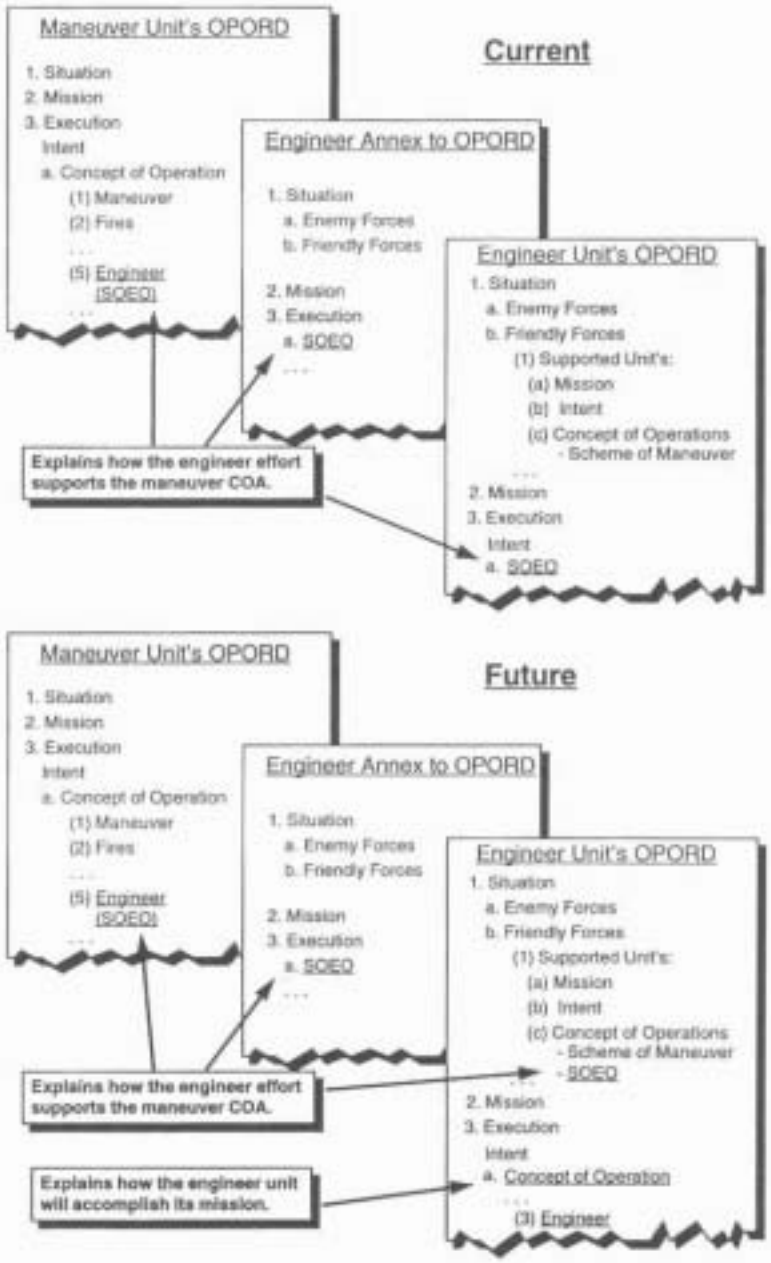
Change 1 to FM 5-71-2/3

By Captain Joe Birchmeier

Small-group instructors at Fort Leonard Wood and observer/controllers at the National Training Center have identified a problem with the format of engineer unit operations orders (OPORDs) in Appendix B of FM 5-71-2, *Armored Task Force Engineer Combat Operations,* and Appendix D of FM 5-71-3, *Brigade Engineer Combat Operations (Armored).* The problem is that the current engineer unit OPORD format does not allow engineer commanders to fully explain how their unit will accomplish its mission, especially in offensive operations in which the engineer commander is the breach force commander.

Changes. To correct this problem, change 1 to FM 5-71-2/3 will soon be published. The changes include:

- Moving the "Scheme of Engineer Operations (SOEO)" from paragraph 3 to paragraph 1 in both the engineer battalion and company OPORDs. The SOEO focuses on what the essential mobility/survivability tasks are and how they support the Scheme of Maneuver.
- Adding a "Concept of Operations" subparagraph to paragraph 3 in both the engineer battalion and company OPORDs. This change will allow commanders to fully detail how their unit will accomplish its mission. At a minimum, this paragraph will clarify the purpose of the mission, expand on the commander's intent, and describe the commander's plan to maneuver his unit during the operation. The format of this paragraph will be much less restrictive than the SOEO, allowing commanders to tailor the content to their mission.
- Publishing the same SOEO in three documents: paragraph 3.a. of the supported unit's OPORD, paragraph 3.a. of the Engineer Annex to the supported unit's OPORD, and paragraph 1.b.(c) of the engineer unit's OPORD.



Timeline. Change 1 to FM 5-71-2/3 should be completed and posted on the Internet (Engineer School home page) by the end of April 1997. Paper copies of the changes should arrive in units through normal publications distribution by the end of the year.

Captain Birchmeier is a doctrine writer in the Directorate of Training and Doctrine, U.S. Army Engineer School. He previously served on the Sidewinder 12 Team, National Training Center, Fort Irwin, California.

From Sandbags to Computers:

What's New in Field Fortifications and Protective Structures

By Colonel Bruce K. Howard

Fortifications have been an integral element of defense throughout the history of warfare. In the past, huge structures were erected to deter enemies and protect the homeland. The Great Wall of China and a multitude of castles throughout Europe are lasting monuments of this doctrine. As armies became more mobile, massive static defensive fortifications became dinosaurs when "modern" armies destroyed them in place or simply bypassed them. The ill-fated Maginot Line is a glaring example of this archaic strategy. Built before World War II to protect the eastern border of France, this defensive fortification was easily outflanked by German invaders.

The art of fortification has been ignored recently, because tacticians thought mobility and modern weapons would make static fortifications passé. This thinking was reinforced by force structure reductions and promises that technology would reduce the need for soldiers and, thus, their protection. Reality, however, tells a different story. Weapons and their threat have increased both in effect and form—from precision-guided munitions to a hodgepodge of terrorist weapons. Though the definition of *static* may have changed (to days or weeks instead of years), the requirement to erect structures to protect our soldiers and equipment is greater now than ever.

The Army's enhanced mobility allows soldiers and units to cover much larger areas of terrain. The need to protect these dispersed assets continues, yet the materials and methods "to protect on the move" have lagged behind other military technologies. Research and development are now catching up with doctrine to provide commanders the necessary, expedient tools to protect their personnel, equipment, and supplies. While the soldier-intensive sandbag was the staple for expedience for many years, new materials and methods provide vastly better protection with significantly less manpower.



Soldiers shovel sand into the first layer of a sand-grid revetment. Collapsed sections of sand grid are shown on the ground to the right.

One of the leaders in this renaissance is the U.S. Army Engineer Waterways Experiment Station (WES). For almost 50 years, WES has conducted blast and weapons-effects tests, from small arms to some of the world's largest nonnuclear blast events. The Department of Defense designated WES the lead research and development laboratory for survivability and protective structures under the Defense Reliance Plan. Much of the information in FM 5-103, *Survivability*, came directly from WES research.

More recently, WES research efforts have moved into new areas:

- Simple, lightweight construction materials.
- Computer programs to assist combat engineering decisions.
- Retrofitting structures to withstand the increasingly violent threat of terrorism.

WES provides research support, products, and answers to our military forces and other government agencies. Using both scale-model blast events and the massive computing power of two on-site supercomputers, WES has advanced the understanding of weapons and blast effects on structures to new levels. The following information profiles some recently developed products and evolving technologies that will enhance protection for soldiers and their equipment.

Sand Grid

Sand grid was the first of a series of quick, effective construction materials developed and fielded to engineer units. Though initially developed to provide soil stabilization on beaches, roads, and shallow river beds,



Two soldiers expand a section of Concertainer. A double-stacked section is in the foreground.

it was quickly adapted to provide protection for personnel and equipment.

Sand grids are made from high-density polyethylene plastic strips welded together to form honeycomb sections. A 3-foot by 20-foot expanded section of grid weighs 45 pounds and has collapsed dimensions of 4 inches deep, 8 inches wide, and 55 inches long. Notched grids allow stacked layers of grid material to lock together and provide fill confinement for revetment construction.

Sand-grid construction is an efficient and cost-effective method of providing expedient protection from the blast and fragmentation effects of conventional weapons. Sand-grid revetments with soil fill provide protection from small-arms fire up to .50-caliber and from the blast and fragmentation of artillery and mortar rounds detonating as close as 5 feet. Evaluations using light antitank weapons and rocket-propelled grenades show that sand-grid revetments with crushed-rock fill provide adequate protection for light armored vehicles and structures.

The life expectancy of sand-grid protective positions far exceeds those built with traditional sandbags. Sand-grid revetments have stood up to two years, showing no effects other than settling of the fill material. When protection is no longer required, sand grids can be picked up, collapsed, and reused at another site. Sand-grid material has many protective applications and has already been used to construct—

- Protective positions for artillery.
- Load-bearing walls for command post bunkers.
- Protective barriers for ammunition supply points.
- Revetments for petroleum, oils, and lubricants (POL) storage.

Sand grid is available through normal procurement procedures. The national stock number is 5680-01-363-8724 (notched sand grid for revetments). Or order from the General Services Administration by specifying Presto Products Part Number NGW3208 (notched wall grid, in black, green, or tan).

Hesco Bastion Concertainer

A British product called the Hesco Bastion Concertainer Revetment System is another expedient protective system that was recently evaluated and fielded. "Concertainer" is a geocomposite construction material that, when expanded from its shipping configuration, forms a wall section of linked, self-supporting cells. These cells can be filled with earth or rubble to provide ballistic and blast protection from a variety of direct- and indirect-fire munitions.

After expansion, the typical Concertainer wall section is about 4.5 feet high, 3.2 feet wide, and 33 feet long. The sections can be stacked two high and spliced together to form walls of various lengths. When empty, each section weighs 300 pounds. Two soldiers can erect and prepare the wall sections for filling with on-site materials. The Concertainer protective system provides better protection with far fewer assets than sandbags or other materials and can be used at fuel points, helipads, artillery/mortar positions, and vehicle barriers. The Hesco Bastion Concertainer Revetment System, which is less expensive than other expedient protective measures, has been exceptionally successful in Bosnia.

Units may order Concertainer through normal procurement procedures. National stock numbers vary depending on the length, width, height, and color of Concertainer needed.

Multipurpose Protective Shelter

Even though the Army's mobility and armaments continue to improve, our need to "dig in" remains. Deployments take us to areas where the weather, terrain, and/or available materials make soldier protection difficult, time consuming, and often inadequate. Instead of using layers of sandbags for protection, soldiers can use Multipurpose Protective Shelters. They will help alleviate shortages of construction materials, save time and



The corrugated aluminum pieces of the shelter fit together quickly.



A completed Multipurpose Protective Shelter. The sand-grid overlay provides additional protection and soil stabilization.

resources, and provide vastly better protection than sandbags.

The shelters consist of individual pieces of corrugated aluminum that fit together quickly. Layered with soil, they are safer and less susceptible to weather than a shelter made with sandbags. The shelter package weighs 550 pounds without end walls and can be erected in single or multiple units. A single unit is approximately 13.3 feet long, 9.1 feet wide, and 7.4 feet tall. When no longer required, it can be dismantled and transported to a new site. The fighting position is reusable, interchangeable, and provides protection from a variety of direct and indirect munitions.

The Multipurpose Protective Shelter has been successfully evaluated by the 326th Engineer Battalion and the 555th Engineer Group. Specifications were sent to the Engineer School in FY96, and the information will be incorporated into Army field and technical manuals when they are updated. Shelter components may be purchased as standard construction materials.

Simplified Survivability Assessment

Many methods of fortification enhance the soldier's protection, but how and when to use each method is more difficult to recognize. WES is developing a Windows-based Simplified Survivability Assessment software program to help engineers predict and prioritize the resources required for various levels of survivability. The assessment procedure will help determine the type of protection, the materials, and the construction manpower required; the resultant level of survivability provided; and the time needed to achieve that level. The software will produce construction drawings for representative protective structures and a materials price list.

The software also allows engineers to design roof support structures and determine the depth of soil needed to cover the structure, based on the threat weapon. The assessment procedure determines the best structure design to protect soldiers and equipment and shows how to upgrade a structure to accommodate increased threat levels.

XVIII Airborne Corps units are field testing this software. Initial tests were very successful, and a prototype should be available through the Engineer School in late 1997.

Damaged Buildings

The Army's increased mobility and maneuver speed allow soldiers little time to build field fortifications, so they often occupy existing structures. Many of these buildings are damaged in combat, as occurred during Operation Joint Endeavor. Often, it is difficult to determine which buildings are safe or provide adequate protection.

The *Building Assessment Handbook*, a user-friendly, step-by-step guide for making rapid building-safety assessments, was developed to address this

"Engineers often are faced with the challenge of providing expedient protective measures."

need. Using figures in the guide, combat engineers can analyze key components of a structure to determine a rating for the building. Completed analyses allow engineers to rate a building as "Apparently Safe," "Limited Entry," or "Unsafe." This guide enables engineers to focus their attention on required repairs or construction, allowing the troops to prepare for the next operation in safe accommodations.

The guide was originally a "quick fix" that provided minimal criteria for soldiers to evaluate damaged structures and develop rough repair estimates. A Windows-based software program is being developed to assist in selecting and retrofitting existing buildings. The latest prototype is scheduled for distribution to selected field units in FY98.

Antiterrorism Planner

Though our forces are more mobile, many support facilities remain static and are vulnerable to terrorist or long-range threats. These facilities must be protected so our support structure remains viable and the soldiers and civilians who work there are safe. WES is developing an Antiterrorism (AT) Planner to help engineer officers plan and implement optimum protective measures.

The demand for military engineering to support antiterrorism rose dramatically as the Army was drawn into a succession of operations other than war. In these situations, our soldiers are subject to attack by unfriendly civilian or paramilitary groups. The AT Planner is a Windows-based software program that operates on a notebook computer. It draws on completed and ongoing research related to protecting fixed facilities from terrorist attack as well as research on field fortifications.

The AT Planner will provide engineers a computerized analytic capability to evaluate critical assets in terrorist threat scenarios based on aggressors, tactics, and weapons systems. The threat conditions dictate several security measures from FM 5-114, *Engineer Operations Short of War,* that engineers must consider and possibly employ. These measures are cumulative from the lowest to the highest threat level and are presented in a concise and user-friendly format. Emphasis is placed on evaluating structures that can be classified as habitable or as warehouses. Structural components are defined for frames, walls, and roofs. Damage is calculated using algorithms from the Facility and Component Explosive Damage Assessment Program, with the user providing the distance of the explosive charge from the building.

The system will facilitate the analysis of mission requirements and constraints, including the level of protection required and the time and resources available. Protective measures will include vehicle barriers, blast protection, and protection from shoulder-launched weapons and small-arms fire.

Initial troop evaluations of the AT Planner will begin in May 1997. It will be provided to the Engineer School for distribution at the end of FY98.

As new materials (such as high-strength concretes) are developed, their benefits will be incorporated into the software. Commanders will use the AT Planner to calculate the correct level of protection needed to counteract any threat.

Conclusion

Although the size and shape of field fortifications have changed considerably through history, the need for protection today has increased as the lethality of the threat continues to escalate. Engineers often are faced with the challenge of providing expedient protective measures. New materials and methods being developed will help engineers protect our forces. These new materials and design tools will provide better, more cost effective, and quicker protective measures for our soldiers and assets worldwide. We must field and train with these improved products so our soldiers do not fill the ubiquitous sandbag in a "Maginot Line" of the future.

For additional information on these and other WES research and development projects, check the Worldwide Web at http://www.wes.army.mil or write to Commander, U.S. Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199.

Colonel Howard is commander of the U.S. Army Engineer Waterways Experiment Station. He is a graduate of the Command and General Staff College and the Army War College and has a master's degree in environmental engineering from the University of Florida.

EOBC Gets a New Look

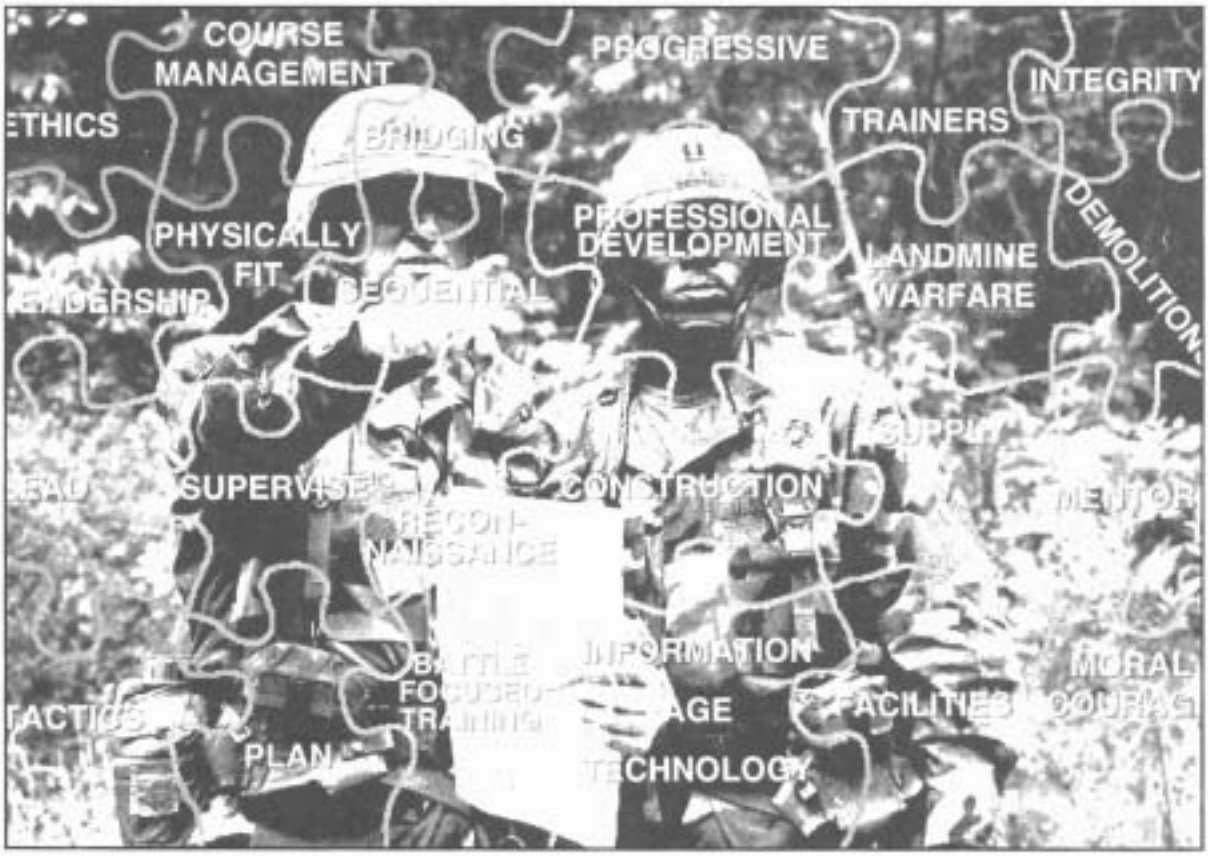
By Lieutenant Colonel Ted A. Thomas

Maneuver commander: "Hey, engineer lieutenant! I need your help in upgrading some roads and building some shelters."

Engineer lieutenant: "Sir, I'm a combat engineer, not a construction engineer. I'm not trained to do those tasks."

Beginning in May 1997, the Engineer Officer Basic Course (EOBC) will have some fairly significant changes. In line with the current *One Corps, One Regiment, One Fight* concept, the Engineer School will train all engineer lieutenants to be *engineers*, not "combat" or "construction" engineers, and they will all complete the same program of instruction (POI). With this new training, all graduating lieutenants soon will be able to respond positively to their maneuver commanders' requests for assistance.

The 554th Engineer Battalion and the Engineer School have eliminated the two-week split in training focus between lieutenants going to combat heavy assignments and those going to combat battalions. Until now, both the construction track and the combat track were two-week classes. Rather than require all students to complete both tracks, which would extend EOBC from its current 17 weeks to 19 weeks, redundant training was eliminated and some classes were shortened.



"The Engineer School's goal is to produce the best-trained lieutenant it can in 17 weeks."

Major Changes

Comments and after-action reviews from the field and the combat training centers resulted in many of the following changes to the EOBC:

- Increased leadership training from 6 to 24 hours
- Added a terrain visualization/obstacle integration training exercise without troops (TEWT) (8 hours)
- Added a task force engineer practical exercise (8 hours)
- Added offensive and defensive tactical reconnaissance classes (4 hours)
- Added force-protection construction training (2 hours)
- Added military operations in urban terrain training (3 hours)
- Integrated tactics and combat engineering training (5+ weeks)
- Converted the Project Hammer exercise from a 3-day construction project to a 2-day project-inspection exercise
- Reduced geotechnical training from 26 to 18 hours
- Consolidated exams, saving 8 hours
- Eliminated the medium girder bridge and ribbon raft construction project
- Changed the Army Physical Fitness Tests from weekdays to Saturdays

Training Sequence. In the revised EOBC, each platoon will have the same training sequence throughout the year. Currently, the course is taught in modules because there are normally two or three platoons in each class iteration but not enough instructors to teach all of the platoons the same subject concurrently. Since each platoon has a different sequence of instruction, the modules are independent packages and do not rely on previously taught material. To remedy this problem, there will be nine platoon-sized EOBC classes per year, each consisting of about 60 soldiers. This schedule allows the course to follow a logical sequence and build on prior knowledge, facilitating better learning.

The nine classes per year support the schedule projected for the Maneuver Support Center. The Military Police and Chemical Schools have seven classes per year in their basic courses. Seven of the EOBC classes will align with theirs, allowing the three schools to share training during inprocessing and soldierization, as well as the common core instruction. The EOBC field training exercise will move to the 12th and 13th weeks of the course to coincide with the other schools' field training exercises.

Terrain Visualization/Obstacle Integration TEWT. The Joint Readiness Training Center (JRTC) and the National Training Center (NTC) noted that obstacles usually are not employed or sited properly within the commander's intent. The new TEWT requires lieutenants to build an engagement area by envisioning it from the enemy side, noting its intervisibility lines, determining the types of obstacles to emplace and where to emplace them, and coordinating these activities with a maneuver commander. A maneuver officer from the Engineer School's Department of Tactics, Leadership, and Engineering will assume the role of maneuver commander.

Task Force Engineer Practical Exercise (PE). This exercise was added to the curriculum because of JRTC comments. In 1989, the EOBC shifted its primary focus to the engineer restructure initiative (ERI), leaving out the light community. The new PE teaches the planning and coordination skills needed across the full spectrum of engineer assignments. Under the ERI concept, company executive officers are heavily involved in the task force engineer mission. The task force engineer PE consists of orders process instruction—going through the deliberate decision-making process, developing and evaluating courses of action, and participating in wargaming and synchronizing the engineer effort in combined arms operations. This instruction will benefit all lieutenants, regardless of their assignment, but it will be especially valuable for those going to light divisions.

Combat Engineering and Tactics Training. Module sequencing will allow a seamless transition from combat engineer training to tactics training. Currently, these subjects are taught as independent, stand-alone blocks of instruction. In the revised EOBC, they will be introduced in a logical sequence. For example, when instructors teach the fundamentals of land mines (such as the M21 antitank mine), they will describe how mines are armed and used in a minefield; then they will explain why and how minefields are used in tactical operations.

Project Hammer. This exercise will focus on platoon leader responsibilities rather than performing carpentry, plumbing, and wiring projects. Lieutenants will learn about blueprints, bills of

material, material takeoff lists, and quality assurance and inspection procedures. When engineers from light units deploy to undeveloped countries such as Somalia and Haiti, they are often among the first soldiers on the ground. They need engineer construction skills to build base camps, provide waste disposal, upgrade or build main supply routes, and perform many other engineer-related tasks. To fill that need, all engineers will receive the training required to perform their missions during operations other than war.

Conclusion

The Engineer School's goal is to produce the best-trained lieutenant it can in 17 weeks. Although these young officers cannot become experts in all the subjects taught at the school, they will receive a broad range of training opportunities and experience. This will be a tremendous advantage when they arrive at a unit. Lieutenants leave the basic course excited about being an Army officer and eagerly look forward to leading a platoon and serving their country. It then becomes the unit's responsibility to sharpen their warfighting and leadership skills. These young officers are the future leaders of the Engineer Corps. Soldiers are our credentials, but our junior leaders are our legacy.

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(Personal Viewpoint, continued from page 12)

obstacles that will allow him to disengage when he chooses. Wide dispersion will negate the already difficult concept of shifting engineer units across task forces to support multiple operations.

At the same time, maneuver units will be faced with an increasingly complex array of countermobility threats. Among these are the use of mines and other obstacles in great number, plus better use of the terrain's natural countermobility effects, to asymmetrically combat American superiority in speed and firepower. Land mines are a cheap, deadly, and almost-insurmountable threat to the mobility of U.S. forces. The problem will get worse as more countries acquire a dynamic obstacle-emplacing capability by using systems equivalent to our Volcano and artillery- and helicopter-delivered scatterable mines. The lesson of Desert Storm will be very clear to our enemies: The American Army cannot be allowed to freely maneuver its armored forces.

Even the nature of the threat will pose an increasingly difficult problem. The mountains of Bosnia and Iran, the ricefields of Korea, the jungles of Africa and South America, and urban sprawl everywhere are certainly more challenging to our mobility than the north German plain or the Iraqi southern desert.

Despite *Army Vision 2010*'s claim that the Army is the service of choice to ensure full-spectrum dominance, divisions become *less* capable of full-spectrum operations with the loss of an engineer battalion. Combat engineer battalions often are the unit of choice in operations other than war. They deploy as mechanized infantry when Bradleys are inappropriate, as firefighters, and as relief for all kinds of disasters. In all operations (garrison, combat, and operations other than war) TRADOC's Division XXI design will result in a huge increase in operational tempo and personnel tempo for the two engineer battalions.

While the basic organizational structure of an engineer brigade and three battalions remains sound, heavy division engineer battalions still need major internal changes to meet the rigorous requirements of both today's and tomorrow's battlefields. Clearly, we must resource key staff officers such as the S2, signal officer, and maintenance officer; restructure the maintenance section to provide company-oriented contact teams; and provide a desperately needed organic medical evacuation and treatment capability.

Focus on Success

The 299th Engineer Battalion in the 4th Infantry Division's experimental force has worked diligently to improve the battalion's capability by using recent lessons learned and future warfighting concepts. The differing approaches taken by TRADOC and the 4th Infantry Division are extraordinary: One whittled away at an old structure to arrive at a predetermined manpower cap, while the other focused on warfighting and improved capabilities.

Deletion of an engineer battalion from the division structure does indeed save personnel spaces, but it creates a poor warfighting design. It repeats mistakes of the past. It fails to capitalize on lessons learned, recent innovations, and battle-proven structures. It fails to address the challenges of the future. It is the wrong force design for the Army's division of the 21st century. The Army needs to reinforce, not destroy, the successes of today's heavy division engineer brigade.

Lieutenant Colonel Bruce J. Porter is a student at the Army War College. He is a graduate of the U.S. Military Academy and holds master of science degrees from Stanford University in civil engineering and computer science. He commanded the 20th Engineer Battalion, 1st Cavalry Division, and served as operations officer for the 5th Engineer Battalion, 24th Infantry Division, in the Persian Gulf War.

UNIFIED ENDEAVOR 97-1

JOINT TASK FORCE STAFF ENGINEERS

By Captain Calvin Hegeman

The leader of a foreign country has abruptly left office, creating instability in the region. The U.S. government is very interested in maintaining peace in order to protect U.S. personnel and property. In response, Joint Task Force (JTF) 780 is formed for "Operation Unified Endeavor 97-1." The mission is to deter or, if deterrence fails, enforce peace to protect U.S. interests.

This scenario-driven computer simulation is performed at U.S. Atlantic Command's (USACOM's) Joint Training, Analysis, and Simulation Center (JTASC) in Suffolk, Virginia. The JTASC offers a unique technical infrastructure for conducting realistic joint task force exercises. It has a full array of high-tech resources, including state-of-the-art computers, large display screens, secure telephones, and audiovisual and interactive video teleconferencing systems for use internally and externally.

The series of Unified Endeavor exercises was developed in 1995 to train potential JTF commanders and their staffs to respond to crises in a realistic joint environment using computer-driven simulation. The cost per exercise is about $3 million—substantially less than the approximately $40 million it costs to conduct a large-scale, multiservice field exercise.

XVIII Airborne Corps was the JTF headquarters for Unified Endeavor 97-1. The exercise was conducted in three sequential phases over a three-month period from September to December 1996.

Phase I involved one week of classroom instruction. Staff and general officers gained an academic foundation in joint doctrine, tactics, techniques, and procedures. The seminar emphasized joint lessons learned and current and emerging issues in joint operations.

Phase II was a 2-week crisis action planning session involving more than 300 personnel from joint planning sections. After



Photo courtesy of JTASC, Suffolk, VA

The Joint Training, Analysis, and Simulation Center (JTASC) located in Suffolk, Virginia, is USACOM's automated JTF training center.

receiving the scenario and the operations order from USACOM, the JTF staff began the deliberate decision-making process. The staff then presented the JTF Operations Order and a finalized Time-Phased Force Deployment Database (TPFDD) that shows the timing and movement of military forces into the area of operation.

Phase III is Unified Endeavor's execution phase. The JTF implements the operations order in response to scenario events generated via advanced computer simulation models. Leaders and staff respond to changing circumstances that place the events in all ranges of the operational continuum—peacetime, conflict, and war. For this exercise, success meant to—

- Avoid going "kinetic," the term used for full combat operations.
- Develop "triggers," which are certain enemy actions or events that tell the commander a pre-emptive strike is necessary.

The early focus on operations other than war and deterrence missions adds credibility and legitimacy to the exercise. A full range of political and diplomatic decisions influenced military decisions throughout the operation. Information warfare is a key focus during Unified Endeavor exercises, and participants take media and world opinion into account. For instance, frequent press conferences are held and televised throughout JTASC. Anyone caught walking in the hallway may be asked by simulated reporters for an interview. Later that evening, the interview is broadcast on the Unified Endeavor News Network, a simulated news program.

Today's military actions are most likely to be contingency operations, whether they are combat operations or operations other than war. JTF doctrine is still evolving, and engineers must be part of this evolutionary process to ensure that they are postured to provide unity of effort and mission accomplishment for future contingencies.

The XVIII Airborne Corps Staff Engineer Section and personnel from other services manned the joint engineer cell during the exercise. The following considerations, compiled by the cell and the USACOM engineer observer/trainer, should improve efficiency for future joint engineer cell operations.

Joint Engineer Cell Component

Understanding how other component engineers function and their mission and equipment is important for a smooth-functioning organization. The Navy, Marine Corps, Air Force, and Army engineer units have specific skills that—once understood by the JTF engineer and his staff—can be used to their fullest potential. This is especially critical during Phase II, when the Joint Planning Group is developing courses of action. Each course-of-action planning group should include an engineer who is familiar with the capabilities of each service.

NAVFOR. Navy engineer support consists of one naval mobile construction battalion (NMCB) with 726 personnel. The NMCB can quickly deploy to force-projection theater locations to construct and improve naval facilities. The NMCB's main mission is to provide responsive military construction support, conduct battle damage repair operations (including rapid runway repair), and construct base facilities. Other missions include constructing rotary-wing airfields; airfield support structures; petroleum, oil, and lubricant systems; ammunition supply points; and lines of communications.

The NMCB can provide an air detachment that deploys by strategic airlift within 48 hours. The air detachment, a lead element of the NMCB, is composed of 91 personnel. The detachment repairs immediate war damage and constructs projects urgently required by major operational plans. For many construction missions, only an air detachment needs to deploy.

MARFOR. Marine air ground task forces (MAGTF) are integrated combined arms forces structured to accomplish specific missions. The Marine expeditionary force (MEF) is the principal Marine Corps warfighting organization. It ranges in size from less than one to multiple divisions and aircraft wings, together with one or more force service support groups. An MEF is self-sustainable for up to 60 days but may be deployed longer with external support.

The Marine engineer mission is based on the way the Marine Corps fights—as a task-organized MAGTF consisting of four elements. Each element has organic engineers, who provide mobility, countermobility, survivability, and general engineering support.

Command element (CE) engineers serve as special staff officers to the MAGTF commander. They are responsible for coordination between the subordinate element engineer units and external elements.

Ground combat elements (GCE) range in size from a battalion to one or more divisions. Marine engineers and their assets in the GCE are sourced from the combat engineer battalion (CEB) organic to the Marine division. Division engineers primarily exist to support the maneuver of the GCE. Their missions include engineer reconnaissance, assault breaching, bridging, and demolition. They also provide limited general engineering support to the division.

Aviation combat elements (ACE) vary in size from one aircraft squadron to one or more wings. Engineer assets organic to the ACE are in the engineer operations divisions, which are located in four Marine wing support squadron (MWSS) units of the Marine wing support group (MWSG). Wing engineer missions include constructing, maintaining, and improving expeditionary roads, base camps, drainage systems, and vertical and short takeoff and landing sites. They also assess bomb damage and provide rapid runway repair.

Combat service support elements (CSSE) draw engineers from the engineer support battalion (ESB) organic to the force service support groups. The ESB provides expeditionary general engineering support and engineer combat service support for the entire MAGTF. An ESB consists of a bulk fuel company, a headquarters and service company, an engineer support company, a bridge company, and three engineer line companies.

AFFOR. Air Force engineers are organized into three basic types of units:

RED HORSE (rapid engineer deployable heavy operational repair squadron) squadrons are mobile, self-sufficient, and

organized by regional responsibility. They can construct facilities for major force bed down, repair extensive damage, develop bases, and perform heavy engineering operations. RED HORSE squadrons are the lead joint engineer resource for force projection. Their missions are solely wartime related. RED HORSE squadrons form three types of deployment echelons.

RH-1 Echelon. This 16-person team deploys within 12 hours and prepares for the reception of follow-on RED HORSE elements. The team performs advance airfield surveys, including evaluations and assessments of airfield pavement, water supplies, utility systems, and existing facilities. It prepares a bed-down plan for establishing a force-projection base and compiles a list of materials required to accomplish the plan.

RH-2 Echelon. This 93-person element can deploy within 48 hours with heavy equipment capable of clearing land, stabilizing sites, performing drainage earthwork, and erecting structures essential for force bed down. This element also can perform rapid runway repair and repair bomb-damaged facilities and systems. It provides initial civil-engineering support, including well drilling.

RH-3 Echelon. This 295-person element can deploy within 6 days. It can repair heavily bombed areas and construct facilities, including expanding essential utility systems, power generation systems, heavy earthwork, and concrete operations.

Prime BEEF (base engineer emergency force) units are organized as combat support squadrons and teams. They are assigned to all major Air Force bases to provide peacetime civil-engineering and maintenance support. A large-scale Prime BEEF combat support squadron can be organized into eight types of combat support squadrons to support theater requirements. These squadrons can fully support AM-2 matting and concrete-slab rapid runway repair operations. Small specialty teams can be organized into nine teams of 3 to 48 personnel, with varying compositions to fit the mission. Skills in a specialty team range from fire fighting to construction management or whatever staff augmentation is necessary to fill known requirements.

Prime RIBS (readiness in base support) units provide combat morale, welfare, and recreation support.

ARFOR. The Army engineer organization may consist of several different packages to support the JTF commander. Engineer combat battalions perform mobility, countermobility, and survivability missions. Each battalion is structured to support a specific Army division and is organized as either light, air assault, airborne, or mechanized to support that division. Divisional engineers have limited construction ability.

The following units are most likely to be used for contingency engineer operations:

Engineer combat battalions, corps are organized as either airborne, light, wheeled, or mechanized units. The units perform horizontal, vertical, and combat engineering missions. They are designed to augment division assets and support corps rear operations.

Engineer combat battalions, heavy construct and maintain facilities and lines of communication and assist in preparing protective positions. Tasks include constructing and repairing airfields, command posts, main supply routes, and critical facilities.

Engineer battalions, prime power provide electrical power. They have two teams: power plant teams operate electrical generators, and power line teams construct and maintain up to 60 miles of high-voltage electrical power lines.

Engineer companies (combat support equipment) perform horizontal construction and sustainment engineering. They are self-supporting and include maintenance, mess, and administrative sections.

Engineer companies (assault float bridge) (ribbon) construct floating bridges up to 210 meters long for crossing traffic up to military load class (MLC) 70. For gaps longer than 210 meters, they conduct rafting operations to reduce the load capacity to MLC 60 traffic.

Engineer port construction companies develop and maintain port facilities. They construct and maintain piers, wharves, ramps, and related structures required for loading and offloading cargo.

Engineer companies (topographic) conduct topographic and geodetic surveys and terrain analysis and reproduce maps. In a JTF operation, one or more companies may support the JTF headquarters to provide terrain analysis products and tactical decision aids.

ARFOR engineers may also provide salvage diving, well-drilling, surveying, and fire-fighting teams to the JTF.

Organization

A joint task force engineer cell includes officers and noncommissioned officers from each of the services involved. The cell organized for Unified Endeavor 97-1 was located under the J3 (Figure 1, page 38). The organization is tailored to fit the mission and meet the commander's intent.

Traditionally, the engineer cell was located under the J4. This alignment may be effective in JTF operations requiring primarily civil engineering skills. When engineers are needed to conduct combat operations, it is more practical for the engineer staff element to fall under the J3.

Ideally, the engineer cell should be established as a separate staff element. Joint engineer operations are intertwined throughout the joint operational area and range from repair of critical facilities to combat operations. Also, engineers are networked to several sections of the JTF staff. They are part of the J5 planning group, J3 operations, J2 terrain analysis (including battlefield visualization), and J4 infrastructure repair and development (Figure 2, page 38).

The Joint Operations Cell (JOC) is the heart of the JTF staff. The JOC in JTASC is located in a movie-theater-sized room with three large screens in front and networked computers on every desk. All situational updates and operational decisions flow to the JOC, which includes operations and liaison officers from all sections and services of the staff and the components. The engineer operations officer, also located in the JOC, passes information to the engineer cell so timely decisions can be made. Having an engineer liaison officer in the JOC is not part of current doctrine; however, it benefits joint engineer cell operations.

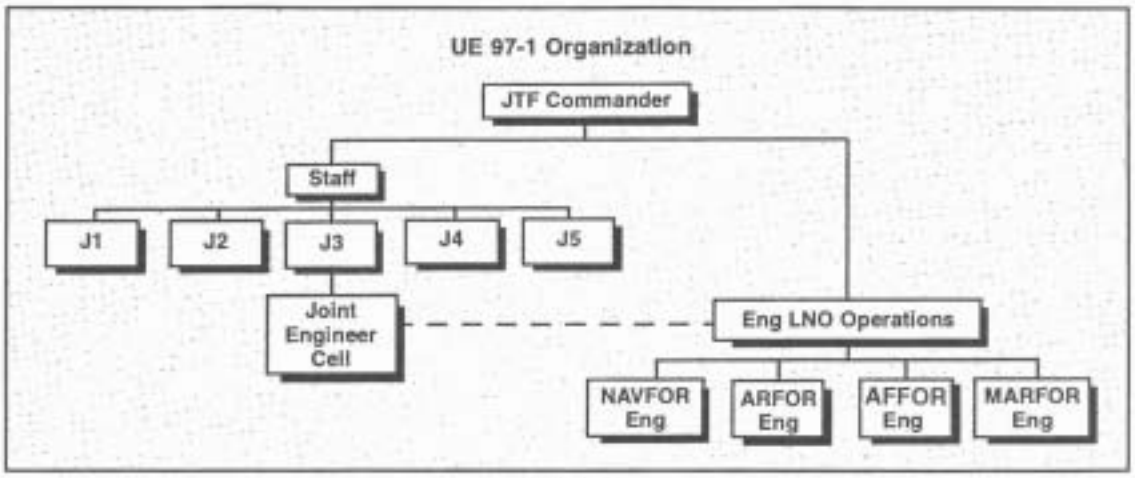


Figure 1

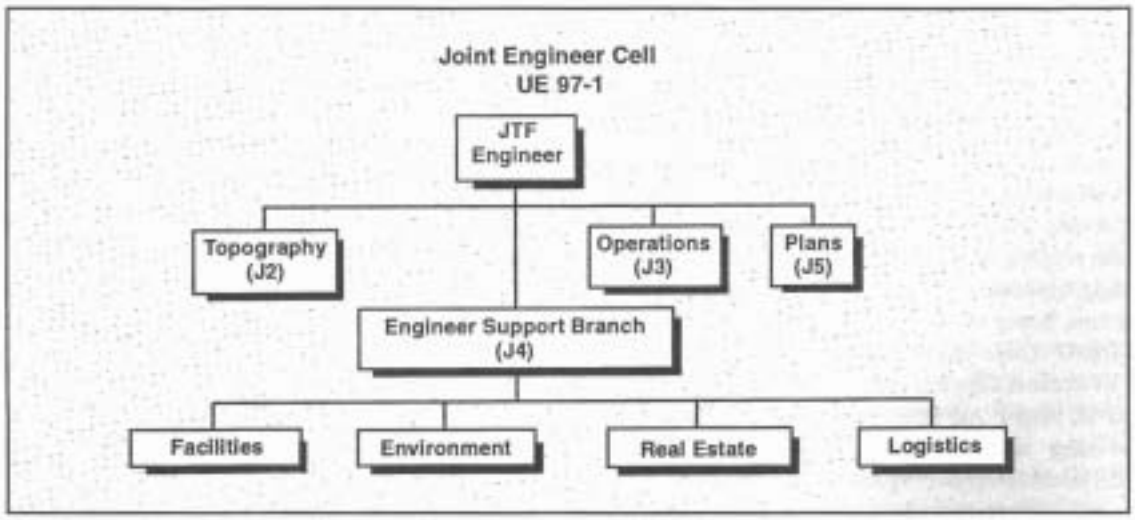


Figure 2

Explosive ordnance disposal (EOD) is not an engineer mission in the Army, although it is in the Air Force and the Marine Corps. During Unified Endeavor 97-1, the joint engineer cell was responsible for writing the EOD annex for the JTF operations order. No EOD section was created within the joint engineer cell, but EOD issues were handled throughout the engineer staff. In the future, EOD should have a staff section located in the J4 with representatives from each service. The alternative is to leave EOD as an engineer mission and add EOD personnel to the engineer manning roster.

The engineer cell topographic section provides many products for the JTF staff. One topographic team cannot provide all the products requested, so a minimum of two teams should deploy—one located with J2 Intelligence and the other in the joint engineer cell. The Marine Corps terrain teams are experts in beach topography and are required if a beach assault is part of the plan. The team has additional terrain data that can be cross-referenced with Army data to augment the picture of the operational area. Due to budget reductions, the Marine terrain team did not participate in Unified Endeavor 97-1.

Engineering Boards

The joint engineer cell is responsible for coordinating three boards:

- *The Joint Civil-Military Engineering Board* provides oversight by establishing policies, procedures, priorities, and overall direction for civil-military construction and engineer requirements.
- *The Joint Facilities Utilization Board* manages facility requirements. It evaluates and reconciles use of facilities, real estate, interservice support, and construction.
- *The Joint Environmental Management Board* establishes policies, procedures, priorities, and direction for environmental management. It includes personnel from joint staff, components, engineer units, host nation representatives (if applicable), other government agencies, and contractors.

It is important to decide early who will attend these boards and the meeting time and place. For the Unified Endeavor exercise series, consider holding one or more of these boards during Phase II. Phase III is very fast-paced, and it becomes increasingly difficult to gather the necessary personnel to attend. Consider holding more than one board simultaneously, because many of the attendees are on several engineer boards.

Automation

The JTASC is a unique building, with outstanding automation and communication platforms. The primary means of communication within the JTASC is e-mail and newsgroups. For example, once a fragmentary order is approved, it is placed in a newsgroup file. Anyone in JTASC can access the file, read it, and then store the information on their computer's hard drive. This streamlined system almost eliminates paper copies for distribution, saving time and supplies. However, considerable time was spent learning how the information flows and how to capture and catalog it for future use.

The software package used for Unified Endeavor 97-1 was *Netscape Navigator* for newsgroups and *Eudora Pro* for e-mail. Newsgroups became a cyberspace dumping ground of information, with hundreds of files. An operator worked full-time to read newsgroups, decipher what was relevant to the engineer cell, then e-mail the information to the appropriate staff members.

The preferred communications system used the "push-pull method." In theory, if someone created a document that was important for another cell, we "pushed" it to them via e-mail. That same document was also posted on newsgroups. If another cell wanted the document, they "pulled" it from the newsgroup engineer file. Not everyone used the push-pull method. Some important information was placed in newsgroups, and it was up to the cell to locate it. As a result, much information was not read. Everyone on the engineer staff should be experienced with computers and the software used during the exercise.

Global Command and Control System

The Global Command and Control System (GCCS) is a powerful new system that replaces the Worldwide Command and Control System. GCCS uses a secured Internet connection to provide a user-driven, widely distributed view of military operations. All government and military agencies can use this system to transfer and store secret data worldwide in a near real-time environment. The Secret Internet Protocol Router Network provides connectivity between GCCS sites.

Seven GCCS terminals located in the JOC were used to access information on—

- Enemy weapons systems.
- Enemy engineer equipment (with photographs).
- World weather satellite photographs.
- Current positions of friendly military units.
- Location of airports and landing strips worldwide.
- Intelligence updates from national assets.

GCCS includes a Netscape browser with limited interactivity to the Worldwide Web. Within the GCCS environment, each command center has its own home page with links to other command centers and other vital information. Netscape is a powerful program used to access this information. The GCCS version of Netscape is similar to the civilian version, making this system relatively user friendly.

The GCCS contains the Joint Engineer Planning and Execution System (JEPES). This planning tool helps the commander in chief and the service components determine the civil engineering support requirements and document their civil engineering support plan. The JEPES program extracts unit and personnel data from the TPFDD and factors in facility planning data. Then it subtracts existing facilities and computes the total facility requirements. JEPES also generates reports and graphics to illustrate requirements and provides data for Logistics Sustainability Analysis and the Logistics Sustainment Analysis and Feasibility Estimator System.

USACOM conducted a one-week GCCS user's course prior to Phase II of Unified Endeavor. GCCS provides a unified and fused picture of the battlespace, bringing joint command and control support capability into the 21st century. The full value of GCCS will not be known until the system is distributed and its capabilities are incorporated into all staff-level operations.

Compatibility

Subordinate components and the JTF staff must use compatible software systems. Presently, II MEF uses Lotus, not Microsoft Office, which makes it difficult to send and receive charts and graphs across the JTF.

Subordinate engineer elements among the components sent different types of situation reports (SITREPs). As a result, much time was spent translating information. A standard JTF engineer report should be developed early and distributed to each of the components. The joint staff J4 is developing a publication for engineers that addresses this issue. In the interim, USACOM engineers have written a standard SITREP, which will be added to the Joint Task Force Standing Operating Procedures.

Conclusion

Unified Endeavor provides a unique training medium. It places engineers from all services into a JTF configuration and teaches them how to conduct joint operations using a real-world mission on real terrain. Engineers use this experience to organize, deploy, and employ Navy, Marine, Air Force, and Army engineer forces during overseas crises. Doctrine and technology continue to evolve, forcing engineers to rethink how to conduct joint operations. USACOM allowed us to test doctrine by providing the most advanced training facility available and then assisting engineers with supportive personnel. USACOM is striving to improve efficiency and productivity for future joint task force contingency operations. Unified Endeavor is an excellent vehicle to accomplish this mission.

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ENGINEER UPDATE

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Department of Training and Doctrine Development (DOTD)

***Engineer* Publication.** We request your input supporting continued publication of *Engineer*. Due to budget reductions, *Engineer* may be forced to reduce the number of paper copies published and rely more on electronic distribution. Send comments to: Commandant, U.S. Army Engineer School, ATTN: ATSE-TD-D-EB, Fort Leonard Wood, Missouri 65473-6650. Our e-mail address is: eubanksc@wood-vines.army.mil. POC is Cathy Eubanks, -4104.

Engineer Unit Directory. Paper copies of the Engineer Unit Directory will not be printed this year. Instead, the directory has been posted on the Worldwide Web at the following file location: www.wood.army.mil/DDD/ddd.htm. Units not having access to the Internet may request a disc or e-mail copy of the directory. POC is Nancy Baker, -4100.

Engineer Personnel Proponency Office (EPPO)

Changes in NCO Structure (CINCOS). The Vice Chief of Staff initiative to reduce NCO content Armywide from 50 percent to 47 percent has been staffed through the Engineer School and the commandant. The engineer CINCOS proposal forwarded to TRADOC on 15 February 1997 focused on tables of distribution and allowances authorizations and has minor impact on the warfighters. Career Management Field (CMF) 12 has a current NCO strength of 44.1 percent, and our proposal reduces that number to 43.6 percent. CMF 51 may improve slightly from 43.2 to 43.5 percent. Our proposal for CMF 81 reduces the NCO content from 48 to 46.4 percent All proposed changes are in positions where redundancy exists. The proposal will not reduce advancement opportunities. POC is SGM John Murphy, -4087.

Call for Divers. Are you tired of exploring only one-third of the earth's surface? Are you looking for a physical and mental challenge? If so, the Army needs highly motivated and fully qualified men and women to fill diver (MOS 00B) slots. Soldiers in any MOS may submit applications in accordance with Army Regulations 611-75 and 611-201. If accepted, they will train for three weeks at the prequalification course, Fort Eustis, Virginia, and for 20 weeks at the Second Class Dive School, Panama City, Florida.

Dive training and subsequent duty as a diver present a unique opportunity for motivated soldiers to become members of an elite, mobile organization. Once accepted, candidates will learn underwater fundamentals and have an opportunity to advance as far as their skills and desire will take them. For more information, see your local PSNCO or Retention NCO, or call MSG Parrett, DSN 676-7311. The e-mail address is parrettk@wood-vines.Army.mil. POC is MSG Parrett, -4087.

BRIDGE THE GAP

By Command Sergeant Major Julius B. Nutter
U.S. Army Engineer School

Keys to Retention Success

As the Army works to sustain its 495,000 end-strength force, keeping quality people should be our number one priority. "Performance" was the magic word when selecting quality people for retention. Now we must keep our best professionals—those who are competent and physically and mentally fit and who have high moral and ethical values.

The future may not resemble the past with regard to recruiting and retaining soldiers. Nowhere is it given that the Army will be able to attract and retain the quality, motivated, self-disciplined, and intelligent men and women that it needs. To be successful in a very complex and automated environment, our future Army needs quality soldiers.

Let me share with you some ideas for retaining soldiers. These ideas show a caring leadership environment. Unit leaders can use them to turn ordinary soldiers into extraordinary soldiers and to retain a quality force. They are designed to help leaders keep quality people—those who make a positive difference in mission execution. Use them to help create and maintain an environment in your unit where people want to be, in contrast to a place where they are obliged to be.

Sponsorship is the first step in making a new soldier part of the team. The initial treatment that a new soldier receives upon arrival leaves a lasting impression of the unit. A successful unit sponsorship program should include the following:

- Unit history
- Mission statement
- Mission essential task list (METL)
- Policies and procedures
- Short- and long-term unit goals
- Visit to installation support agencies

Share the unit's goals and vision. It is important for soldiers to understand them. When the mission statement paints a positive picture, it's amazing how sharing the vision enhances commitment, retention, and quality performance.

Bonus tip: At your next command information class, ask if anyone knows what the unit mission is. Some may guess. Some may know. Some may laugh and ask, "Do we really have one?"

Conduct quarterly sensing sessions to get a "feel" for your subordinates' concerns. Ask members the following questions:

- How is the unit doing?
- In what areas can we improve?
- How can we improve on weaknesses?
- Do you see anything that may interfere with your ability to be a real contributor?

Give people room to breathe, make decisions, and make mistakes from which they can learn. Most of all, instill the impression that you respect their judgment.

Note: If you want to build capable people who will stay for more than the short term, let them run with the ball. Trust them enough so they will seek your input when it is needed.

Encourage soldiers to be all they can be through military and civilian schooling. Most soldiers want to be part of a unit that cares about their professional development.

Finally, leaders at all levels must ***talk*** to soldiers and their families about re-enlistment. Sometimes the best way to retain quality is to ask soldiers to stay on the team. Other times it may take command involvement to get a soldier an option or assignment he or she wants.

This year the Army must recruit 90,000 men and women. Every quality soldier we retain brings us closer to this goal. To reach this goal requires a team effort. I solicit your support.



Two American soldiers look down on a long row of "dragon's teeth" (concrete devices to halt invading tanks) at the Siegfried Line. American troops moved through a break in the vaunted defense line and passed into Germany in September 1944.

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