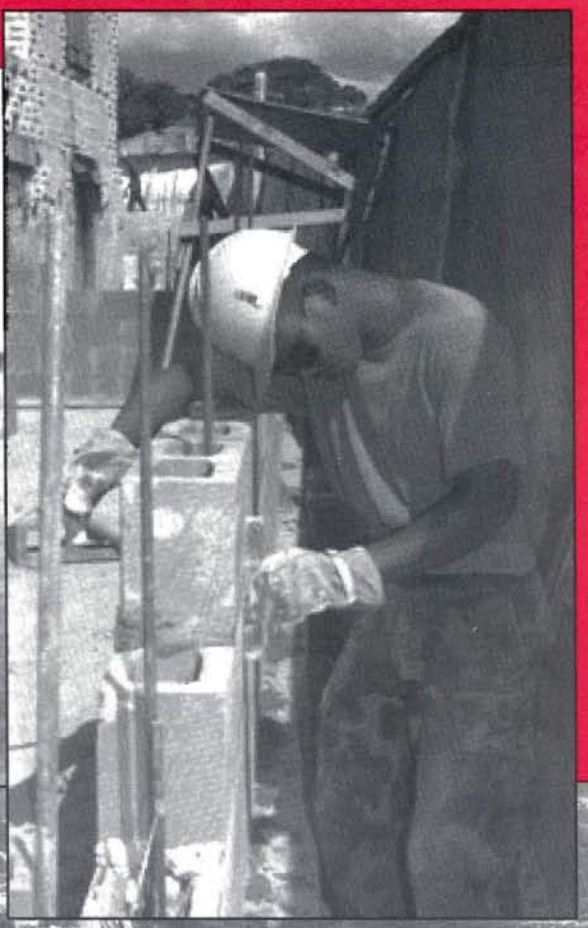
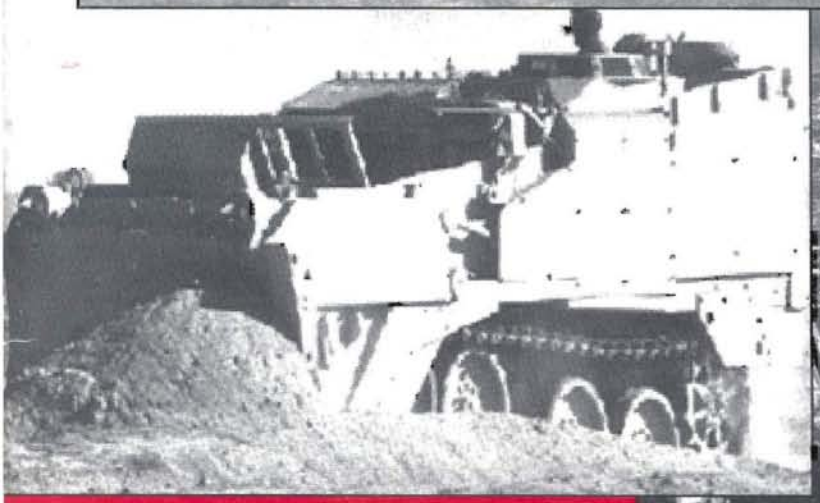
# Engineer

THE PROFESSIONAL BULLETIN FOR ARMY ENGINEERS

April 2000









# One Regiment

Headquarters, Department of the Army
PB 5-00-2 Approved for public release, distribution is unlimited.



# CLEAR THE WAY

*By Major General Robert B. Flowers*
*Commandant, U.S. Army Engineer School*

To tell you that the Army and the Regiment will face unique challenges and exciting changes ahead would be an understatement. You know as well as I that the CSA's Transformation Strategy, although desperately needed to align Army capabilities with known threats through 2010, requires major paradigm shifts as well as tough resourcing decisions.

Central to ensuring that the Army can achieve the desired end state for the "Initial Force" (present to 2003) were some extremely agonizing resourcing decisions that resulted in the Presidential Budget Decision 745 termination of the Grizzly and Wolverine programs. Since announcing the decision, we have secured the backing and public support of key MACOM commanders, CINCs, and senior Army leaders in the Pentagon. We now very much expect that Congress will reverse the decision this summer.

With this understood, I assure you that your Engineer School has been feverishly working to position the Grizzly and Wolverine program for success. Our strategy has already begun to reap some benefits. We were able to secure sufficient FY00 funding to procure 14 Wolverines—enough to field an entire battalion set later this year at Fort Hood. We also feel that we have positioned ourselves to restart the program with minimal effort by gaining support for placing the Grizzly and Wolverine on the Army's 1-N list of essential unfinanced programs. In fact, both are in the top 20 and stand a great chance for restarting whenever Congress allows. We expect the first decision point on restarting by 4th quarter FY00.

Additionally, we have begun efforts to evaluate alternatives in case the Grizzly and Wolverine are not allowed to restart. Recognizing that none will fully replace the phenomenal capabilities of either the Grizzly or Wolverine, our initiatives include—

- Restoring personnel and equipment—specifically 57 sappers, 9 ACEs, and an M113—to the Force XXI Heavy Engineer Battalion force structure.
- Restarting the MICLIC replacement program, specifically the Explosive Standoff Minefield Breacher (ESMB), to provide standoff capability against all surface and buried minefields effective against all known threats through 2010.
- Reviewing best alternatives to upgrade the AVLB by improving its hydraulics and electrical systems, adding a new suspension, replacing the power train, and upgrading it to MLC 70 bridge capability if we fail in our efforts to restore the Wolverine.
- Improving the ACE by increasing its dozing, armor-protection, and communication capabilities, as well as improving its maintenance and sustainability.
- Modernizing the Engineer Squad Vehicle to a Bradley for greater survivability through lethality and commonalty with the Brigade Combat Team.
- Continuing to demonstrate the requirement for an Engineer Brigade headquarters in the force structure of the Force XXI Heavy Division.

The Grizzly and Wolverine situation, as well as numerous other issues affecting the regiment, will be discussed during our upcoming Engineer Force (ENFORCE) 2000 Conference. The USACE DPW Training Workshop will meet 1-3 May. MACOM engineers will meet 2 May. We will all gather together as *One Regiment* for the remainder of the ENFORCE 2000 Conference 3-5 May. The ENFORCE 2000 Golf Tournament is scheduled for 6 May.

The ENFORCE 2000 Conference theme is "Engineers Shaping the New Millennium." A key undercurrent of this year's conference is the remembrance of the 50th anniversary of the Korean War. I will deliver the commandant's "State of the Branch" presentation—a candid update of our branch. Lieutenant General Joe N. Ballard, our Chief of Engineers, will conclude the formal agenda with a "State of the Regiment" presentation. The conference finale will be the 12th Annual Engineer Regimental Dinner, during which the Itschner, Grizzly, and Sturgis Awards and the Gold de Fleury Medal will be presented.

This year's conference administrative information and registration are available via the Internet on the Fort Leonard Wood home page. Spouses are invited to join the Regimental Dinner and other conference social activities. Information outlining activities available for spouses during their stay can also be found on the Fort Leonard Wood home page.

It is imperative that we continue speaking with one voice as *One Corps, One Regiment, One Team.* Your input and active participation are critical to guide and strengthen our actions. I look forward to seeing you at Fort Leonard Wood. Be sure to study for the test!

Essayons!

# Engineer

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## UNITED STATES ARMY ENGINEER SCHOOL


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***Front Cover:*** *"One Regiment"—Active, Reserve, National Guard, and Corps of Engineers work to revolutionize the way the Army provides support.*

***Back Cover.*** *Soldiers of the 8th Engineer Battalion, 1st Cavalry Division, put logs under the weakened support of a bridge near Yangzi, Korea, to prevent its collapse until a tank retriever can arrive and remove the M-4 tank. (28 Jan 51)*

## FEATURES


2 **Transforming the Engineer Regiment**
*By Lieutenant General Joe N. Ballard*

6 **The Engineer Regiment in Kosovo**
*By Colonel Robert L. McClure*

11 **Cobra Gold '99 Tests the Eight-Step Training Model**
*By First Lieutenant Matthew Luzzatto*

14 **Route Reconnaissance: A Lost Art**
*By Captain Matt Pasvogel*

17 **A Guide to the U.S. Army Engineer Museum**
*By Kim Combs*

18 **The Army School System: One Army, One Team, One Standard**
*By Major Maurice E. Gissendanner*

20 **The Army Engineer Diver**
*By Captain James Kisiel and Master Sergeant Marcus King*

22 **Engineer Doctrine Hierarchy and Publications Renumbering**
*By Lieutenant Colonel Harry Rossander*

26 **Understanding AC/RC Assignments**
*By Major Diane T. Cummins-Lefler*

28 **Constructing Pavements With Recycled Waste Materials**
*By James E. Shoenberger*

30 **Sets, Kits, and Outfits: Technical Trades and Topography**
*By Alan Schlie*

34 **GIS - The Bridge Into the Twenty-First Century**
*By Lieutenant Colonel Tim Rensema, Mr. Craig Erickson, and Captain Steve Herda*

40 **EOBC and EOAC Update**
*By Captain Sam Hudson*


## DEPARTMENTS


Inside front cover: **Clear the Way**
24 **Book Review**
37 **Past in Review**
39 **The Engineer Writer's Guide**
42 **CTC Notes**
46 **Engineer Update**
49 **Lead the Way**



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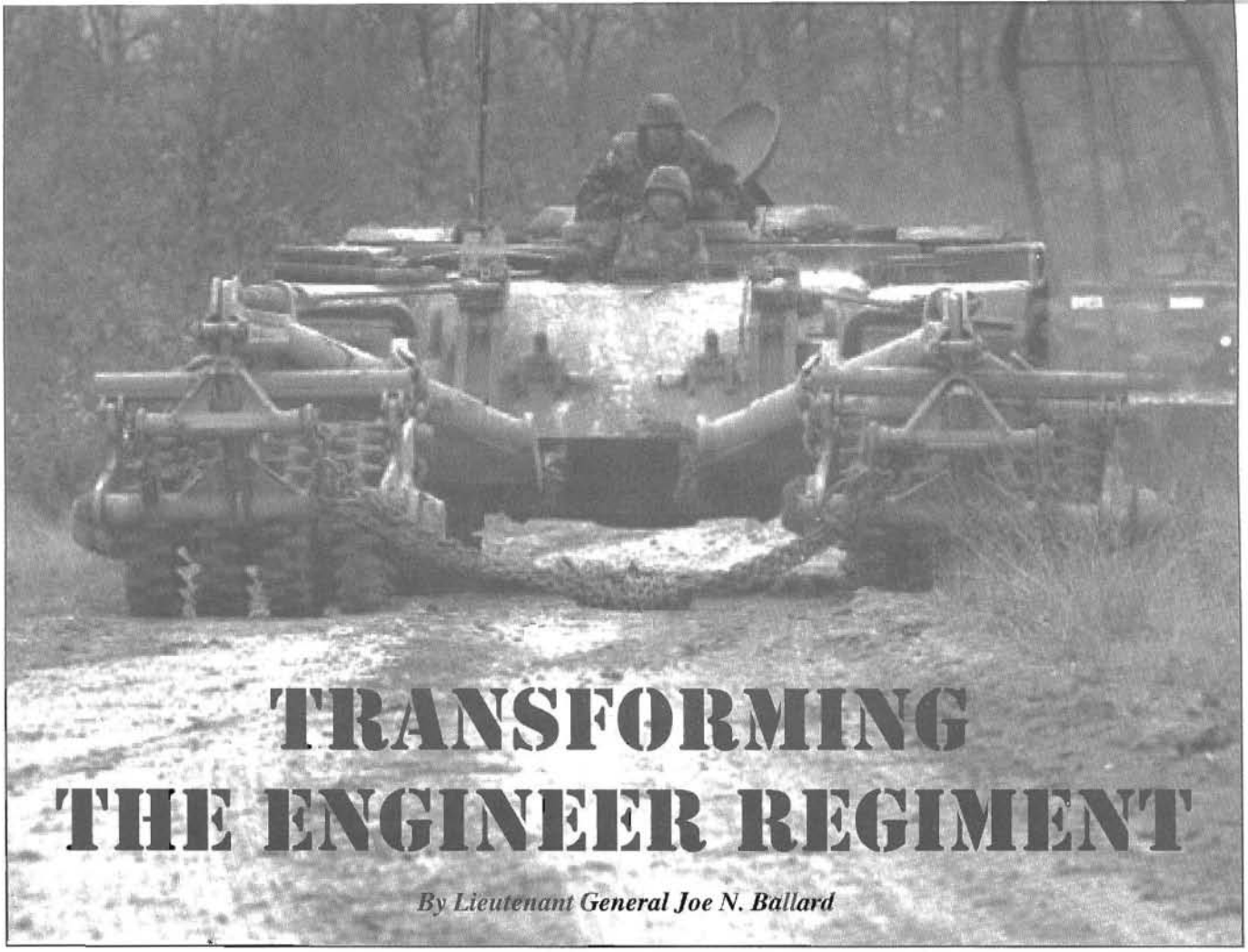


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# TRANSFORMING THE ENGINEER REGIMENT

*By Lieutenant General Joe N. Ballard*

Charles Darwin once said, *"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change."* This quote is very appropriate, given the changes occurring in the Army. General Shinseki realized that the Army had to change, to transform itself to meet the needs of the current global environment. The Army's vision is to produce a more deployable force that is lethal and survivable. As the Army changes, so will the Engineer Regiment. We can either swim with the current of change and make it across the river or swim against the current and drown.

For the Engineer Regiment to properly support the new, more mobile Army, we will have to revolutionize the way we provide support. This metamorphosis will be even more difficult if we are not unified.

The Army transformation has posed several challenges to the Engineer Regiment. First, two of our procurement programs—the Wolverine and the Grizzly—have been put on the shelf. Second, the new Initial Brigade will have only one organic engineer company. And third, the force structure for engineer units that are echelons above division and corps will probably be reduced.

These changes require our regiment to do some innovative thinking to determine how we will provide world-class engineer support to this more deployable Army. What we need to do as a regiment is get on board with the transformation and decide how the regiment can best support the new Army vision.

I challenge you to consider how we can optimize our performance, given the structure already determined for the Initial Brigade Combat Teams. We don't have all the answers because the transformation is still in its early stages. But in this article, I'd like to share some of my thoughts on recent events and where I think the regiment needs to go.

## Initial Brigades

As has been well publicized, the new Initial Brigade calls for only one engineer company to be organic to it. We have become accustomed to a brigade having a full battalion of engineers. The transformation is a fact of life, and it is unlikely that the Initial Brigade structure will change significantly with regard to its organic engineers. This company will have many of the capabilities that are already found in a mechanized engineer company. The challenge is to accomplish all the mobility, countermobility, and survivability tasks for the Initial Brigade that an engineer battalion provides now.

The Engineer School and TRADOC are working to determine how this engineer company will fight and how it will be augmented during contingencies. There are still a lot of problems to be resolved. Probably the most important thing that we can do as a regiment is to influence the force structure at the division level.

We are continuing to work to keep the engineer brigade structure. This command element is essential in order to coordinate augmenting engineer forces. We are also working to ensure that there are augmenting engineers available at the division level. Our challenge will be to justify to the Army what the right engineer mix is to support the force. To do that, we have to develop sound reasons for retaining force structure.

The Army transition strategy has raised the question, "How do we provide the best engineer services to the Army and DoD?" The regiment's place in the new Army will be determined by how well we answer that question.

We must use our collective experience and knowledge to define practical, workable solutions to these problems. We will know more as the new brigades begin to train and test their new force structure. I challenge everyone in the regiment to stay engaged. The results of these brigades' training exercises will affect every engineer's future.

***"As the Army changes, so will the Engineer Regiment. We can either swim with the current of change and make it across the river or swim against the current and drown."***

### Wolverine and Grizzly

As I mentioned earlier, we have lost funding for the Wolverine and Grizzly. It looks as if one battalion's worth of equipment will be fielded in the case of the Wolverine. The Grizzly program will be stopped and positioned so that it can be restarted if funds become available. These systems are at the top of the Army's list of unfunded priorities. We need to keep pushing for them.

It is a fact that there is a lack of capability inside our current structure to conduct gap crossings and breachings. The transformed Army will be a full-spectrum force. These systems are needed to support a high- to medium-intensity conflict. Engineer School personnel are analyzing other equipment that is more deployable. These newer systems will be the first to the battlefield. But the larger, more survivable equipment will still be required to prevent casualties and ensure mobility. Regardless of whether they are in tracked or wheeled vehicles, the maneuver forces will require mobility support, and it is our responsibility to provide that support. How will we do that, given the constraints placed upon us?

### Engineer Services

It is clear that the Army will soon be a lighter, more deployable force. For the Engineer Regiment to be of the greatest benefit to that force, we need to be able to bring the full capabilities of the regiment to bear on any situation. That means we must do a fundamental relook at the full spectrum of engineer support to the Army and to our Joint forces.

The old ad hoc delivery of engineer services to the multitude of contingency operations around the world simply does not meet the standard that is expected from the regiment. We must have a clearly understood, well-coordinated doctrinal process for engineer support, from minefields to theater operations. This process must better use the resources and command-and-control structure of USACE—the engineer MACOM. It must leverage the strengths of our engineer troop units—both active and reserve—while minimizing weaknesses. It must leverage the tremendous worldwide contractor resources that we can tap into. It must leverage the capabilities of Corps labs, districts, and divisions.

We have been working on several initiatives to provide this type of support. One initiative that we are currently working with the Army Staff is aimed at improved delivery of engineer services above the tactical level. This plan will better use the resources and command-and-control structure of the engineer MACOM.

USACE division commanders are aggressively engaged with every CINC now, and we will increase planning staffs to integrate with CINC operations over the rest of this year. We are working as a part of the Army Transformation Team to dramatically improve how the regiment provides engineer services to U.S. forces.

The engineer support to Kosovo is a good example of how engineer services can optimize the effectiveness of the force. USACE's North Atlantic Division was directly engaged with EUCOM to deliver the required engineer services above the tactical level. By using the full spectrum of engineer capabilities available, we were able to get U.S. forces into winterized billets within 90 days (see article on page 6).

During this mission, we reached back to the USACE labs and district personnel to acquire technical assistance as well as contractor support. It was truly a coordinated effort between every aspect of the regiment. And it worked!

USACE has structured itself to be theater-focused. A general officer from one of our major subordinate commands is focused on each theater. Each CINC headquarters will soon have a USACE planning cell. This is a natural extension of the work USACE is doing around the world. The added planning resources will strengthen USACE ties and reinforce the existing ENCOM planning link for major theater war scenarios. Also, the USACE planning cell will fill the gap in engineering planning that exists for contingency operations such as the flooding in Mozambique.

The goals are to build on the current interaction between each CINC's staff and USACE and to take advantage of current engineer theater engagement under programs such as foreign military sales and nation-assistance projects. The result will be better engineer support to all CINCs across the full operational spectrum.

## The Future

The future of the Army is to be a more deployable force. For engineers to be of full benefit in that force, we need to be innovative and develop a force that is agile and synchronized across the battlefield and the full spectrum of conflict. Each component of the regiment must work together as a focused team. We must make the term *One Regiment* a reality. We can continue to provide a full spectrum of engineer services to the Army with a lighter, more deployable force. To do this, we must have seamless integration of all aspects of the regiment. Our goal is to maximize engineer support with the smallest footprint possible.

All the changes and initiatives I just mentioned are the close fight. These are actions that we are currently working and, by the time this article is published, may already be determined. However, as a regiment, we need to focus on the deep fight. After the structure of the engineer forces is determined, how will we operate? Can we predict the challenges and shortcomings of the new structure before they become crises? Some of this will shake out as the new brigades start to train. But the integration of these brigades with division and echelon-above-division engineers will take the collective energies of the entire regiment to determine the best support ratios and operating techniques.

Last year, I published an article in this magazine challenging the regiment to focus on working as a unified organization. At a recent Senior Reserve Engineer Conference, the commanders briefed some of their efforts to help form a more unified team. We have made some progress, but we still have a long way to go.

The transformation of the Engineer Regiment cannot be accomplished by a small group of officers in the Pentagon or the Engineer School. It takes the collective input of every component of the regiment to ensure that we capture the ideas we can use to make our new structure a success. We must learn to communicate with one another.

Recently MG Halvorsen, commander of the Texas National Guard's 49th Armored Division, took charge of the U.S. forces in Bosnia. This is the first time the active-duty soldiers in Bosnia have come under the control of a commander from the National Guard. This is not an isolated incident—this is the future. For engineers, this is even more significant because under the new Army structure, active-duty soldiers will find themselves working much more often with reserve and National Guard engineers. To provide seamless support, we must be able to operate together. That is why communication, cooperation, and information sharing is so critical.

The Army is changing, and the Engineer Regiment is going to change with it—there is no doubt about that. There is a lot we can wring our hands about, but hand-wringing isn't going to help matters. Now is the time for leadership, and for the entire regiment, to pull together. No one is well-served if the regiment is piece-mealed by equipment cuts here and personnel cuts there. We cannot afford to play catch-up as the transformation plan for the Army

(DoD photo by TSgt James Mossman, USAF)



**Soldiers from the 50th Engineer Company, 1st Platoon, and the 2d Battalion, 9th Infantry, pull together two sections of pontoon bridge on the Imjin River in the Republic of Korea. They are participating in the exercise as part of the U.S. Army Officer Professional Development Program.**



(DoD photo by SSgt Lisa Zunzanyika-Carpenter, USAF)

**Army engineers from A Company, 40th Engineer Battalion, and A Company, 20th Engineer Battalion, push a partially constructed Mabey and Johnson bridge into position at Camp Demi, near Kladanj, Bosnia-Herzegovina.**

vision is executed. We must get out ahead now with a solid engineer support plan. We all must be engaged in this planning for engineer support to the Army and the nation. It is up to us to ensure that these changes do not jeopardize the safety of our soldiers or the defense of our country.

## Challenges to the Regiment

These are my challenges to the members of the Engineer Regiment:

- Be a student of change. Pay attention to the results of the testing of the new structures and equipment.
- Be knowledgeable of how engineers are integrating into the Army vision.
- Talk to the forces you support about their requirements and engineering changes. Ensure that their ideas and concerns are relayed through the engineer chain of command to the decision makers.
- Be an active part of the dialogue at your level. Make sure your soldiers and junior leaders know what is happening. It will affect their future.
- Talk to people at the Engineer School. They are the proponents for these changes, and they need information concerning issues in the field.

During my more than 35 years in the Army, I have never seen the Engineer Regiment presented with the magnitude of changes that are happening as we speak. Meeting the challenges that the Army transformation provides is an opportunity for us to become more efficient; to be a stronger, more unified team; and to revolutionize our support to the Army. We must rise to the challenge.

In conclusion, I would like to share with you the words of President Dwight D. Eisenhower, who said, *"Engineers build for the future, not merely for the needs of men but for their dreams as well. Thus, inherently, the engineer's work is a fearless optimism that life will go forward and that the future is worth working for."*

I challenge all of you to go out and work to keep the regiment ready to meet the needs of the Army.

Essayons!

*Lieutenant General Ballard is Chief of Engineers and Commander of the U.S. Army Corps of Engineers. He previously served as Chief of Staff of the U.S. Army Training and Doctrine Command, Fort Monroe, Virginia. LTG Ballard is a registered professional engineer in civil engineering.*

# The Engineer Regiment in Kosovo

*By Colonel Robert L. McClure*

For the better part of 1999, much of the world's attention was focused on Serbian President Slobodan Milosovec's ethnic atrocities in Kosovo as well as NATO's 78-day bombing campaign that eventually compelled Milosovec to stop and accept deployment of an international peacekeeping force in that beleaguered province. American soldiers first entered Kosovo on 12 June as part of that force and began to establish a safe and secure environment. The media gradually began to pull out of Kosovo, so by the end of the year, Kosovo, along with Bosnia, became essentially "backwaters" of international interest. The Russian war in Grozny, the new millennium celebrations, and other issues commanded headlines.

For engineers, that was a bit of a shame because what happened in Kosovo after June is just short of a miracle: two base-camp "cities" were erected in record time to house the American force and its allies before the onset of a harsh Balkan winter. For me personally, Kosovo after June 1999 was an engineer's dream. While perhaps not news to the rest of the world, in Kosovo the Engineer Regiment again proved its versatility and worth to the Army and, more importantly, to our soldiers.

## Planning

Engineer planning for operations in Kosovo began months before the first bomb was dropped. At the outset, planners wanted to use the lessons learned in Bosnia and convinced decision makers to reach base-camp "end state" as quickly as possible. Because of uncertainty about the Bosnian mission's duration, when the Army moved across the Sava River into Bosnia in 1995, soldiers were housed first in tents – in the winter! Only years later were they moved to semipermanent Southeast Asia (SEA) huts (a theater-of-operations design that first made its debut in Vietnam) on base camps. Engineer planners knew it was much more cost effective to forego this gradual approach in Kosovo in favor of building end-state SEA huts right away, and operational commanders agreed with this approach.

The First Infantry Division (1ID), known as the "Big Red One," was tapped to be the first unit in Kosovo. The division's Engineer Brigade would

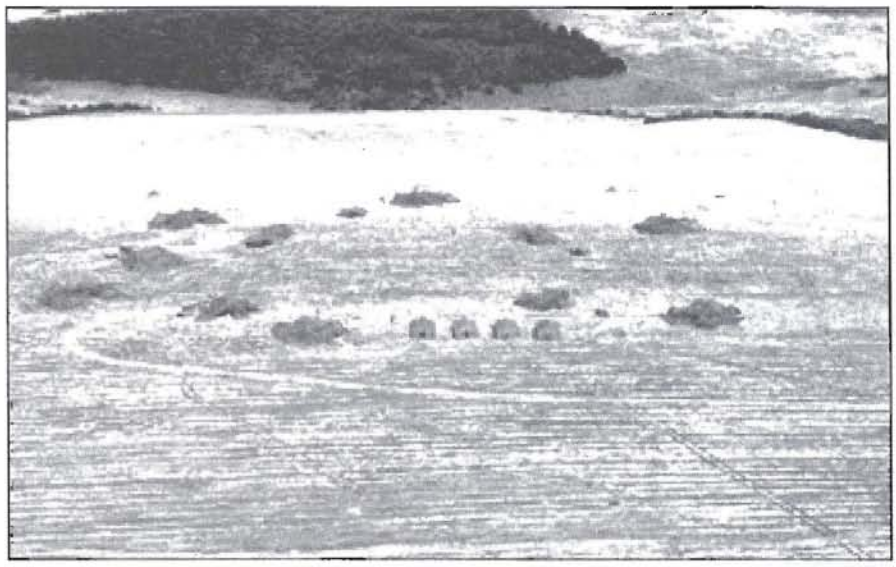


**A view of Camp Bondsteel**

oversee the sapper and construction-engineer effort. A relatively new entity (engineer brigades within divisions were formed less than 10 years ago), the organization would prove its worth by integrating engineers from outside the division, indeed around the world, into the task-force effort. The Engineer Brigade commander at the time, COL Joseph Schroedel, and his staff worked tirelessly at a base-camp plan that would incorporate all the necessary requirements and still be functional for the mission. Incorporating requirements from force-protection experts and safety specialists, Engineer Brigade personnel laid out a base-camp "template" that depicted where soldier living areas should be arranged in relation to helicopter flight lines, ammunition holding areas, etc. At the same time, planners also took geologic data (obtained from the Waterways Experiment Station in Vicksburg, Mississippi) that indicated possible underground water sources and matched the data to possible camp locations that had been selected from satellite imagery.

The engineer force assembled in Kosovo in the summer of 1999 consisted of more than 1,700 personnel under the command and control of 1ID's Engineer Brigade. Foremost was the organic 9th Engineer Battalion, whose mission was to provide direct support to 1ID's 2d Brigade Combat Team. Attached construction units included the 94th Engineer Combat Battalion (Heavy), with the 535th Combat Support Equipment Company from Germany; Naval Mobile Construction Battalion 3 (Seabees) from California; A Company, 864th Engineer Battalion from Fort Lewis, Washington; and the 568th Combat Support Equipment Company from Fort Riley, Kansas.

Also attached to the1ID Engineer Brigade were explosive-ordnance-disposal units and a team of about 30 military and civilian engineers from the U.S. Army Corps of Engineers Baltimore District with expertise ranging from structural to electrical to environmental engineering and more. The team's job was to integrate the final requirements of units and agencies on the camp, assist with final design, and ensure that standards were being met by both contractor and construction engineers. This team came with its own video teleconference system back to districts in the states and made the term "tele-engineering" come alive. More than once, the answers to tough engineering questions were no more than a telephone call away. A construction-management section attached to the brigade staff assisted the construction battalions with design and layout of various projects. The brigade staffed a mine-action center in the task-force headquarters that maintained a database of all known and suspected mine locations in sector and also coordinated United Nations and humanitarian demining operations.



Camp Bondsteel, 15 June 1999



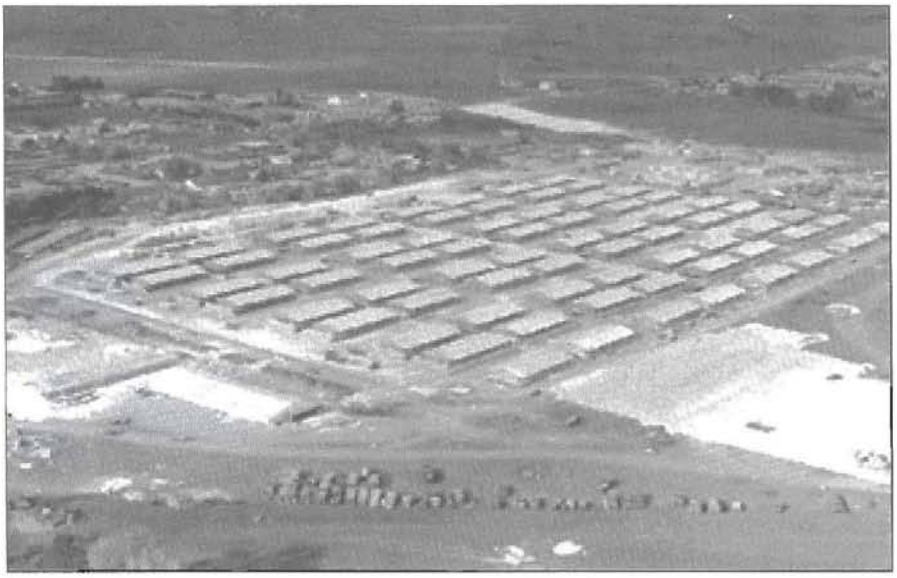
Camp Bondsteel, 15 October 1999

## Mission

The mission was simple, daunting, and as broad as any the Corps of Engineers had ever faced. First and foremost, it was to provide direct engineer support to the maneuver commander with mobility and force protection so that a safe and secure environment could be established in



**Camp Monteith, 1 July 1999**



**Camp Monteith, 15 October 1999**

sector. This would not be easy and proved to be a challenge to the 9th Engineer Battalion every day until it left the theater. At the same time, the Engineer Brigade was to merge construction assets and integrate them with the contractor, Brown & Root Services Corporation, to build not one but two base camps for a total of 7,000 troops. That would have been a tall order in itself had not the V Corps commander added a deadline of 1 October. His challenge to the engineers was to ensure that housing for soldiers was built before winter set in, and he didn't care that the deadline happened to be less than 90 days after many of the construction units arrived on site.

During this time, two phrases were adopted as unofficial mottos to help leaders at all levels discern the highest priority when conflicts arose and to remind everyone that there were more engineer missions than there were engineers. Those phrases were "It's the SEA huts, stupid!" and "No idle engineers!"

When the 9th Engineer Battalion hit the ground in Kosovo, it began building triple-standard concertina fences around the areas selected for the two base camps—Bondsteel and Monteith. In all, elements of the 9th built more than 17 kilometers of fence in Kosovo, 10 kilometers around the perimeter of Camp Bondsteel alone. Additionally, the battalion reconnoitered more than 320 kilometers of roads and classified 75 bridges for military use by sappers. Because of the magnitude of the overall peacekeeping mission, one company from the 9th was reorganized as infantry and attached to a mechanized infantry battalion to conduct presence patrols near the city of Gnjilane (see *Engineer*, February 2000, page 6). Other missions for the 9th included clearing mines and ordnance when they impeded maneuver and constructing force-protection bunkers on base camps to protect against possible indirect fire.

The construction effort began in earnest around the first of July with the arrival of the Seabee battalion overland from Albania, where the battalion had been a part of Task Force Hawk during the air war. The Seabees occupied Camp Monteith (on the edge of Gnjilane), which had been a Yugoslav army artillery barracks before the war. The camp itself was largely untouched, except where two precision bombs had destroyed the maintenance facilities. However, either retreating forces or locals had trashed and looted each building, and it took weeks to make them usable again.

Force-protection concerns caused by the closeness of Gnjilane forced us to abandon many of the original buildings on Camp Monteith and build most of the camp in an adjoining field. More than 75 SEA huts, along with support structures, were built for the planned force of about 2,000. It is perhaps a curse of fate that those looking for engineer stories in Kosovo always will overlook Camp Monteith. But even though it is smaller than Camp Bondsteel, Camp Monteith—the site of the American headquarters—is no less an engineering marvel. Buildings have been refurbished, electricity and water run to all soldiers' quarters, and facilities such as weight-lifting and recreation rooms have been built in large fest tents. The



**Soldiers from the 9th Engineer Battalion set up concertina wire around the construction area at Camp Bondsteel.**

camp is also the center of tactical activity in the American sector because of the mixed ethnicity of the surrounding population and the camp's proximity to the Russian battalion serving alongside other peacekeepers in Kosovo. Indeed, the first American fire support for Russian forces since World War II—155-millimeter illumination rounds—were fired from the artillery positions made by Seabee engineers at Camp Monteith.

But Camp Bondsteel is the "Grande Dame" in Kosovo of what engineers do. Spread over almost 900 acres of rolling wheat fields, it was picked early on to become what it is today—the major American base camp in theater. Within its fenced perimeter are more than 175 SEA huts, a 30,000-square-foot headquarters building, an ammunition holding area, motor pools, chapels, recreation and dining facilities for about 5,000 American and allied soldiers, and a helicopter airport with more than 50 parking pads. Water is piped into each hut from huge holding bags filled by several wells in camp. And there's even a wastewater treatment plant. It is Camp Bondsteel that benefited most from all the staff planning conducted early on. Its layout is very similar to the templated camp design, adjusted only for the terrain and other factors.

The numbers involved in building both camps were staggering. At the height of the effort, about 1,000 expatriates hired by Brown & Root, along with more than 7,000 Albanian local nationals, joined the 1,700 military engineers. From early July and into October, construction at both camps continued 24 hours a day, 7 days a week, with perhaps half a day each week for soldiers to perform personal chores and equipment maintenance. More than a quarter-million 2 by 4s were used, along with almost 200 tons of nails and more than 100 miles of electrical cable. More than a half-million cubic yards of earth were moved on Bondsteel alone, and the gravel used at both camps would cover a two-lane road from St. Louis to Kansas City.

Camp construction centered around the SEA huts. Each living-area bay was 16 by 32 feet—almost exactly the size of the familiar medium, general-purpose tent. In Kosovo, we joined five of these bays and a latrine under one roof. We planned for six soldiers per bay, 30 soldiers per SEA hut, and 120 soldiers—about a company's worth—in a "quad" of SEA huts that were then surrounded by a force-protection wall. We covered the plywood floors with linoleum and hung plasterboard on the walls for fire resistance. We installed smoke detectors, emergency lights, and eight electrical outlets in each bay. The SEA huts had vertical supports that rested on concrete footers placed on compacted earth and gravel. We used no foundations and did not place footers on fill because of settlement. We installed a heater/air conditioner and a small window at each end of the bays. We routed electricity, water, and communications utilities underground and prefabricated walls and other sections so they could be constructed quickly.

Toward the end of September, it was taking about 18 days from initial site preparation to complete a SEA hut for 30 soldiers, with dozens of them under construction at any one time. In the end, more than 700,000 cubic feet of living space had been built—equal to a subdivision of some 355 houses—all in less than 90 days!

## Challenges

Obviously, any endeavor this size is not without its challenges. Shortly after site preparation began at Camp Bondsteel, a 36-inch natural-gas pipeline was discovered under the camp – right where we wanted to make a 3-foot cut! It was easier to redesign the camp around the pipeline than dig it out, and that's why today a "no-construction" strip of land runs northwest to southeast among the SEA huts. The total absence of civilian sewage-treatment facilities in Kosovo forced early diversion of critical horizontal equipment to build sewage lagoons, so we would not foul the local watersheds.

Outside the wire and at the other end of the engineers' mission spectrum, the 9th Engineer Battalion was given several ethnically mixed villages to control, because someone occasionally terrorized the area with small-arms and mortar fire at night. Although the "mad mortar man" was not caught, he did stop after a section of tanks and a military-police element were placed under control of the engineer lieutenant in Gnjilane. The combat engineers' ability to not only maintain control under extreme circumstances but also to inspire confidence in this small village and elsewhere speaks volumes of the American soldier and junior leaders who made it happen on the ground.

## Lessons Learned

The engineer lessons learned in Kosovo are few and simple. First, a brigade-level command-and-control headquarters was essential to effectively integrate the enormous engineer effort required to get soldiers under cover before winter. While many have questioned the need for engineer brigades in divisions as the Army looks ahead in the twenty-first century, it was essential to Task Force Falcon's early success. The magnitude of commanding more than 1,700 soldiers and integrating the efforts of nearly 10,000 people would have swamped a normal engineer-battalion staff.

Second, our engineer soldiers are trained and led well, as evidenced by the broad range of missions they accomplished—from patrolling as infantry to major camp construction. However— and this is not news—their equipment is outdated. The 94th Engineer Battalion had some bulldozers that vendors no longer stocked parts for in theater. The only sources for parts for many of the prime movers and trailers were cannibalization points in the United States.

Finally, we need to put some muscle back into the sapper battalions. For a variety of reasons over the past several years, these battalions have been cut to the bone and are on the verge of becoming irrelevant on the battlefield. According to the table of organization and equipment, the personnel strength for line companies in sapper battalions is now less than 100. When such a unit is manned at less than 90 percent strength (as was the case in June 1999), and you subtract nondeployable soldiers (all units have them), you end up with 65-person companies patrolling sectors as infantry or trying gamely to conduct route-clearing operations that would be so much easier with more soldiers. It's time to stop doing more with less.

As the millennium changed, so did the engineer force in Kosovo. And, although most of the camps were built by Christmas, a significant list of projects remained. Taking over from the 9th Engineer Battalion was their sister unit, the 82d "Blue Babe" Engineer Battalion from Germany. A National Guard combat-heavy construction company from North Dakota—B Company, 142d Engineer Battalion—deployed to take over duties from the 568th and 864th Engineer Companies. Additionally, a company-sized "air detachment" of Seabees replaced Naval Mobile Construction Battalion 3 at Camp Monteith.

## Accomplishments

The story of American forces in Kosovo is far from over. However, as opposed to the Army's earlier experience in Bosnia, soldiers deploying to Kosovo will have a warm, dry place to live. There, the Engineer Regiment came together as one and, in record time, built base camps worthy of American soldiers, so they could perform their critical duties. Although the camps were by and large complete when the world celebrated the new millennium, engineers were not left without a mission. Presence patrols by combat engineers continue around the clock, minefields and unexploded ordnance are still being marked, and snow from main supply routes throughout the American sector is being removed by engineers with more than a half-dozen plows and salt spreaders. Yes, engineers have been tasked to plow snow in Kosovo. It is no surprise that the clearest roads there this past winter were in the American sector.

With luck, much of the world will turn away and forget the terrible tragedy of Kosovo as time passes. However, the Engineer Regiment should not forget its accomplishments but build on them as *One Team, One Regiment, One Fight*—active and reserve, civilian and military. Anyone who has had the opportunity to see what the Engineer Regiment created in so short a time in Kosovo cannot help but be impressed with the "can-do" spirit of engineers, as well as that of America and her Army, when the mission demands action.

*Colonel McClure commands the 1st Infantry Division Engineer Brigade. He was previously on the U.N. peacekeeping mission planning staff in New York; commanded the 92d Engineer Battalion when it built the U.N. base camps in Haiti; and served more than 10 years in Germany, including company command in the Berlin Brigade. COL McClure is a West Point graduate, holds a master's degree from the Kennedy School at Harvard and a War College Fellowship from the Center for Strategic and International Studies in Washington, and is a registered professional engineer in Virginia.*




# Cobra Gold '99

## Tests the Eight-Step Training Model

*By First Lieutenant Matthew Luzzatto*

For several years, the eight-step training model has been a helpful guide that many units have adopted as their standard operating procedure. Closely resembling troop-leading procedures, the training model refined the existing standard into a straightforward method for conducting quality training. This past year, the 864th Engineer Combat Battalion (Heavy), Fort Lewis, Washington, put the eight-step training model to the test and proved its effectiveness during the 84th's deployment to Thailand as part of Cobra Gold '99.

Cobra Gold '99 joined the U.S. and Thai militaries to build four multipurpose village activity centers in less then a month. Varying slightly in design, each building rested on an 80- by 40-foot concrete pad with precast concrete columns. On top of the columns was a steel-framed roof support system with a heavy concrete tile cover. Each building consisted of some variation of block construction and might include end walls, various rooms, or decorative block with steel-mesh enclosures. Built adjacent to existing school compounds, the new activity centers furnished much-needed classrooms and functional meeting spaces to these remote and economically depressed villages. In addition, U.S. and Thai soldiers received valuable joint operations construction experience.

With a firm understanding of the mission's scope, the 864th began to execute the eight-step training model early on so as to use this valuable training mission to the fullest.

### Plan the Training

One year before the mission's execution, the battalion S3 attended a Cobra Gold '99 preplanning meeting in Bangkok and, in July 1998, a Concept Development Conference was held in Hawaii. Throughout the rest of 1998, the battalion staff continued to collect information and coordinate future contracts for the mission that was planned for May 1999. Meanwhile the battalion's construction section gathered everything it could from previous Cobra Gold missions. After-action reviews and plans from those exercises helped ensure that many of the challenges faced in the past would not arise again.

### Train and Certify Leaders

In early January 1999, the task force narrowed the concept of the operation to four construction sites—three would be completed by Alpha Company's two vertical construction platoons, and Seabees from the 5th Naval Marine Construction Battalion would complete the fourth. During the battalion's annual construction conference, OICs and NCOICs updated their project-management skills, to include learning to use the new Sure Track software program by Primavara. More importantly this conference allowed battalion leaders to ensure that project leaders understood and adhered to the battalion's high standards.

As a final predeployment certification, each OIC gave the battalion commander a preconstruction brief that included details of how the OIC planned to accomplish each mission. The briefs were of special importance because the construction sites were located hours from each other and in some of the most



**Soldiers from the 864th Engineer Battalion construct the foundation system for a multipurpose building in Thailand.**

remote areas of Thailand. This meant that the majority of the command and control would rely on expertise of the site OICs and NCOICs.

## Recon the Site

In February a reconnaissance team consisting of Alpha Company's executive officer, a site NCOIC, and part of the battalion's construction section visited Thailand to get a first-hand look at the sites. The team took photographs and videos and established the basis of good relations with each village leader. The team determined the best means of providing each site with essential life-support supplies and contracts. Meanwhile, the battalion's construction team established and finalized bill-of-material contracts and met with its Thai army counterparts for each site.

## Issue the Plan

After compiling information from the reconnaissance team and the OIC's planning, the task force issued a comprehensive plan early in March 1999.

## Rehearse

To ensure the success of a mission, there is no substitute for quality construction rehearsals. So for more than a year before the execution of Cobra Gold '99, the 864th sought construction missions that were similar to those it would perform in Thailand. In August 1998, Alpha Company's 1st Platoon completed a mission for the 3d Ranger Battalion that involved constructing four different walls at one of the ranges so the rangers could train on urban demolition. While constructing three of these walls, the company placed more than 1,500 concrete masonry blocks—an outstanding rehearsal for Cobra Gold, where it placed more than 3,000 blocks. Alpha Company's 2d Platoon constructed a 50- by 100-foot Butler building at the post's Regional Correctional Facility. This project involved pouring a 60- by 105-foot concrete pad, which was excellent preparation for the 80- by 40-foot pads it built in Thailand.

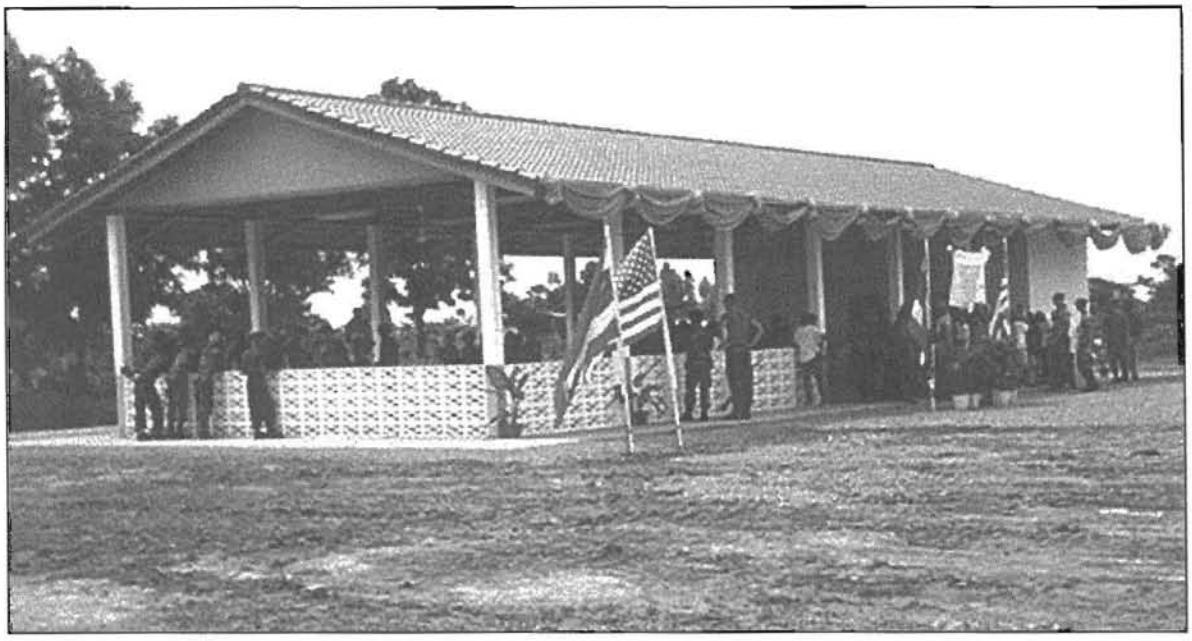
Before the deployment, Alpha Company focused on some of the more unique construction challenges it would face. For example, the platoons had never constructed the type of roof they would build in Thailand, so for practice they took on a small project in the company's motorpool. For years, Alpha Company's vertical platoons had practiced laying block on a small 16- by 14-foot pad. The battalion's construction section designed and built a roof for the pad that was similar to the roof design and materials the company would use in Thailand. In completing the roof, Alpha Company discovered many of the challenges that might arise and resolved in detail how to meet these challenges long before the company arrived in Thailand.

The foundations of the buildings in Thailand were also unique. With concrete footers and precast reinforced concrete columns as the structures' main support system, Alpha Company incorporated a grade beam system that tied each of the columns together. To rehearse this particular task, the company constructed a similar foundation system with only four columns. As an added benefit, this foundation would act as the company's new block training foundation, replacing the shed it had put a roof on earlier. Just as with the roof, the lessons learned from constructing this new foundation system helped leaders avoid construction problems in Thailand before they occurred.

Rehearsals such as these offered not only an opportunity for leaders to refine their plan but also gave the soldiers and NCOs a chance to practice and determine the best and most efficient way to accomplish each task. By conducting rehearsals that closely mirrored the actual training in Thailand, the task force ensured that all sites could meet the deadline for completing the construction projects.

## Execute

On 15 April, the task force sent the construction section and Alpha Company's executive officer to Korat, Thailand, to ensure that coordination the reconnaissance team had done earlier was still in place. On 20 April, the four-man advanced party



**Thai military and civilians join soldiers from the 864th Engineer Battalion at one of the Cobra Gold '99 projects.**

teams deployed to ensure that the footers were placed and the columns erected within 10 days. The main body of 85 soldiers departed from McChord Air Force Base, Washington, on 28 May and began the 29-hour flight to Thailand. They had 20 days to complete the remaining 90 percent of the project. By the time the 864th left Thailand, it not only had built four outstanding structures but also had strengthened relations with the Thai military and civilians.

## Conduct an AAR

Throughout the project, OICs maintained a log of after-action-review comments, as-built drawings, and a record of additional bill-of-materials (BOM) purchases. When it returned to Fort Lewis, the construction section compiled this information with its own comments and those of the leaders into a valuable package for the next Cobra Gold exercise.

## Retrain

Using the lessons learned from Cobra Gold '99, the 864th Engineer Battalion staff already has started to plan for the battalion's involvement in Cobra Gold 2001. Although Cobra Gold '99 was quite successful, everything did not go according to plan during the exercise. All of the sites experienced design changes, BOM shortages, and some weather problems. Yet, the effects of these ever-present challenges on the overall mission were minimal because of the time saved and the lessons learned during the battalion's execution of the eight-step training model.

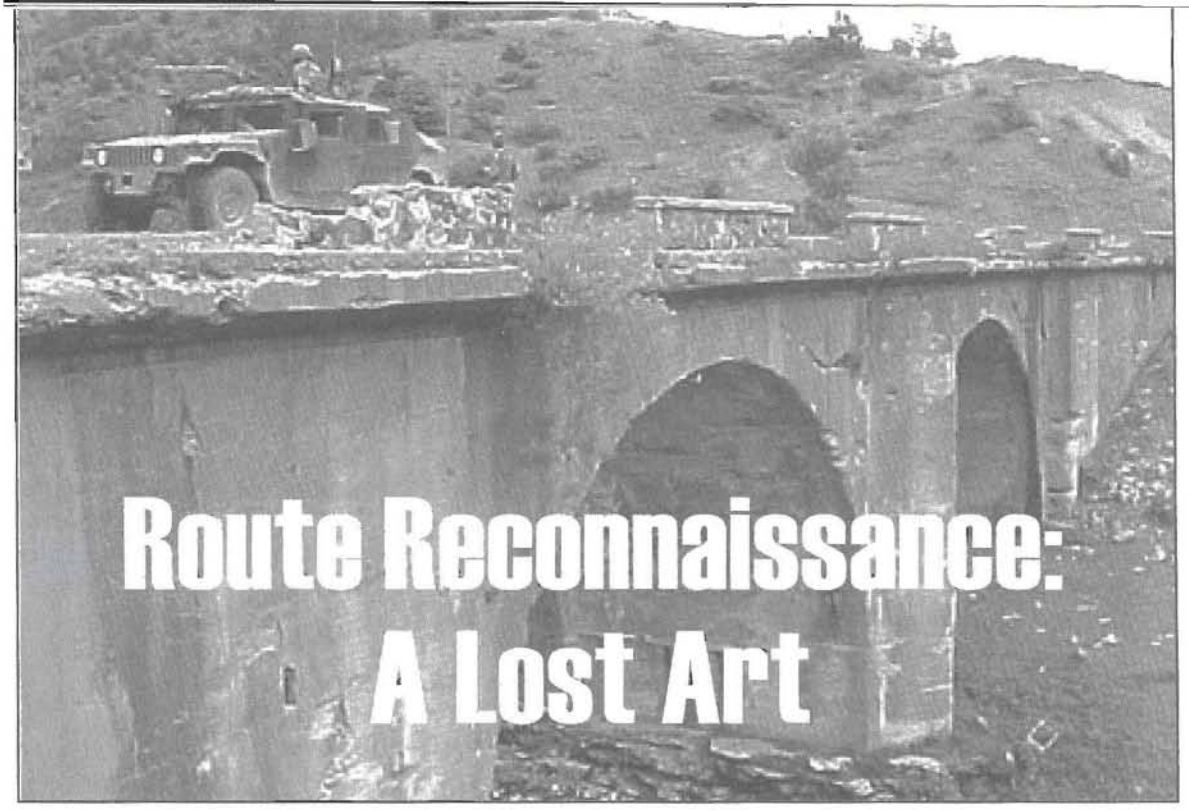
## Conclusion

*Planning* as much as a year before executing the mission limited the number of design changes. *Training and certifying leaders* gave them the confidence and skill to make the right call in the face of adverse conditions and situations. *Reconnaissance of the site* ensured that leaders knew what to plan and could provide soldiers what they needed to get the job done. *Issuing the plan* ensured that everyone down to the lowest level understood their role in the training's execution. *Rehearsals* revealed problems to be addressed and trained soldiers on tasks where they lacked proficiency. *Execution* gave everyone an opportunity to see what they could do with what they had learned in a real-world training situation. The *after-action review* provided quality feedback on what to maintain and what to change the next time around when the battalion *retrains* during the Cobra Gold 2001 exercise.

Although the 864th was commended for completing one of the most successful missions in the 18-year history of Cobra Gold, the success was also a tribute to the effectiveness of the Army's eight-step training model.

*First Lieutenant Luzzatto is a vertical construction platoon leader, A Company, 864th Engineer Combat Battalion (H), at Fort Lewis, Washington. He served as battalion construction officer for the 864th while deployed to Kosovo from July 1999 to January 2000. First Lieutenant Luzzatto is a graduate of the United States Military Academy and the Engineer Officer Basic Course.*





# Route Reconnaissance: A Lost Art

*By Captain Matt Pasvogel*

On 8 April 1999, the first elements of Alpha Company, 40th Engineer Battalion, deployed from Germany with Task Force 1-6 Infantry as part of the initial-entry force to Albania. Based on the initial mission analysis, our engineers were prepared to conduct high-intensity conflict and force-protection tasks. After the first few days in Albania, the situation and mission expanded from protecting the force to establishing a forward operating base for future operations. This base was more than 150 kilometers from our base in Tirana, Albania. While performing initial route-reconnaissance missions, we realized that they were very different from the heavily rehearsed and trained engineer obstacle-reconnaissance missions.

It did not take long to push forward the appropriate manuals and equipment to support the initial-entry force before the rest of Alpha Company arrived on 3 May. The company eventually reconnoitered more than 500 kilometers of roads and several tunnels and ferry sites and classified more than 90 bridges in Albania. Because many of today's military missions initially occur in countries with underdeveloped lines of communication, engineers must be well-trained in the vital mission of route recon. This article highlights some of the important doctrine, training, leader development, organization, materiel, and soldier (DTLOMS) issues as well as lessons we learned concerning route recon.

## Doctrine

Alpha Company personnel found that Field Manuals (FMs) 5-170, *Engineer Reconnaissance*, and 5-34, *Engineer Field Data,* are packed with information that is essential to conducting a successful engineer recon. FMs 5-170 (Chapter 5) and 5-34 (Chapter 3) outline several methods for conducting these missions and describe how to properly fill out the various reports. Our recon teams and squads used these methods as guides for gathering route information and compiling it in an understandable format to pass on to higher maneuver and engineer headquarters. We developed a checklist from these two manuals to remind team leaders of the various aspects of recon missions (see Figure 1). Our current doctrine, coupled with some mission checklists, contains sound tactics, techniques, and procedures (TTP) for accomplishing route-reconnaissance missions.

**Recon Checklist/Limitations**

- ✓Curves < 25 meters or 82 feet
- ✓Gradients > 7 percent
- ✓Inadequate drainage
- ✓Poor surface conditions
- ✓Road width < 4.0 meters
- ✓Overhead clearance < 4.3 meters
- ✓Bridge military load class (bypass possibilities and bridge degradation)
- ✓Shoulder softness/caving
- ✓Potential quarries, lumberyards, cement, and lime
- ✓Turnouts/turnarounds
- ✓Obstacles to movement
- ✓Rock slide areas

**Figure 1**

## Training

Although Alpha Company personnel did not focus on route recon before deploying, our junior leaders developed training plans and constructed rehearsals while in Albania. The engineer battlefield assessment from the mission analysis and a map recon provided a good start toward determining the features we needed to classify along the route. After deciding on the critical features to be reconnoitered, we used similar features within the perimeter of the Task Force Hawk base, if available, to conduct training and rehearsals. Within the base were many small bridges, sharp turns, narrow roads, and areas of insufficient drainage. Our sappers used spare time between missions to conduct butcher-board classes and walk-through exercises. It may not always be feasible to conduct training on actual features while deployed, but key leaders must conduct rehearsals of anticipated features using rock drills and walk-through exercises.

## Leader Development

With all the high-intensity-conflict training needed at the home station, we found it hard to dedicate the time and resources needed to train soldiers and leaders to standard on route-reconnaissance tasks. Because of our level of training before deploying, we constantly disseminated new TTP or lessons learned as they developed. Every time a recon team completed a mission, the leader back briefed the engineers at the tactical operations center (TOC) concerning the team's compiled data. The back brief also included any new techniques the team discovered and validated. The TOC disseminated that information to other leaders during daily operations meetings or mission rehearsals. Conducting thorough rehearsals and sharing information were very helpful to engineer leaders at all levels.

## Organization

Alpha Company categorized its engineer recons as initial, intermediate, or deliberate, depending on the time allowed and the enemy situation. During the initial or leader's recon, there was little time for engineers to gather detailed data. These recons usually consisted of a senior NCO or platoon leader riding with the task-force commander to get an initial assessment of the route. The engineer took digital photos to use for making an initial assessment of whether a feature might constrain vehicular movement.

After the initial recon, we tailored a team of four to six engineers to conduct an intermediate recon. While on this mission, the soldiers measured and collected data to help assess the route classification accurately.

Once the route was classified, engineers conducted one final recon, if it was needed. This deliberate recon consisted of heavy engineers, heavy equipment transporter operators, heavy wheeled-vehicle operators and, if they were available, U.S. Army Corps of Engineers representatives to further assess whether calculated constraints could be eliminated by constructing bypasses, upgrading roads, reducing curves, or repairing and/or reinforcing bridges.

At each stage of the mission, the data gathered was passed on to higher headquarters to help develop a route database for



**A soldier measures a bridge section during a reconnaissance mission.**

Task Force Hawk. In the future, whatever technique units use, they must not create "cookie-cutter" teams. They must ensure that recon elements are organized based on the task or mission.

## Materiel

Almost all of the recon missions involved high-mobility, multipurpose wheeled vehicles (HMMWVs). At a minimum, the front and rear vehicles had mounted crew-served weapons during every movement. Each engineer team used similar equipment to help gather necessary data. The key pieces of equipment were a Global Positioning System, a digital camera, and a tape measure. These three items were part of the basic load any time a recon team went on a mission. When these teams conducted training and rehearsals, they developed a list of equipment that would help them execute their drills. We recommend that units develop recon kits that contain equipment essential to mission success. Figure 2 shows a sample checklist for a bridge recon.

## Soldiers

We found that soldiers need some basic skills or abilities to be part of a recon team. For bridge recons, especially in the mountains, soldiers must not be afraid of heights. They must be agile enough to climb around or lean over the edges of bridges to measure various areas. In Alpha Company, each team identified its good swimmers in case the mission involved taking measurements over water. We picked soldiers who understood the types of data we needed to collect and the formulas used to calculate constraints or the military load class of a bridge. We found it necessary for a recon team to train and rehearse so that leaders could identify soldiers who possessed the skills needed to conduct various tasks.

**Bridge Recon Checklist**

- ✓Global Positioning System
- ✓Digital camera
- ✓Tape measure (100-foot)
- ✓Binoculars
- ✓Safety rope
- ✓Report forms
- ✓Radio
- ✓FM 5-170
- ✓FM 5-34
- ✓Map sheet
- ✓Compass and protractor
- ✓Calculator

**Figure 2**

## Lessons Learned

As with many real-world deployments, units must develop training programs to compensate for tasks that are not a part of their mission-essential task list or that they could not train before deployment. Alpha Company personnel learned the following lessons during their deployment to Albania:

- **Doctrine**. Learn our doctrine, because it is sound, and use it.
- **Training**. Continue to develop training programs while deployed.
- **Leader development**. Conduct rehearsals and training to certify leaders.
- **Organization**. Avoid "cookie-cutter" recon teams; tailor them to the task or mission.
- **Materiel**. Develop checklists to complete various types of recons.
- **Soldiers**. Identify soldier skills needed for critical tasks.

Units should develop sound training plans that support their missions and develop SOPs as they are needed. Our Army doctrine provides an excellent foundation that will allow soldiers and leaders to succeed. We must not send untrained soldiers into harm's way in real-world deployments.

*Captain Pasvogel commands Alpha Company, 40th Engineer Battalion, Germany, and recently deployed to Albania in support of Operation Noble Anvil. He was previously a training and doctrine staff officer in the Office of the Deputy Chief of Staff for Engineering, U.S. Army Europe. CPT Pasvogel is a graduate of the U.S. Military Academy and the Engineer Officers Advanced Course and holds a master's degree in engineering management from the University of Missouri-Rolla.*



# A Guide to the U.S. Army Engineer Museum

*By Kim Combs*

The U.S. Army Engineer Museum was established at Fort Leonard Wood in 1989 as a part of the Engineer School's move from Fort Belvoir, Virginia. The museum consists of an encyclopedic gallery, a chronological gallery, and a World War II historic community. In addition to these displays, there is a regimental store within the museum.

## Encyclopedic Gallery

In an effort to support the instruction at both the Engineer School and the Maneuver Support Center, pieces of the material culture of American engineers are displayed in the encyclopedic gallery. Five aspects of the Army engineer mission are highlighted: topographic engineering, land-mine warfare, tactical bridging, demolitions and explosives, and arms and ammunition.

**Topographic Engineering.** The topographic engineering section displays the material culture of topographic engineers, surveyors, and cartographers from their colonial beginnings to the present. Gouvernor K. Warren's 1856 Pacific Railroad survey is used in the dioramas to interpret early field surveying. The cases exhibit map-making, drawing, and surveying equipment.

**Land-Mine Warfare.** This area contains American mines, mine detectors, and foreign materials that are significant to the development of U.S. equipment. The dioramas depict an engineer searching for mines in Vietnam and a World War II German antitank mine (the Goliath) on the Normandy beachhead. In the display cases are U.S. mine detectors, minefield-probing and marking materials, and American and foreign mines. There is a modern AN/PSS-11 mine detector set up where visitors can pivot the detector over mined terrain and listen for the different tones. Opposite the mine detector is a model minefield. By pressing the buttons, visitors can see various mine patterns from World War II to today.

**Tactical Bridging.** The tactical bridging exhibit includes models of floating, fixed, and mobile tactical bridges. Visitors walk on an authentic "double-double" Bailey bridge to see models of fixed bridges. Across from the fixed-bridge display is a diorama with models of several types of floating bridges. The gallery also contains several models of bridges and related equipment dating from the Civil War to today.

**Demolitions and Explosives.** One wall in this area contains objects relating to the recent history of the unique aspect of the Army engineers' mission. In display cases are items such as dynamite, C4, cratering charges, and bangalore torpedoes. Across from the wall are two dioramas. One contains a model railroad bridge rigged for demolition where visitors can press a button to see where different types of charges are placed. The other diorama depicts a typical oak tree that is ringed with explosives in preparation for creating an abatis. Between the dioramas is a 50-cap blasting machine where visitors can view a short video on military demolitions.

**Arms and Ammunition.** In this section, a diorama depicts an engineer outpost during World War I. Display cases along the walls contain weapons used by American Army engineers since the 18th century. Also displayed are swords, muskets, rocket launchers, mortars, and hand grenades. In the center of the back wall, visitors can try their hand at a piece of equipment the Army uses for modern marksmanship training—a laser rifle with a series of optically sensitive targets.

## Chronological Gallery

The history of American Army engineers is interpreted in the chronological gallery. Displays concentrate on the Battle of Yorktown during the American Revolution, westward expansion, and the Mexican-American War. The Civil War area contains an original ponton; the Spanish-American War display follows. In the World War I section, a trench has been recreated, and the World War II area shows a D-4 bulldozer in action. A timber trestle bridge in the Korean War display is followed by a mine-detecting jeep from the Vietnam War. The Desert Storm exhibit shows an interpretation of war on the home front as well as in the desert.

This gallery includes an Engineer Hall of Heroes, which is designed to inspire and reinforce the basic idea that every individual who has proudly and honorably served the Army Corps of Engineers during the past 200-plus years is indeed a hero.

## World War II Historic Community

In 1981, Fort Leonard Wood set aside 12 World War II temporary mobilization structures, part of the installation's museum. This group of buildings has been restored and now serves as the only preserved and interpreted World War II company area in the Army. The grouping consists of four barracks, two mess halls, three day rooms, two orderly rooms, and a regimental commander's quarters. Each building has been restored to the condition it would have been in

*(continued on page 36)*

# The Army School System: One Army, One Team, One Standard

*By Major Maurice E. Gissendanner*

As the Army trains its personnel during the twenty–first century, it will use The Army School System (TASS) to ensure that Active Component (AC) and Reserve Component (RC) personnel are trained to the same standard. Active and reserve training institutions will use identical equipment, material, and certified personnel to provide standardized training to the force.

Over time, each of the Army components—Active, National Guard (ARNG), and Reserve (USAR)—developed independent school systems, which gradually developed separate standards. The Army School System, formerly known as the Total Army School System, now creates one system with identical tasks and standards for all three components.

A composite of the AC, ARNG, and USAR institutional training systems, TASS is composed of accredited and integrated AC, ARNG, and USAR schools that provide standard institutional training and education to Army personnel.

Using TRADOC Regulation 351-18, *The Army School System*, as a guide, the Army's goal is to provide standardized training and education through the efficient use of—

- Facilities, equipment, personnel, and time.
- The Army Training Requirements and Resource System (ATRRS), for entering training requirements and constraints.
- Total Army Training System courseware (TATS-C).
- Title XI personnel (The Title XI Program is the congressional action that authorizes and requires the use of active-duty commissioned and noncommissioned officers for dedicated support and evaluation of reserve units. Title XI personnel are assigned to proponent schools, TRADOC integration elements, and the RC TASS battalions.)

## TASS Battalions

Currently, TASS is focused on the RC training institutions. In 1994, RC TASS battalions began to replace the U.S. Army Reserve Force (USARF) school battalions. Since then, RC engineer TASS battalions have reclassified 12,287 soldiers into the Engineer Regiment.

Command and control of the RC TASS battalions resides with the U.S. Army Reserve Command (USARC) and the National Guard Bureau (NGB). However, several major changes occurred when RC TASS battalions implemented the new school system. They—

- Became functionally aligned with their proponents for accreditation and instructor certification (for example, the U.S. Army Engineer School aligned with Engineer School battalions).
- Teach functionally aligned courses using only proponent courseware (for example, TASS engineer battalions teach only engineer courses).
- Became responsible for training all customers who reside within their region (see figure, page 19).

There are nine engineer RC TASS battalions. Seven reside within CONUS and two reside OCONUS (the Combat Support Battalion in Puerto Rico and the 4960th Multifunctional Training Brigade in Hawaii). All RC TASS battalions within CONUS are accredited. The two OCONUS battalions are scheduled for an accreditation evaluation during FY00 and FY01, respectively. AC TASS battalions will be incorporated into the TASS accreditation schedule during FY02.

## TATS-C

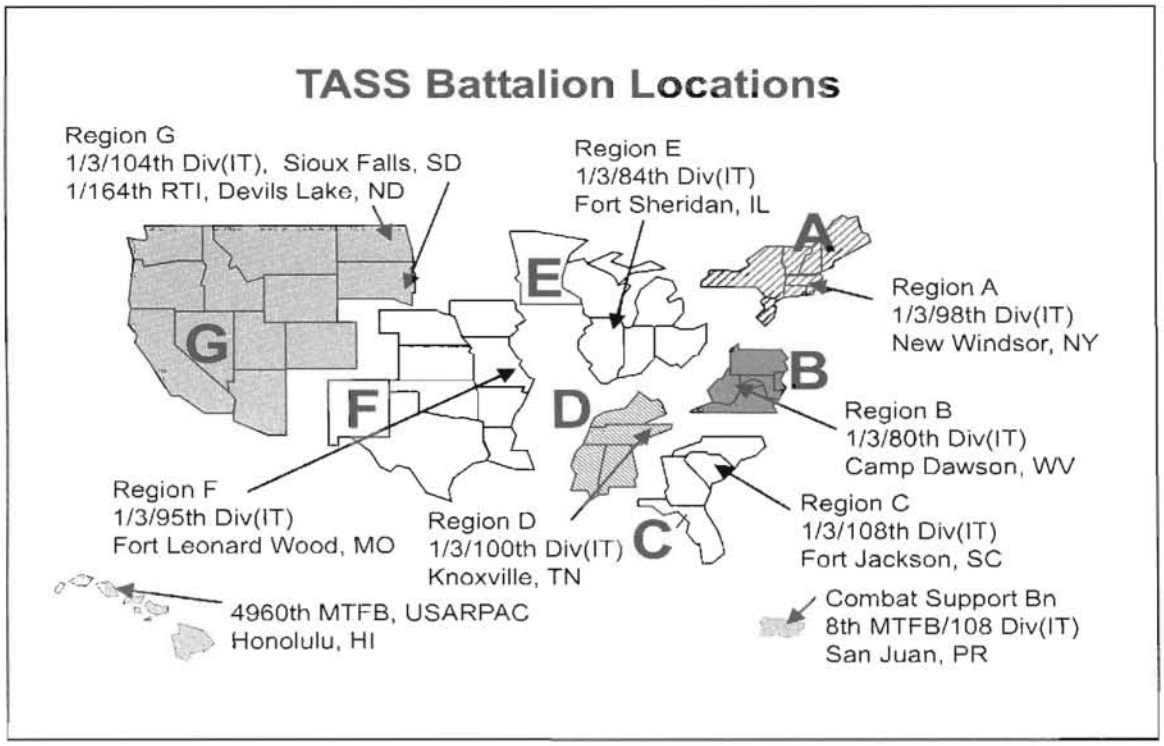
Implementation of TATS-C will ensure that AC and RC training institutions train soldiers to the same standard. TATS-C will replace the AC courseware and the RC configured courseware (RC3) that was formerly taught in USARF schools. RC3 primarily included those tasks needed to prepare reservists for mobilization, not necessarily all the tasks for which AC soldiers trained. Performance standards differed and trade-offs were made for reservists because of their time constraints.

TATS-C will have little impact on how AC TASS battalions operate, but it will significantly impact inactive-duty training (IDT), weekend drill, and phase 1 of military occupational specialty qualification (MOSQ) training for RC TASS battalions. Currently, under RC3, RC school battalions teach only combat engineer training (CET) during IDT. This is normally completed within two or three monthly drill periods. TATS-C has added some technical training to phase 1 of MOSQ training, which requires RC TASS battalions to conduct additional IDTs. Annual training requirements for RC TASS battalions will not change.

Engineer TATS-C is due out to the Engineer Regiment no later than 4th quarter FY00 (less the 51T10, 51T30, 62N40 courses and the Engineer Captain's Career Course) and will be implemented no later than 1st quarter FY02.

## Accreditation

The Engineer School's TASS Division began official accreditation evaluations in 1997. According to a schedule set up by TRADOC, every three years proponent schools will evaluate the TASS battalions that are functionally aligned with them.




During an accreditation year, an evaluation team (comprised of Title XI and RC personnel) evaluates at least one annual training period of a TASS battalion and at least one-third of its IDT periods. All training sites must receive a "GO" rating for a TASS battalion to become accredited.

The evaluation team uses checklists from TRADOC Regulation 351-18 to evaluate the TASS battalions. One checklist covers training support, which includes requisition procedures, test-control procedures, and student and instructor record keeping. The other checklist covers conduct of training, which includes classroom and field instruction, instructor techniques, and use of equipment and training aides. RC engineer TASS battalions are well on their way to consistently providing standardized training to engineer soldiers, which translates into accreditation for the battalions.

## Distance Learning

Eventually, TASS will take on the dimension of providing distance learning (DL) to soldiers. At the center of the DL concept is the DL Classroom, an Army initiative to place high-tech classrooms throughout the military community. The current TRADOC plan calls for fully implemented DL by 2010. By that time, TRADOC expects that 66 percent of our soldiers will receive DL and that 99 percent of our soldiers in CONUS will be located within one hour of a DL facility.

## Conclusion

Under TASS, the Engineer Regiment will be able to apply multiple means and technologies to deliver standardized training to soldiers and units at the right place and time. No matter where our soldiers are located, they will be able to receive the same training taught by proponent certified instructors.

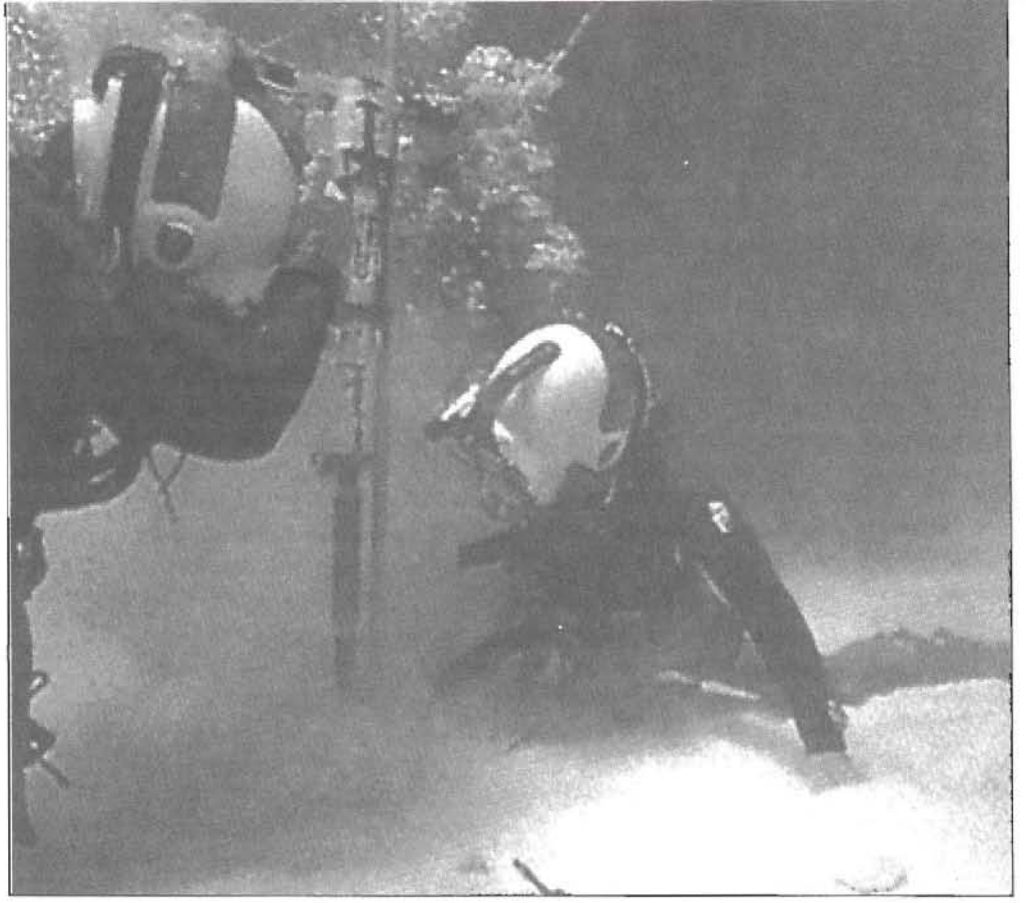
To make TASS successful, we need your feedback on what is working and what needs to be improved in our individual training courses. These courses belong to you, and TASS is your school system. Use them effectively to ensure that our soldiers get the training they deserve.

Send comments and suggestions to Commandant, U.S. Army Engineer School, ATTN: ASTE-DOT-SS, 320 Engineer Loop, Suite 336, Fort Leonard Wood, Missouri 65473-8929; or via e-mail to *gissendm@wood.army.mil*. The telephone numbers are DSN 676-4106 and commercial (573) 563-4106.

*Major Gissendanner is chief of The Army School System Division, U.S. Army Engineer School. Previous assignments include platoon leader and executive officer, 175th Engineer Company (TOPO); platoon leader, 362d Engineer Company (CSE); executive officer, 100th Engineer Company (TOPO); S2 and assistant S3, 536th Engineer Battalion (Combat Heavy); commander, A/536th Engineer Battalion; and project officer, Galveston District, U.S. Army Corps of Engineers.*

**References:**

1. TRADOC Regulation 351-18, *The Army School System*. 31 March 1999.
2. "Total Army School System," *Engineer*. December 1996.
3. TRADOC memorandum, subject: "Total Army Training System (TATS)." 25 March 1996.
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# The Army Engineer Diver

*By Captain James Kisiel and Master Sergeant Marcus King*

Yes, the Army has divers. Unlike the combat diver additional skill identifier held by soldiers in the Special Forces, engineers have military occupational specialty (MOS) 00B divers. A part of career management field 51, MOS 00B is a low-density MOS. The rank structure for this MOS ranges from private to master sergeant. However, since there is a constant need for new divers in the field, specialists and below may qualify for reclassification into MOS 00B.

Department of the Army Pamphlet 611-21, *Military Occupation Classification and Structure*, and Army Regulation 611-75, *Management of Army Divers*, list the requirements for diver application. The training required to become a diver is very demanding but also very rewarding. Phase One is a nine-day course taught at Fort Leonard Wood (see Engineer Update, page 48). Phase Two is a 26-week course taught by a multiservice instruction team at the Naval Diving and Salvage Training Center, Panama City, Florida.

## Capabilities

Dive teams are a critical asset to commanders. Both Force XXI and Army After Next units will have to cross rivers and overcome the problems that involve rivers in areas of operation. Engineer divers can conduct waterway reconnaissance, which will save time for bridging units and prevent damage to their limited assets. Divers can provide nearshore and farshore topographic and hydrographic reports, measure and plot river depths to reveal the true channel, and measure possible nearshore and farshore exits. Maneuver commanders must know if bridges will support maneuver-force traffic. Divers can make this determination quickly, allowing the force to keep its momentum.

In addition to security and river-crossing missions, divers can dismantle or create waterborne obstacles, which makes them a countermobility and mobility asset down to the task-force level. Divers can emplace precision demolition charges to deny the enemy access to key structures and facilities, such as bridges and dams, and stop his momentum. Divers also can emplace and remove mines in shallow-river mining operations.

## Dive Teams

The Engineer Regiment has four light dive teams (each with 22 soldiers) and two heavy dive teams (each with 25 soldiers). The light teams are stationed at Fort Eustis, Virginia, along with one heavy team. The other heavy team is stationed in Hawaii. The teams at Fort Eustis are configured by FORSCOM as a provisional company.

### Light Dive Teams

Engineer light dive teams support the scuba and surface-supplied-air diving (helmet diving with air hoses from the surface to the diver) requirements of maneuver commanders. Light teams emplace and reduce underwater obstacles and minefields; repair damaged bridges, locks, dams, pipelines, canals, and levees; and construct underwater bridge structures, obstacles, and floating barriers. Some of these capabilities are required in humanitarian-assistance operations but, inevitably, most will be required in any theater during war.

Light dive teams have nonarmored vehicles and are highly mobile. They can conduct many missions without external aid but depend on support from other units, such as scouts and mechanized-engineer and combat-support-equipment companies, to perform construction and salvage missions.

### Heavy Dive Teams

Engineer heavy dive teams support the scuba and surface-supplied-air diving requirements of commanders in charge of ports, harbors, and coastal zones. These teams enable commanders to construct port and logistics-over-the-shore structures and facilities as well as floating barriers. Heavy teams also can repair damaged piers, docks, wharfs, seawalls, and breakwaters; clear and mark inland navigational waterways; and collect underwater terrain and structure information.

Heavy dive teams also have nonarmored vehicles and are mobile. They can conduct many missions without external aid but depend on support from other units, such as engineer-port-construction and combat-support-equipment companies, to perform construction and salvage missions.



**An Army diver decends into a partially sunken wreck.**

The primary differences between the construction and salvage capabilities of light and heavy dive teams are the focus and the command-and-control assets. Heavy teams have additional specialized equipment and focus on construction and heavy salvage in ports and harbors. More experienced senior leaders of heavy teams are used extensively to plan and manage theater diving missions.

## Protecting the Force

Dive teams have been a part of numerous operations but often are overlooked because of their size and relative obscurity. The performance of divers during their deployments to *Operation Desert Storm* and *Operation Restore Democracy* are two prime examples of how they have protected the force. In *Operation Desert Storm*, dive teams provided waterborne security for ports in Kuwait and Europe. They conducted hull surveys on cargo ships and barges to ensure that vessels were not mined. These surveys were critical because of the nature of the explosive cargo on many of the vessels. Similarly, in *Operation Restore Democracy*, dive teams provided waterborne security for Army vessels that entered unsecured ports in Haiti.

Engineer light and heavy dive teams are critical assets to the Engineer Regiment. These teams assist maneuver and port commanders in a variety of missions that focus on the onward movement and protection of U.S. forces. Water does not have to be an obstacle or a security threat to our soldiers. Enlist the help of engineer divers, and command the water space!

*Captain Kisiel formerly commanded the Engineer Dive Company at Fort Eustis, Virginia.*

*Master Sergeant King is the Senior Career Management NCO, CMF 51, for the Engineer Personnel Proponency Office, U.S. Army Engineer School. He was previously the first sergeant of the 518th Engineer Company, Fort Kobbe, Panama.*

# Engineer Doctrine Hierarchy and Publications Renumbering

*By Lieutenant Colonel Harry Rossander*

The U.S. Army Engineer School and TRADOC are revising the Army doctrine hierarchy and numbering system to be more in line with the Joint doctrine hierarchy and numbering system. Changing the method of numbering and titling Army doctrine manuals will ensure a seamless link between Army and Joint doctrine. TRADOC personnel anticipate that these revisions will help groom young Army officers for Joint, interagency, and multinational military operations; help Army headquarters plan, prepare, and conduct Joint operations; and enable us to move in concert with the Joint doctrine system and the NATO doctrine system as they embrace improvements related to the twenty-first century.

The new doctrine hierarchy consists of a three-tier system for placement of field manuals (FMs) (see *Engineer*, April 1999, page 27). The top tier contains FMs with a direct link to a specific Joint publication, or the scope of the FM addresses multiservice and combined-arms operations. FMs 5-100, *Engineer Operations*, and 90-13-1, *Combined-Arms Breaching Operations*, are examples of manuals on this tier. The second tier contains proponent publications that are branch-specific and address how that branch fights or supports the fight. An example is FM 5-71-100, *Division Engineer Combat Operations*. Third-tier publications are primarily technical in nature, such as FMs 5-34, *Engineer Field Data*, and 5-434, *Earthmoving Operations*.

To implement the new hierarchy and align our publications more closely with Joint manuals, a new numbering convention was proposed by the Engineer School. This new numbering convention follows guidelines found in (draft) TRADOC Regulation 25-36, *The TRADOC Doctrinal Literature Program (DLP)*, and allows us to put some rhyme and reason into how our publications are regimented.

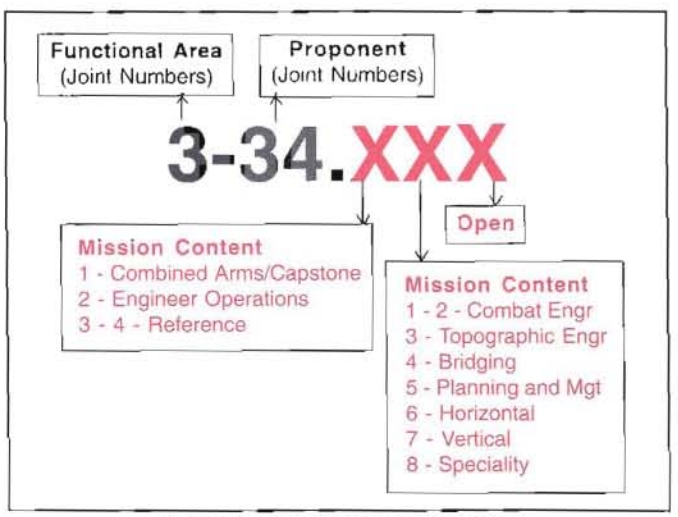



**Figure 1. Numbering Convention**

Joint Publication (JP) 3-34 is the Joint engineer manual. All engineer manuals will begin with 3-34 and will be followed by a three-number extension. The only exception to this rule will be the engineers' capstone manual, FM 5-100, which will be renumbered as FM 3-34. The first number in the extension will be denoted as shown in Figure 1. This extension number will make it possible for users to quickly determine the tier and the function of the manual. The second number in the extension will permit further segregation of publications by subject matter, something we have been unable to do in the past. The final number in the extension will enable us to put more than one publication in any category and will allow for future expansion.

The new hierarchy and numbering convention was specifically designed so publications can be tracked across all tiers and functional categories. In addition, with this new system, we can more uniformly align with existing Joint doctrinal publications.

The plan for adopting the new numbering system is to introduce it on publications as they are revised, beginning with FM 5-100. However, for at least one publication cycle, both the old and new numbers will be shown on the cover. In addition, a cross-reference system will be developed to enable users to find a publication by either the old or the new number.

Currently, engineers have the second largest publications library in the Army, with responsibility or proponency for more than 90 manuals. In addition to implementing the new doctrine hierarchy and numbering system, Engineer School personnel are reducing the number of manuals to 70 or less in the next two years (see Figure 2). This will be done through review, validation, and consolidation of existing doctrine. The Engineer School will be seeking subject-matter experts from both the schoolhouse and the field to help review and revise many of the existing publications.

*Lieutenant Colonel Harry Rossander is chief of the Doctrine Development Division in the Directorate of Training, U.S. Army Engineer School, Fort Leonard Wood, Missouri. His e-mail address is rossandh@wood.army.mil.*

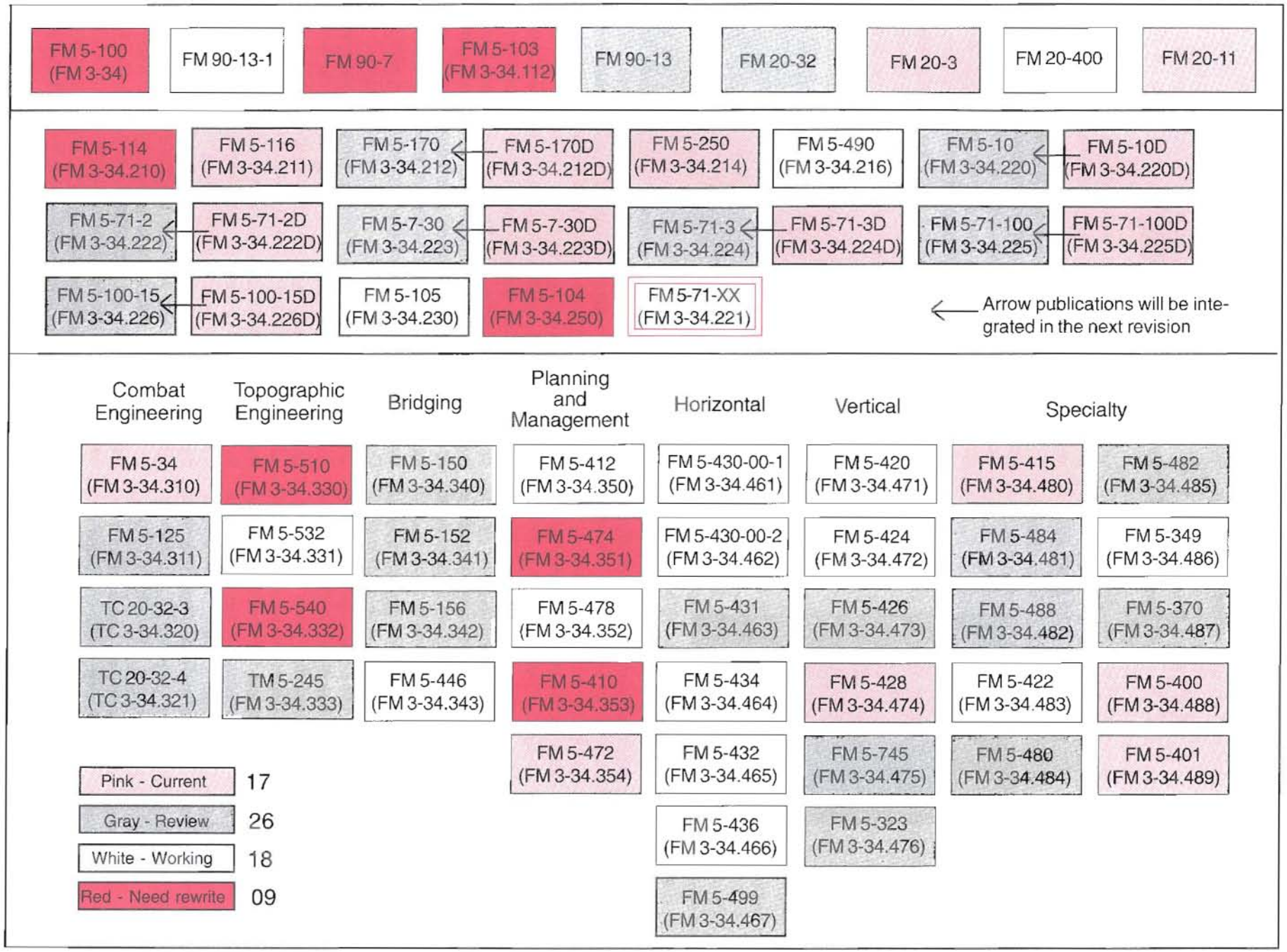



Figure 2. New Hierarchy for Publications

# Book Review

*Flame On! U.S. Incendiary Weapons, 1918-1945*, by John W. Mountcastle, White Mane Books, Shippenburg, Pennsylvania, 1999, 206 pages, list $29.95 (hard cover). Available on-line from *http://www.Amazon.com*.




This book is a detailed, scholarly work by the former Chief of Military History for the U.S. Army, Brigadier General John W. Mountcastle. Beginning with incidents in the Old Testament, the author describes the early history of flame weapons. He includes information on such interesting topics as the use of a primitive flamethrower by attacking Boeotians during the siege of Delium (424 B.C., during the Peloponnesian War) and the development of "Greek Fire" by the Byzantine engineer Kallinokos. However, the development of flame weapons remained episodic until the German manpacked flamethrower made its combat debut in World War I.

Richard Fiedler, a chemical engineer in Berlin, invented the first modern flamethrower prototype in 1901. Early in the development, the German Army recognized that to function effectively the ungainly flamethrowers required carefully trained operators and mechanics. When the Germans mounted the first attack with flamethrowers on 26 February 1915 against French troops in the Malancourt Forest near Verdun, the French fled in panic. As a result, the Germans organized the Third Guard Pioneer (combat engineer) Battalion, under the command of Captain Redemann. As the war progressed, the pioneers' flamethrowers became an integral part of German "storm-troop tactics."

The early manpacked flamethrower was a difficult and dangerous weapon to use. However, when combined with other technical innovations (such as modern grenades, trench mortars, chemical warfare and, belatedly, the first German tanks) and the tactical flexibility inherent in the pioneer corps, the result was a highly effective combined-arms team at the company and battalion levels. Led by their "sturmpionier," the German storm troopers were able to restore operational maneuver to the deadlocked western front by using flexible, dismounted-infantry tactics at the same time the Allies were turning to the tank, an invention of British Royal Engineer Edwin Swinton.

Another item of note was the use of a specialized workshop unit to maintain and modify the pioneers' equipment as necessary, further enhancing their flexibility and timeliness. This stands in stark contrast to the standard development processes of the American procurement bureaucracy.

As latecomers to the First World War, the Americans had to play catch-up in a number of areas. In the American Expeditionary Force, the Gas Service (the predecessor of today's Chemical Corps) was the responsibility of the Corps of Engineers. The 30th Engineer Regiment (Gas and Flame) under the command of Lieutenant Colonel Amos Fries (Corps of Engineers) was formed to provide support in this new area of chemical and incendiary warfare. The 30th Engineer Regiment (renamed the 1st Gas Regiment in August 1918) developed a close working relationship with its British counterparts, the Royal Engineers of the "Special Brigade." However, Lieutenant Colonel Fries had a strong bias against flamethrowers and preferred to focus on gas countermeasures. After the war, Congress authorized the establishment of the Chemical Warfare Service, with Fries as chief. During the interwar period, he continued to favor the development of chemical warfare agents over flame weapons. As a result, the United States continued to neglect developments in this area. However, this was not the case within the resurgent German military of the 1930s.

German pioneers, as well as their British counterparts, have historically maintained a strong interest in close-combat "assault engineering." This was demonstrated well in the stunning German victories over the West in 1940. Once again, the German attack was led by the pioneers. Indeed, a platoon of about 80 airborne pioneers (under the command of Lieutenant Rudolf Witzig, later the chief of the postwar Bundeswehr Pioneer School) made a dawn glider assault on the 700-man Belgian fortress of Eben Emael. This fort blocked the advance of the northern German pincer into the Netherlands and was considered to be one of the strongest forts in the world. Using flamethrowers and shaped charges (the latter was a secret weapon making its combat debut), the pioneers shocked

the world by neutralizing the fort in 30 minutes. Through the insightful writings of Captain Paul Thompson (U.S.Corps of Engineers), this victory served as a wake-up to Americans on the importance of flame weapons and close-combat assault tactics.

Indeed, Thompson called for the American Corps of Engineers, which historically had a more construction-service-oriented outlook than their British and German brethren, to adopt a more aggressive role in combat and the new combined-arms philosophy. The Chemical Warfare Service responded by beginning to develop flamethrowers. Regrettably, the Corps of Engineers missed the opportunity to thoroughly shake off the peacetime, civil-works mentality of the interwar period and did not formally develop any specially trained engineer assault troops, forcing these to be improvised by combat engineers serving in the field. By the time American troops entered the ground war during *Operation Torch* (November 1942), the Chemical Warfare Service was able to equip each divisional engineer battalion with 24 M1 flamethrowers. However, engineers lacked the doctrine and training to use the new weapons effectively, which also suffered from lack of care and proper maintenance. The development of vehicle-mounted flamethrowers also suffered due to a strong aversion by the U.S. Army to the development of special-purpose armored combat-engineer vehicles (CEVs).

The lack of armored flamethrowers in Europe may have contributed to the difficulties Americans had on Omaha Beach on D-Day. Indeed, during the advance across northwestern Europe, they had to request support from British Crocodile flamethrower tanks to reduce German fortifications. The Americans found that often just a demonstration of a flamethrower within sight of the defenders was enough to induce surrender or withdrawal. In fact, General Patton was forced to improvise flamethrower tanks in the field and was quite pleased with the results.

In the Pacific Theater, however, the prevalence of close-combat operations against the Japanese in prepared defenses forced American units in the field to develop effective flame tactics. As a result, thoroughly trained, properly led provisional flamethrower units were developed in the field by the infantry and engineers of the Army and Marines. Indeed, the Marines stated that manpacked flamethrowers were responsible for breaching the Japanese defenses on Tarawa in November 1943. When some soft-hearted Americans protested the use of flame weapons, General George C. Marshall stood up for the lives of American citizens serving on the line in combat and stated, "Vehement protests I am receiving against our use of flame throwers don't indicate an understanding of the meaning of our dead on... Tarawa." American armored flamethrowers (fabricated in workshops on Hawaii using Sherman tanks) made their Pacific debut on Iwo Jima, where the first eight proved their worth. By the time the attack on Okinawa was launched, the 713th Armored Flamethrower Battalion had been formed with 54 flame tanks. The battalion was credited with 4,788 kills, with no losses of its own. As one magazine summed it up, "There are few arguments about fire; it saves U.S. lives and kills Japs."

Although the U.S. military continued to use flamethrowers in Korea and Vietnam, these highly useful weapons were recently relegated to war stock (if not retired), apparently for reasons of "political correctness." Indeed, flamethrower tactics were dropped from U.S. field manuals when FM 20-33, *Combat Flame Operations,* was superseded by FM 3-11, *Flame Field Expedients,* in 1990. Given the increased likelihood of having to conduct operations on urban terrain in the near future, it is a shame that a modern-day General Marshall did not stand up for the good of the American soldier and defend the retention of these useful weapons. The unpalatable fact is that there is currently no antiseptic way to conduct these operations. In fact, some of the most successful operations on urban terrain were undertaken by the Germans toward the end of World War II. These operations gave the Germans the opportunity to implement a number of lessons learned from the bitter battle in Stalingrad. They employed small combined-arms assault teams, which included pioneers equipped with flamethrowers and man-portable fuel-air explosives. These teams were supported by Sturmtigers (similar to the old CEV), remote-controlled vehicles, and pioneer half-tracks firing heavy rockets (nicknamed "Foot Stukas").

Operations in urban terrain are—and probably will remain—brutal, primitive, close-combat affairs. For our national strategy to be more than a piece of paper, the U.S. Army must have the means of making it a reality at the tactical level. Given the proven lack of public tolerance for U.S. casualties in strategically questionable undertakings in the Third World, we must do everything reasonable to minimize our losses. If we are to succeed in urban combat, while minimizing the loss of American lives, we would be well-advised to retain the flamethrower.

Although this review focused on the flamethrower, the book also provides an extensive discussion of air-dropped incendiaries and the moral issues involved in using fire bombing, particularly against cities like Hamburg, Dresden, Yokohoma, and Tokyo.

Combat engineers should find this book to be fascinating reading. It is recommended to all combat-arms leaders.

*Lieutenant Colonel William C. Schneck, P.E., commands the 276th Combat Engineer Battalion, Virginia Army National Guard.*

# Understanding AC/RC Assignments

*By Major Diane T. Cummins-Lefler*

*"My next assignment will probably be an Active Component/Reserve Component (AC/RC) job. Isn't that taking me away from soldiers?"*

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Many of us, officers *and* enlisted, find ourselves repeating those or similar phrases. Too often we allow rumors of the past to determine our views on various assignment positions instead of conducting our own research. After serving for more than a year as a company commander in 1st Battalion (Training Support) (Engineer), 395th Regiment, at Fort Hood, Texas, I have a better understanding of what it means to be in an AC/RC job and how important this assignment is to the Corps of Engineers as well as to the Army. The purpose of this article is to help you to better understand AC/RC assignments.

## Background

During the Gulf War, the Army had difficulties deploying the National Guard's "round-out brigades" and high-priority combat-arms units. The old methods and criteria of reporting readiness showed that the units were combat ready. However, when they arrived at their mobilization stations, their readiness reports were dismissed and the units were put through an extensive train-up period that included a National Training Center rotation. The entire mobilization and train-up process revealed numerous problems with the units' readiness, how readiness was tracked and reported, and how the AC interacted with the RC. There had to be a better way.

These experiences led Congress to push for a new system of training and evaluating RC units. In 1992 and 1993, Congress developed the Ground Forces Readiness Enhancement program, which dedicates extensive personnel and material resources to ensure that RC units are trained and ready for deployment. Congress directed realignment of the AC support to the RC with a focus on selected high-priority RC units. The Ground Forces Readiness Enhancement legislation resulted in the dedication of 5,000 experienced AC soldiers to train and evaluate RC units.

In the Engineer Regiment, this is an extremely vital mission, because 76 percent of the regiment is in the National Guard or Army Reserves. The corps-level units that all divisional engineers depend on for support reside in the RC and deploy with us when we fight. To train these units, there are six engineer training support battalions that work directly with combat engineer and bridge units. These battalions are devoted to helping engineer units reach and maintain combat readiness. *(Note: Combat heavy, topographic, and other "noncombat" engineers receive similar support from combat-service-support training-support battalions that are manned by Army Reserve soldiers with only a few active-duty team members.)* The combat engineer training-support battalions are located throughout the United States (Fort Hood, Fort Lewis, Fort Carson, Fort Knox, Fort Meade, and Fort Jackson) and train all of the priority RC engineer units.

In addition to the six engineer training-support battalions, there are resident trainers, AC officers, and NCOs who live and work with selected priority units every day. The focus of these teams ranges from individual and crew-level training to mentoring NCOs and officers at the company and staff levels on training management. The majority of these resident teams are in the 15 enhanced separate brigades of the National Guard and force-support-package Army Reserve battalions. Together, the training-support battalion and resident team help the RC commander achieve his readiness goals.

## Operations

The 1st Battalion's mission is to teach, coach, and mentor combat engineer RC units. We do this through a variety of training events that culminate in combined-arms lanes-training exercises that are as close to a combat-training-center experience as we can replicate. To set units up for success at these events, we transport mobile training teams to unit drill locations to teach tactical skills and to certify unit leaders on critical tasks. We also conduct a weekend or an inactive-duty training (IDT) lanes exercise where we take the unit through the crawl-and-walk phases of the lanes-training process. This combination of teaching and assessing led to the title of "observer-controller/trainers (OC/Ts)," which captures the flow of our training year with the unit as well as our focus.

In the training-support battalions, we are all OC/Ts. We teach units their mission-essential tasks, conduct crawl-and-walk lanes during IDT, and then assume the full OC role during their

annual training (AT) rotations. Mobile training teams focus on train-the-trainer sessions. This method reinforces the units' chain of command by allowing them to teach their soldiers the tasks instead of having the OC/Ts do it. We instruct company and platoon leaders in doctrine or specific mission-training-plan tasks. At times, mobile training teams may also generate some individual or crew-level training on systems such as the MK19, Volcano, Modular Pack Mine System, and armored vehicle-launched bridge. While these systems have been in the AC inventory for years, many RC units are just now receiving them. Mobile training teams normally consist of two or three soldiers who go to a unit and provide instruction—usually in a classroom environment.



**Soldiers conduct an after-action review with the 395th Battalion command group.**

IDT is geared to collective-task lanes training, which focuses on the sapper platoon and takes the unit from the concept-of-the-mission training team to at least the crawl-and-walk phase. A normal IDT lasts two days, from 0800 Saturday to 1600 Sunday.

AT is the premier training event of the year, and everything we do is geared toward this training. Ideally, this is where we bring it all together in a combined-arms exercise. Each OC/T covers a platoon, and the NCOIC and commander cover the company headquarters. Normally, the operations tempo allows OC/Ts to rotate out of the field every third day for resupply runs.

After every IDT and AT, we produce a take-home packet, which is our primary written feedback mechanism to the units we assess. These packets are very high-quality, automated products that include—

- A cover letter from the commander.
- Platoon- and company-level training and evaluation outlines with comments and recommendations for training.
- A company summary for the entire training period that lists strengths and areas in need of improvement.
- A Training Assessment Models report.

OC/Ts can expect to spend more than 100 days each year on temporary duty or in the field, mostly between March and July, for IDT lanes and AT. More than half of the 100 days are limited field time. The remainder of the year is similar to that of any unit in garrison.

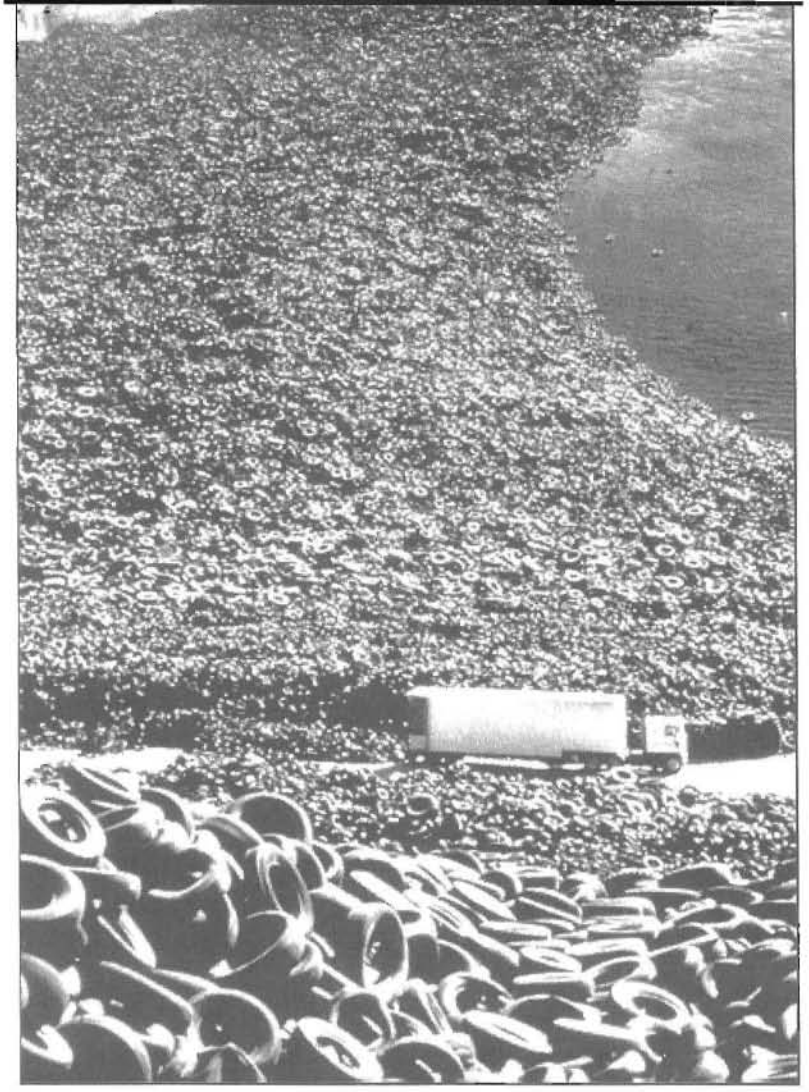
Engineer training-support battalions normally have three companies—each commanded by a branch-qualified senior captain (their second command) and five seasoned NCOs (all with successful squad-leader and platoon-sergeant time). The NCOIC's duties are similar to those of a first sergeant. Every soldier in AC/RC assignments brings a wealth of knowledge.

OC/Ts are picked based on their performance and experiences and go through a series of classes and testing before being certified. In our brigade, the certification process is a five-phase program that is monitored and tracked annually. In addition, we certify each OC/T on an extensive list of combat-engineer skills, to include using modernized demolition initiators and live mines. The final phase of our battalion's OC/T training is a "right seat" rotation at either the Joint Readiness Training Center or the National Training Center.

## Conclusion

An AC/RC assignment can be challenging and demanding. We operate on the basis of sound doctrine and tactical and technical proficiency. In addition, one must have superior communication skills to teach, coach, and mentor leaders at the platoon level and higher. If you are looking for a rewarding, fast-paced, engineer-specific, doctrine-driven experience, look no further. Continue to make a difference in the future of engineer soldiers. Accept an AC/RC assignment and help achieve the *One Army, One Standard* goal.

*Major Cummins-Lefler is an observer-controller/trainer (OC/T) for C Company, 1st Battalion (TS) (Engineer), 395th Regiment, Fort Hood, Texas. Previous assignments include PERSCOM, DA Secretariat Recorder, Alexandria, Virginia; and Commander, A Company, 35th Engineer Battalion, OSUT, Fort Leonard Wood, Missouri. A graduate of Howard University, Washington, D.C., MAJ Cummins-Lefler has been selected for CGSC. For more information on this organization, visit their web site at http://www.hood-pao.army.mil/1BnTSEng_395thRegt/.*



# Constructing Pavements With Recycled Waste Materials

*By James E. Shoenberger*

The safe disposal of waste materials is an increasing concern in the United States and around the world. Even with the heightened awareness of the importance of recycling, the difference between the volume of waste materials generated versus the amount recycled continues to grow. Although many existing disposal facilities are reaching capacity, approval for additional facilities is becoming more difficult to obtain because of restrictive environmental regulations and objections by local residents. To help address these issues and provide information on one possible solution to the problem, the U.S. Army developed Engineering Technical Letter (ETL) 1110-3-503, *Use of Waste Materials in Pavement Construction.*

State and federal government regulations and policies have a strong influence on whether waste materials are used in pavement construction. Federal programs such as the 1976 Resource Conservation and Recovery Act and the 1984 Hazardous and Solid Waste Amendments promoted the use of waste materials or recycling. Federal interest in recycling was exemplified in the 1991 Intermodal Surface Transportation Efficiency Act that initially required all state Departments of Transportation (DOTs) to use a certain percentage of crumb (ground) rubber in asphalt mixtures. This requirement was later rescinded because of significant opposition from many states. Unfortunately, most state DOTs and other agencies handle requests for using waste materials on a case-by-case basis. So without the benefit of an established approval procedure, it is often difficult to use the materials.

Using waste materials in pavement construction not only reduces the amount of waste materials requiring disposal (which is costly) but also provides construction materials with possible savings over new materials. Because of the large volume of materials required for constructing pavements, they are favorable structures for recycling a wide range of waste materials.

Recycling may mean the reuse of materials removed from previous pavement structures, such as recyclable asphalt pavement, recyclable portland cement concrete, and various base course materials. Recycling may also involve using materials that do not originate from pavements; examples are slags, ashes, and various polymer materials. Existing design and analysis procedures are often inappropriate for mixtures containing waste materials; therefore, new procedures must be developed or existing procedures must be modified to make an application successful.

## Specifications

Specifications exist for reclaimed asphalt and concrete pavements, scrap tires, iron and steel slags, fly ash, and plastic wastes. These materials have been widely used, particularly in areas of the country where they are produced. Construction specifications for using materials such as foundry sands for fills are the same as those for granular backfill materials. These specifications provide requirements for lift thickness and compaction. One requirement for satisfactory specifications is that suitable test and evaluation methods are available. In many instances, test methods developed for design and construction specifications are not readily usable in standard specifications.

The Corps of Engineers has a guide specification that covers the use of reclaimed asphalt pavement in hot-mix asphalt (Corps of Engineers Guidance Specification 02749). Technical Instruction 822-08 and Technical Manual 5-822-7, *Standard Practice for Concrete Pavements,* address the use of reclaimed asphalt and concrete pavements, iron and steel slags, and fly ash. The Corps of Engineers *Handbook for Concrete and Cement* contains standards CRD-C 255 and CRD-C 256 that pertain to specifying, sampling, and testing fly ash. These standards are also available in American Society for Testing and Materials C 618 and C 311.

## Environmental Considerations

Possible environmental effects of using waste materials must be considered when planning pavement projects. This includes the effects of preparing the materials for use as well as the effects of constructing and using pavements. Investigations have been conducted into the environmental effects of many waste materials during pavement applications. These materials require special consideration since many of them are considered hazardous when used or stockpiled in nonpavement applications.

## Cost Considerations

The economics of using waste materials in pavement applications must be favorable for their widespread use to become a reality. Economic benefits can be obtained through improved pavement performance or from reduced landfills. Consideration must be given to the effect that waste materials may have on pavement once it deteriorates to the point of requiring rehabilitation. Using waste materials in pavement construction will hinder future recycling if it means that the entire pavement structure must be considered hazardous.

Many claimed cost savings are based only on initial rather than life-cycle analysis. Accurate life-cycle cost analysis for most waste materials is difficult because of the limited number of applications of a particular material. True life-cycle analysis must include the initial cost, increased performance, and the effects of the waste-material recyclability of the pavement materials at the conclusion of its useful life.

## Types of Wastes

The various types of waste materials can be divided generally into four categories: industrial, domestic, mineral, and agricultural. With time and changes and developments in technology, some of these materials will disappear from production, while new types will appear.

**Industrial Wastes.** As a group, these waste materials are probably the most widely reused. Industrial wastes generated in the United States exceed 400 million tons annually.

**Domestic Wastes.** The United States generates more than 200 million tons of domestic wastes annually. About 185 million tons are household or commercial wastes (trash or garbage). Of this amount, about 75 percent is placed in landfills, 11 percent is recycled, and 14 percent is incinerated.

**Mineral Wastes.** These wastes—about 1.8 billion tons annually in the United States—are by-products of various mining processes. They have had limited use in pavement construction, mainly because of transportation costs.

**Agricultural Wastes.** Produced in the United States at a rate of more than 2 billion tons annually, these waste materials are generally used where they are produced. They have a very limited use as part of a pavement structure.

## Summary

Waste materials can be recycled to produce valuable construction materials for pavements. Many different types of waste materials have been and are currently being used in this application. The challenge is to recognize potential uses of the various waste materials and to apply engineering solutions for their use in pavement construction. Specifications that are developed should address the environmental aspects of using particular wastes.

The availability and generation of waste materials is not constant. While some materials will cease to be produced, new ones will appear. The satisfactory use of larger volumes of these and other types of waste materials through proper design and construction procedures can provide enormous economic and environmental benefits.

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# Sets, Kits, and Outfits:
## Technical Trades and Topography

*By Alan Schlie*

*In the final of four articles on sets, kits, and outfits (SKO), the focus is on the technical trades and topography. The first article discussed tool sets for construction trades; the second concentrated on pioneering, mine warfare, and demolition tools; and the third addressed bridging, diving, lighting, and fire-fighting tool sets.*

### General Engineering

The **Field Sketching Set, T63238,** is a collection of pencils, protractors, drafting scales, paper, and erasers in a box, with a small drawing board mounted on a collapsible, wooden tripod. The set's most technological component is a solar-powered calculator. With the advent of Land Warrior, the need for this set in combat units is limited; but in units that cannot expect to receive Land Warrior, some type of field-sketching capability is a must. The set is being completed revised and is awaiting software-integration funding. The set will contain a belt-wearable computer with pen tablet; laser range finders with digital compass and vertical angle capability; a digital recording device; and numerous software applications for surveying, drafting, earthwork estimation, and construction planning.



**A soldier uses the Field Sketching Set to digitally record and display the geographic positions of objects.**

The **Drafting Set: Battalion Charts, G44569**, contains both the older, manual drafting implements and a newer computer-aided design (CAD) capability. Next scheduled for review in 2003, this set is critical to commanders' construction-planning capability. Supporting the drafting set is the **Reproduction Set: Diazo Process, R84689**, which provides a capability to produce engineering drawings and prints in the field. The Diazo process requires an ammonia-based chemical, which complicates its use within enclosed areas and makes cleanup in the field difficult. Newer, multiple-scale engineering copiers are available commercially and have other advantages in addition to their environmentally friendly toners and developers. The next generation of engineering plotters will be digital, full-color, multiple-scale, and scanner-capable. The reproduction set is being reviewed at this time.

Material test sets include the **Concrete Test Set, V71587**, used to test aggregates and concrete; **Asphalt Test Set, V64463**, used to test aggregates, asphalt materials, and asphalt paving; and **Soil Test Set, V92959**, used to determine soil trafficability, compression, or foundation stress. With a few exceptions, the components of the three sets reflect equipment used in high school science labs in the 1960s. All are being reviewed this year and will include moderate upgrades in technology. The future intent is to collocate these three sets, the drafting set, and the reproduction set in an expandable military shelter to create a true job-site planning and materials-testing lab.

**General-Purpose Surveying Set, U70179**, is used by soldiers to conduct surveys essential to road, airfield, building, and utility construction. A three-soldier surveying team collects point data in the field using the automated integrated survey instrument (AISI). The data is downloaded and manipulated by Terramodel software and provides the products necessary for construction planning, designing, and estimating. The set, which is capable of producing third-order surveys, was reviewed in 1999.

## Maintenance

Most of us refer to it as the "contact truck," but it is actually the **Contact Maintenance Shop Equipment Set: Truck-Mounted**. Your unit may have the M880 truck-mounted set, T10138; or the commercial utility cargo vehicle (CUCV)-mounted set, S30914; or the latest version on a high-mobility, multipurpose wheeled-vehicle (HMMWV) chassis, S25681. Each set provides organizational and direct-support maintenance teams an on-site repair capability for engineer equipment. The sets contain oxyacetylene and arc-welding equipment, power tools, diagnostic equipment, and hand tools. The older models carried portable generators for the electric-welding capability. The HMMWV model's power requirements are met internally with 200-amp electric arc-welding capability and 4-kilowatt, 120-volt, 60-cycle, alternating-current power for tools. The Ordnance School is fielding the HMMWV-mounted set. The M880 and CUCV-mounted sets are no longer being fielded and are scheduled for review this year.

We call this one "the Batmobile," but in reality it is the **Organizational Repair Shop Equipment Set: Light-Truck-Mounted, T13152,** when mounted on a truck or the **General-Purpose Repair Shop Equipment Set, T10549,** when mounted on a semitrailer. The model of the truck may change, or it may be mounted on a semitrailer, but the on-board tools include an air compressor, lathe, battery charger, drills, welding machine, and hand tools to support organizational maintenance and direct-support maintenance of engineer equipment. Power is provided through a power takeoff or external 240-volt AC power source. The dynamotor engine for the welder connects to the truck engine or, on the semitrailer version, to the on-board generator. A machinist, a specialty MOS trained by the Ordnance School, operates both systems. The sets are being reviewed at this time.

*Precision Instrument Repair Tool Kit, W4930*, is designed to be used by soldiers tasked to repair surveying instruments. However, with the fielding of AISI, surveyors are not required to perform other than operator-level maintenance on the instruments. This set will be declared obsolete in the future.

**Hydraulic Systems Test and Repair Unit (HYSTRU), T30377,** is a trailer-mounted shop set containing maintenance tools and test equipment for diagnosing, maintaining, and repairing hydraulic systems. The operator can fabricate hose and tube assemblies, measure pressure, flush and clean hydraulic fluids, and transfer fluid. It will be reviewed in 2003 with the intent to mount it along with the contact maintenance truck on the chassis of one of the family of medium tactical vehicles (FMTVs).

## Pipeline

Until the decision is made on whether the Army will use only aluminum pipeline and speed couplings for distribution of water and petroleum, oil, and lubricants, the need remains to repair existing pipelines regardless of construction material. Those sets include the **Pipeline Welding Radiographic Inspection Equipment Set, N95306**; the **Pipe-Cutting and Grooving Tool Set: 6-, 8-, 10-, and 12-inch Pipe, W48485**; the *Pipeline Construction Tool Kit: Welders Supplemental, W56910;* the *Pipeline Construction Tool Kit: Grooved Coupling, W48896;* the *Supplemental Pipeline Pumping Station Tool Kit: 4-, 6-, and 8-inch Pipe, W65884; and the Welded Pipeline Construction Tool Kit: 4-, 6-, and 8-inch Pipe, W58006.* Two storage-tank erection sets used in conjunction with pipeline construction (*Erection Outfit: Low Bolted Storage Tank, H14389;* and *Erection Outfit: High Bolted Storage Tank. H14252),* that may remain in the inventory for some time to come. These SKO, which are located in engineer pipeline companies and quartermaster petroleum-pipeline and terminal-operating companies, are scheduled for review in 2001.

## Aggregate Production

The ongoing fielding of the 125-tons-per-hour **Crushing, Screening, and Washing Plant, F49673,** will allow quarry units to produce quality 3/8- to 4-inch aggregate for construction projects. The plant replaces all crushing, screening, and washing equipment. The plant consists of 20 pieces of major equipment that require 375 kilowatts of electrical power to operate and meets Environmental Protection Agency dust-abatement and noise standards. When the Hydraulic Excavator II (HYEX-II) is fielded beginning this year, it will replace the current *Rock-Drilling Equipment, S03225*; and the *Pneumatic Tool Outfits*, (600-cubic-feet-per-minute), *P12140. The Pneumatic Tool Compressor Outfit*: (250-cubic-feet-per-minute), *P11866*, will be retained in many units and will be joined by the *Hydraulic Electric Tool Outfit (HETO), W58486,* to provide multiple power sources for hand tools.

## Railroad

Two engineer SKO support the principal tasks of the Transportation Corps Railroad Battalion. The Railway Engineer Company contains two platoons of carpenters tasked to lay and repair track and construct railroad bridges, structures, and facilities with the **Railway Construction Set:**



Soldiers from the 249th Engineer Battalion (Prime Power) unload a 750-kilowatt, lightweight generator.

**Railroad Track; R05441**. And the Railway Equipment Maintenance Sections repair rolling stock with the **Railway Equipment Maintenance Tool Set; W63281**. The next scheduled review for these SKO is 2003.

## Prime Power

At a recent conference, prime-power subject-matter experts conducted a comprehensive review of the SKO supporting their missions. The battalion's mission is to provide up to 18 megawatts of electrical power for facilities such as command-and-control sites, hospitals, weapon systems, and logistic-support areas. The power plant operation and maintenance teams rely on the *Power Plant Service Kit, S78722*, to establish, operate, and maintain power plants. Power-line teams construct and maintain up to 60 miles of high-voltage transmission line. To complete their mission, they use the *Power-Line Maintenance Service Kit: Transmission-Line Power-Line Team, S78712*, and the **Electrical Power Transmission Tool Set: Railway Maintenance, W60952**. The *Power-Line Maintenance Service Kit: Distribution-Line Utilities Team, S78702*, is used for construction and maintenance of lines between transmission lines and buildings and structures. These SKO will be reviewed in 2002.

## Topographic

**The Topographic Section Surveying Set, U71275,** provides surveying, drafting, computing, and office equipment for use in preparing sketches, drawings, and maps and furnishing geodetic control to the field artillery. The most recent supply catalog combined this set and the **Topographic Platoon Surveying Set: Supplemental, U71138**. The set was reviewed in 1999; the next review will consider consolidating the construction surveying set and drafting set with this set.

**Transportable Lightweight Printing Plant: Special Warfare, P61665**, is used by psychological operations (PSYOPS) teams to create, photolithograph, and print pamphlets, leaflets, and posters. Mounted on two trucks towing 15-kilowatt generators, it is capable of printing 8,000 single-color, 11- by 17-inch products per hour. It is now one of three modules developed for the PSYOPS Modular Print System. Proponency will be transferred to the Special Warfare School.

The **Topographic Support System (TSS)** consists of 22 separate sets, each mounted on a semitrailer. It successfully mobilized what had been an immobile plant operation for creating, updating, and printing maps and other terrain-analysis products. The TSS has done a yeoman's job since initial fielding in 1987, but it reflected the technology of the 70s when it was developed. Some of the sets are already being turned in, but a few will be retained to meet specific contingencies, such as map production.

The **Digital Topographic Support System (DTSS)** will provide timely and accurate digital and hard-copy geospatial information to meet commander and staff real-time requirements for topographic support. The DTSS supports the collection, extraction, and exploitation of the physical characteristics of

the surface of the earth in order to build a foundation for the common knowledge of the battlespace. The DTSS provides the commander with tools to enhance battle-management capabilities. The benefit is that the commander's situational awareness of the battlespace is visualized as never before.

The DTSS consists of four configurations to provide specific products at different command levels on the battlefield. The *DTSS-Light* provides digital equipment to respond rapidly to the commander's need for topographic products and to quickly process low-volume reproduction of large-format, high-resolution, multicolor topographic products. The *DTSS-Deployable* was previously known as the MultiSpectral Image Processor (MSIP). It manipulates digital terrain data and provides it to commanders to support tactical decisions. The *DTSS-Heavy* consists of a larger mix of equipment to support more workstations. The *DTSS-Base*, also called the Terrain Imagery Integration Prototype (TIIP) provides equipment enabling the echelon-above-corps topographic unit to respond to the commander in chief's requirement for generating terrain data, analysis, and production of graphics, maps, views, and other products. Basis of issue plans have been completed, and fielding of the various systems is underway. Although DTSS are issued in set configuration, they are not true SKO in that reviews and supply catalogs will not follow SKO procedures.

## Miscellaneous

Engineers are proponents for some unique SKO. Fire stations are tasked to repair the hoses and refill/recharge carbon dioxide fire extinguishers. This is accomplished using the *Repair and Refilling Kit: Carbon Dioxide Extinguisher, R72484*. In circumstances where deployment is likely to an area where native timber can be harvested for theater-of-operation construction, a **Supplementary Equipment Set: Forestry, U59373,** provides pioneer hand tools to support the forestry team's 60-inch-diameter sawmill. (Numerous combat-engineer battalions were operating sawmills in the Ardennes when called on to contain the German offensive, referred to as the Battle of the Bulge, in the winter of 1944.) The *Tool Kit Rigging Wire Rope: Cutting, Clamping, and Splicing, W50266,* is found wherever wire rope or cable is used on winches, anchorages, or slings. It contains the items necessary to cut, clamp, or splice 3/8-, 1/2-, and 5/8-inch-diameter wire rope. Soldiers involved in driving piles use the **Portable Jetting Set: Pile-Driving Operation, L16026,** to aid in the final positioning and aligning of piles before they are capped for work platforms, or bents, or as posts for retaining walls, dikes, levees, breakwaters, abutments, or footings. The *Sign-Making Kit, S70984,* is found in every unit with a need to provide information, instruction, or directional signs. The oddest set in the engineer arsenal of soldier tools is the **Amphibious Lighter Tool Set: LARC V Organizational Maintenance, W31223**. No longer an engineer responsibility, it is at the top of the make-it-obsolete list.

## Comments

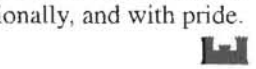
The Tool Improvement Program Suggestion (TIPS) has been combined with the Supply Maintenance Assessment and Review Team (SMART) suggestion program. TIPS still focuses on tools, while SMART focuses on organizations and processes. Use TIPS to report tools that should be deleted from the system, added to the system, can't stand up to use, or need to be modified to work better. Both programs provide monetary awards in many instances. Put your SMART ideas on a DA Form 5533 and TIPS on DA Form 2233, or on plain paper, and send them to Project SMART/TIPS, Director of Combat Developments for Combat Service Support, 3901 A Avenue, Suite 220, Fort Lee, Virginia 23801-1809. You can also call DSN 687-0363/2406/2399 or e-mail *SMART@lee.army.mil*. The web site is *http://www.cascom.army.mil/multi/project_smart/*.

Comments on tools within engineer SKO can also be addressed to the Directorate of Combat Developments, Engineer Division, ATTN: ATZT-CDE-O, 320 Engineer Loop, Suite 141, Fort Leonard Wood, Missouri 65473-8929. Telephone numbers are DSN 676-6191 or commercial (573) 563-6191. You can also e-mail your comments to *schliea@wood.army.mil* or the web site at *http://www.wood.army.mil/WebCommentForm.htm*. We don't give monetary awards, but there is a faster response.

The Army is always looking for better, faster, cheaper, and safer ways of doing business, whether it's supply, maintenance, transportation, or engineers.

## Summary

This final article of the series gives a glimpse of the magnitude and diversity of the SKO managed by the Engineer School. And it hints at the impact SKO have on the battlefield as each soldier's tools of the trade, the absence of which would result in less mission accomplishment. As the four articles have discussed, considerable effort is being expended to update engineer tool sets. Much work still remains if we are to provide the right tools for the job. Unit commanders have been given the task of obtaining these tools within the constraints of operating budgets. There is no requirement for a unit to have all the newly configured sets immediately. The intent was to neither cause readiness problems nor break the piggy bank but to provide tools for soldiers to accomplish their designated tasks quickly, professionally, and with pride.



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# GIS – The Bridge Into the Twenty-First Century

*By Lieutenant Colonel Tim Rensema, Mr. Craig Erickson, and Captain Steve Herda*

*"Terrain visualization is the responsibility of commanders and staffs across the spectrum of today's Army. To effectively see the impact that terrain has on units conducting and supporting military operations, all commanders and staffs must be aware of the effects of terrain. The terrain expert is the engineer."*

*Major General Robert B. Flowers*
*Commandant, U.S. Army Engineer School*

It is the responsibility of engineers to advise leaders of the effects that terrain may have on unit operations. The U.S. Army Engineer School offers valuable training in understanding these effects and the tools that are available to analyze terrain. Among these tools is the PC-based TerraBase II, version 3, which performs terrain-evaluation functions such as line-of-sight displays, weapons fans, slopes, oblique and perspective views, fly-throughs, sunlight/moonlight data, and distance measurements. Army topographic units have the Digital Topographic Support System (DTSS). Engineer terrain-analysis teams (military occupational specialty 81T) use the DTSS to provide Geospatial Information and Services (GIS) support. The terrain teams are the critical support element for terrain complex analysis in support of the military decision-making process (MDMP). The terrain teams are currently allocated down to each division in the Army. In the digital force, the DTSS has a much-expanded role that includes digital terrain data management and dissemination. In the expanded role, terrain teams and equipment are allocated to each maneuver brigade.

High-end GIS tools like the DTSS combine remotely sensed data, conventional ground surveys, and cartography on various computer-based systems. The Army's GIS, which continues to evolve, relates real-world positional data from the battlefield to positions on a known grid reference so that attributes such as slope, vegetation, and bridge capacity may be analyzed. The GIS databases can be accessed, manipulated, and transformed in an interactive process that allows commanders, decision makers, and planners to explore the battlefield and obtain the range of consequences of a plan before mistakes are irrevocably made.

For the majority of units in the Army Reserve Component, access to the benefits of GIS may seem out of reach. However, this capability to move from acetate and grease pencils to a computer-maintained, digital spatial-management system is within our grasp today.

## Advantages

The potential advantages of the GIS go beyond just viewing terrain information. By using spatial data from a variety of sources, GIS programs can reduce analysis time, simplify complex decisions, and reduce the time on the objective for reconnaissance teams. GIS data layers afford additional functionality in expediting various decision matrixes required by staff elements. As an example, these programs could support obstacle-plan development, route reconnaissance, force protection, and other tactical operations.

Another benefit of the GIS is its ability to evaluate all available data (including elevation), which increases the potential to provide spatial decision criterion to commanders. Additional data can be incorporated into the GIS database to allow more accurate analysis at tactical operations centers.

Integrating administrative data layers with the tactical requirements of maneuver commanders is a concept worth testing. The Integrated Training Area Management (ITAM) program has already established an experienced operator base with the equipment to apply GIS to environmental, facility, and training-site management. Most installations already have ArcView® to analyze data layers for their training areas. Through ITAM, active and reserve installations can provide spatial-analysis systems to maneuver commanders wanting to expand their battlefield-analysis capabilities.

## Testing the System

The Minnesota Army National Guard at Camp Ripley has one of the most advanced GIS databases in the Army National Guard. Personnel there have created more than 75 data layers to better support training-site personnel. During its 1999 annual training at Camp Ripley, the 164th Engineer Battalion (C)(M) from Minot, North Dakota, used a Mississippi River crossing operation conducted by its 957th Engineer Company (Assault Float Bridge) from Bismarck, North Dakota, to develop and test the concept of using administrative GIS data layers to support tactical operations. Camp Ripley's hardware, software, and personnel were used to develop this exercise. Using Field Manual (FM) 90-13, *River-Crossing Operations*, as a reference, battalion personnel identified data necessary to determine the best crossing sites.

Pertinent evaluation information for river crossings includes slopes, soil types, river width and depth, current velocity, vegetation cover, obstacles, and the enemy situation.

Working with the Minnesota Army National Guard GIS staff, 164th personnel reviewed existing data layers to determine the support data that was available for developing a river-crossing scenario, using the analytical ArcView® capabilities with the spatial-analyst extension. We found that most of the evaluation information needed was available within existing data layers obtained through remote sensing. While the capability to determine water depth and current velocity is currently not available, software is constantly being improved to obtain these variables based on factors such as drainage basins, slope, and discharge of the river.

Figure 1 shows a layout for the river-crossing exercise that was produced by using the GIS. It depicts the corridor considered for river-crossing site analysis—a 3-kilometer buffer of the main river channel adjacent to Camp Ripley training sites. This buffer defines the area to which analysis programs will be limited. While the entire area could undergo analysis, this buffer area reduces analysis time and represents all possible crossing sites.

The second analysis phase involved developing crossing-site evaluation criterion. We applied a suitability analysis method that combined slope, taken from a digital elevation model (DEM), and soil texture data to evaluate areas along the entrance and exit banks that met FM 90-13 requirements. Figure 2 shows the terrain-rating layer, the resultant data layer of this analysis.

From the terrain-rating data layer, the best river-crossing sites were visually identified. Other potential analysis requirements for site selection were identified also, such as river width, road networks, cover and concealment, and salients in the river course.

River width was taken from satellite data provided by the National Imagery Mapping Agency. Road networks, which define how well a site can support a maneuver-unit crossing, and cover and crossing area. Figure 3, page 36, depicts the area of operation and captures all of this data, with the exception of the weather, and identifies what we determined to be the best river-crossing site. Analyzing data layers using the GIS may never completely replace the need for ground reconnaissance, but it can reduce the time spent at the site.

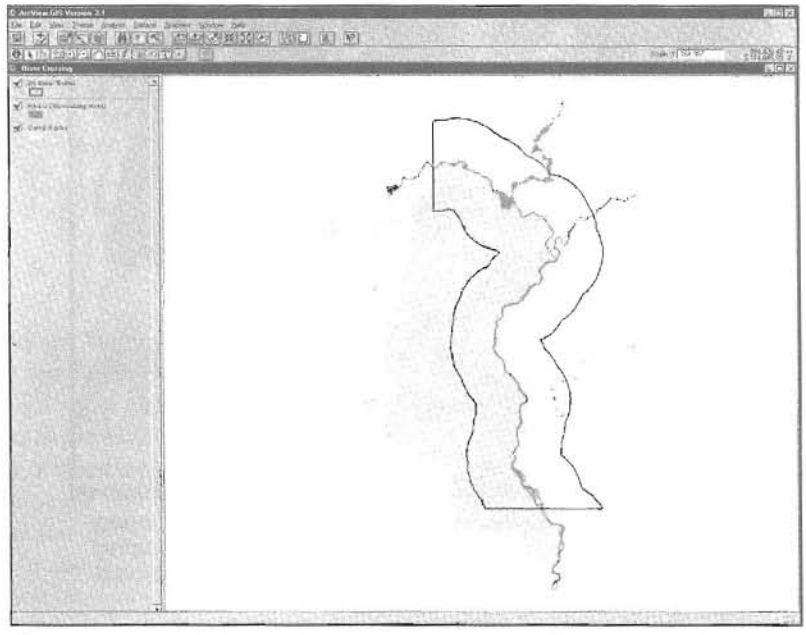


**Figure 1. The corridor outlined in black depicts the area considered for river-crossing site analysis; this area is a 3-kilometer buffer of the main river channels adjacent to Camp Riley training lands.**

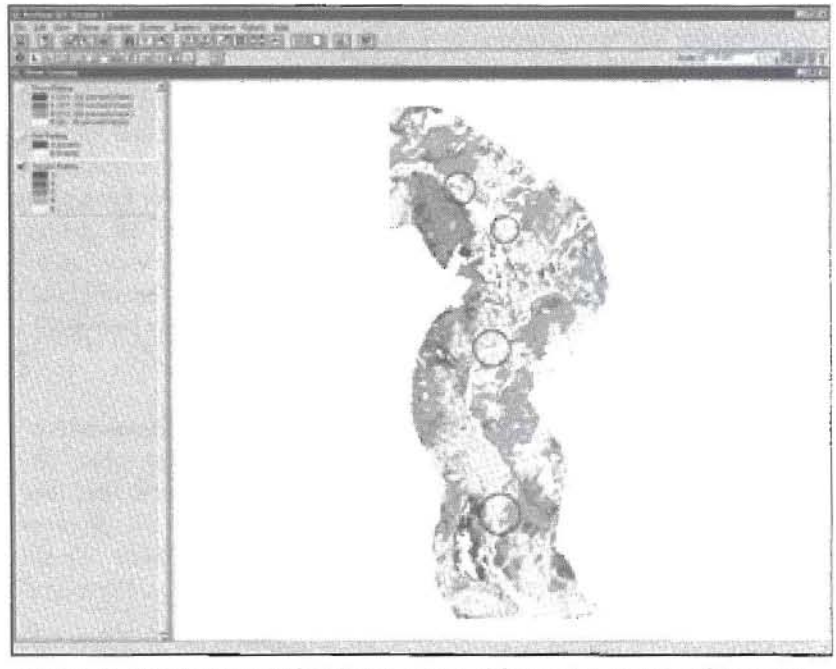


**Figure 2: This terrain-rating layer, created from slope and soil-texture data, was used to evaluate the area along the entrance and exit banks that met slope and soil requirements. The circled areas were considered potential crossing sites.**

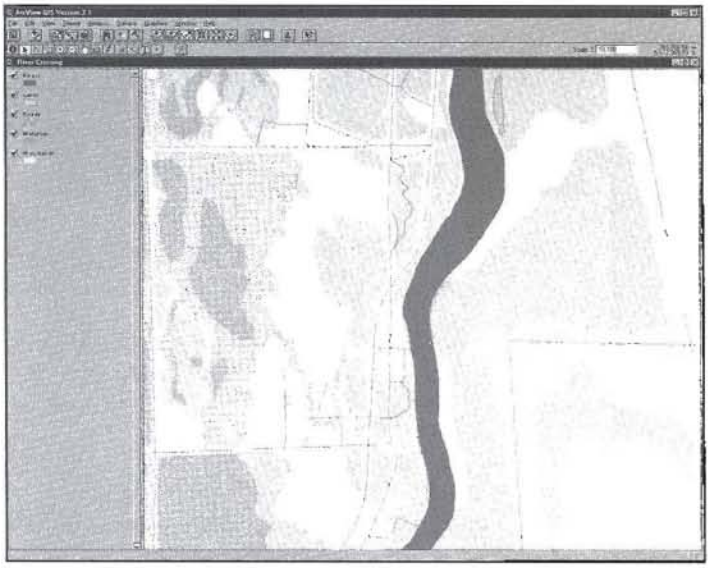


**Figure 3. Road networks, lakes, rivers, wetlands, and woodlands were used to individually evaluate potential crossing sites. This is a close-up view of the southernmost potential crossing site.**

Other helpful information used in determining risks was obtained through DEMs. This included line-of-site analysis, which enabled us to determine where the bridge site was exposed to enemy direct fire and to identify enemy positions in defilade on the opposite shore. Once enemy emplacements of artillery and mortar were known, the artillery range could be overlaid on the project location using the GIS program. We used this tool to determine whether our crossing site came under indirect fire from known enemy divisional and regimental artillery groups. Our selected site was out of the effective range of the regimental artillery group but within the divisional artillery group range. Our friendly fire support also could have been included as a data layer to determine the direct- and indirect-fire-support coverage we could expect.

Especially crucial to the success of this test was having the proper requirements in place, such as a well-defined operational scope, appropriate hardware and software, a GIS-competent operator, and a resident database.

## Conclusion

The Deputy Chief of Staff for Operations has organized regional support centers to provide a consistent database for training-site management. It contains "core" data layers that are also conducive to tactical operations. With the addition of layers and modifications provided by analyses of other units, many different tactical scenarios can be "played" using existing GIS operations. TerraBase II provides terrain-evaluation tools based on elevation data, digital imagery data, and digital map data. For more complex analysis requirements, an interactive GIS program like ArcView© can help maneuver commanders benefit from GIS even if the DTSS has not been fielded to their units.

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*(continued from page 17)*

1943, the peak year of training at Fort Leonard Wood. The interior of one of each type of building has been restored. Also, the interior of one barracks building has been restored to interpret basic training barracks in 1967. This Cold War interpretation dramatically illustrates the adaptive reuse of World War II temporary buildings to support the training boom of the Vietnam conflict.

Other restored buildings in the complex house a variety of exhibits supporting the history of Fort Leonard Wood. One restored dayroom has a display dealing with the life and career of MG Leonard Wood, the installation's namesake. In another restored barracks is an interpretation of the German and Italian prisoner-of-war camp, which operated at Fort Leonard Wood from 1943 to 1946. The most recent addition to this area is a historic chapel. By preserving this collection of World War II buildings, Fort Leonard Wood has created a time capsule of the history of the training experience from 1941 to the present.

## Regimental Store

Located in the lobby of the museum, the Regimental Store (which is operated by the Army Engineer Association) offers a unique line of gifts. Merchandise primarily features engineer regimental crests and the engineer castle. Proceeds from the store help support the adjacent engineer Regimental Room. Steeped in engineer history, the Regimental Room proudly displays colors and special plaques of deactivated engineer units.

Come and visit your Engineer Museum.

*Mr. Combs is the Engineer Museum curator.*

*Located at the corner of South Dakota and Nebraska Avenues, the museum is open to the public, free of charge, from 1000 to 1600, Monday through Saturday. The telephone number is (573) 596-0780 (DSN 581-0780), the e-mail address is combsk@wood.army.mil, and the web site is www.wood.army.mil/museum.*

# A Genius for Fortification:
## Vauban and the Future of Positional Warfare

*By Dr. Burton Wright III*

Today positional warfare is a long-forgotten art. Armies of the future will never allow themselves to become bogged down in reducing fortresses or, for that matter, in building them. Such anachronisms can be bypassed by vertical envelopment or destroyed by precision munitions.[1] Speed and violence of execution are the tenets of today's doctrinal manuals. Picks and shovels belong in museums. Or do they?

When he became king, France's Louis XIV joined with Inspector General Jacques Martinet [2] and the Minister of War, the Marquis de Louvois, to create an excellent standing army of 200,000 men.[3] Although it was the best-drilled and best-equipped in Europe, in the long series of dynastic wars that followed, Louis' army became very adept at maneuver and fortifications. This expertise was the result of the genius of one man—an engineer named Sebastian le Prestre de Vauban.

Born of poor landowners, Vauban was orphaned in childhood and brought up by peasants. He retained many aspects of their culture throughout his life. At the age of 17, he enlisted as a private soldier and was eventually commissioned a lieutenant. His talents were so outstanding that he attracted the attention of the Marquis de Louvois, who did not let the lack of blue blood stand in the way of promoting good men.[4] Through his brilliance and professionalism, Vauban worked his way up to the rank of Marshal of France. Over four decades, this engineer compiled a series of spectacular victories—in both attacking massive forts and in defending them from attack—that has never been matched.

Before Vauban's time, fortifications were somewhat primitive and consisted of high walls protected by a moat or ditch. In the Middle Ages, simple linear walls of stone were enough to keep those inside safe and sound. But with the invention of the cannon, the idea of fortifications took a new turn. Walls became massive and impervious to direct infantry assault. Engineers of Louis XIV's day went even further in developing defensive positions, making it much more difficult to conquer a city in a short time. Sieges became long and bloody affairs.[5]

France's principal enemies during Louis XIV's reign were the English and the Dutch. Both provided formidable opposition to the king's dynastic plans for Europe. Most of the major fighting during his numerous conflicts with his neighbors took place in and around Belgium and the Netherlands. Both nations have terrain that is more adaptable to the use of fortifications to deny an invader entrance than to maneuver warfare.[6] It was for this type of war that Vauban was most suited.

One of Vauban's defensive techniques was to build forts in the shape of a star and place them on critical terrain in advance of the main walls of the city (see Figure 1). This forced an enemy to reduce the fort before taking on the city. The star shape allowed the garrison to use

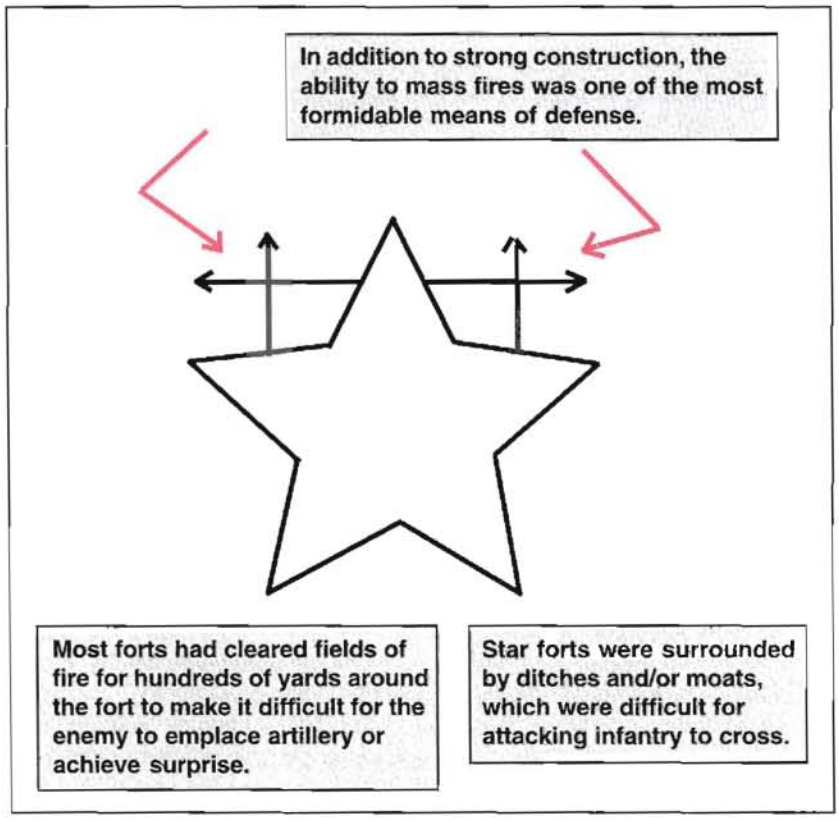



**Figure 1. A star-shaped fort.**

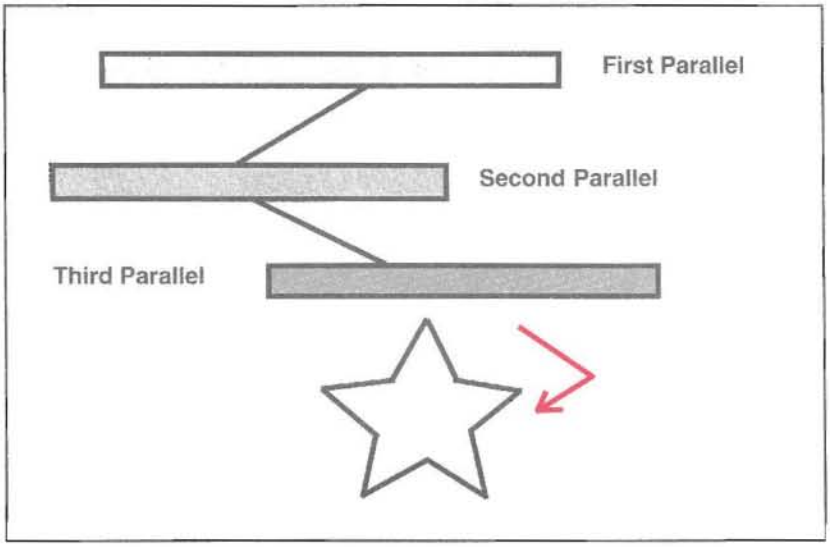



**Figure 2. The parallel method of attack.**

flanking fire and to sweep the glacis of attacking infantry. The defenders' cannons were placed in embrasures to give them protection while they fired. Star-shaped forts had both inner and outer defenses; if one was breached, then the other provided safety for the garrison to continue the resistance. *(Note: If you fly over many of the border towns of France, Holland, and Belgium, you can see numerous intact examples of star-shaped forts. Most of these were built and designed by Vauban.)* [7]

During the Middle Ages, one of the ways to breach fortifications was to dig a sap or tunnel (hence the term *sappers*) under a wall and explode gunpowder in the tunnel so the wall would collapse. Many of Vauban's forts were constructed so that this breaching method would not collapse the walls. He used large amounts of packed earth combined with masonry and stones to create a powerful line of fortifications. The only way to attack with some expectation of success was to use a parallel method that Vauban pioneered.

Vauban's parallel method of breaching consisted of parallel lines dug at right angles to a line of fortifications and then turned at right angles, much like a zigzag design (see Figure 2). Gibbons (round, dirt, protective rolls, often enclosed by woven rope or straw) were pushed in front of those digging the parallel. When the parallels were close enough to the fort, guns were situated so as to put that part of the fort under fire, then the second parallel was begun. At the end of the second parallel, more powerful and shorter-range guns were placed to support the third parallel. This brought the infantry near the walls, which allowed a direct attack. This system could take weeks or even months to accomplish, because usually more than one parallel was planned against a fort.

Vauban made his reputation at the age of 40 with the siege of the great Dutch fortress town of Maestricht, where he first used his parallel system of attack. When his parallels reached below the wall of Maestricht, Vauban approached the commander of the city and requested that he surrender. The commander refused, so the French army set off mines and other explosions to create lanes through which infantry overwhelmed the defenders.

In Holland, where much of Louis XIV's Thirty Years' War took place, roads were few and in terrible condition, so canals and rivers served as logistical lifelines. Possessing fortified areas along one of the critical canals could mean the difference between defeat and victory. Year after year, France fought England and Holland for these important fortified towns and the strategical control they offered. The capture of Maestricht allowed the French to use the inner waterways of Holland for moving troops and supplies. Several months later, Vauban successfully forced the surrender of Trier. This gained for France the control of the Moselle River and enabled the country to supply one of her greatest generals, Turenne, while he campaigned in Germany.

Toward the end of several great battles between the French army and the army of the Duke of Marlborough, the French built a series of fortified lines in Belgium that was too strong to directly attack. Vauban's genius helped to fashion those lines, and they were never penetrated to any extent. The French army, under the aged but crafty Marshal Villars, was able to use the lines as an area to retreat to when pressed by the British and Dutch forces. The army rarely ventured beyond these lines.

Defensive warfare can help preserve an army from disaster when time is the most important factor. The French knew that eventually both the Dutch and British would tire of the war and seek a negotiated peace. Queen Anne dismissed Marlborough and, after a few small battles (the last of which was Demain), the war ended. The Peace of Utrecht followed.

Without the genius and professional skill of Vauban, many of Louis XIV's campaigns in his various wars to make France the strongest country in Europe would have come to naught. As long as Vauban was alive, France was assured that he and his engineers would dominate the war of fortresses.

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Who knows, a future Vauban may be serving in our Army right now? Since terrain dictates tactics, if the enemy chooses to use dominant terrain, then we can be sure that fortifications of some kind will be built and, more importantly, have to be breached.

For example, during World War II in Italy, Field Marshal Albert Kesselring conducted a masterful defensive battle up the Italian boot by fortifying dominant terrain and annihilating the Allies as they attempted to take it. And during the long, bloody battle to take the dominant heights

of Monte Cassino, the British, American, and Polish armies were all forced back. Finally, the Polish army broke through, but the cost in casualties was enormous.

In Vietnam in 1967, the U.S. Army's 173d Airborne Brigade faced dug-in and fortified North Vietnamese forces at Dak To. Before the battle began, U.S. soldiers found communications wire and steps cut into the hillside, which told them the enemy's level of preparation. The soldiers knew the North Vietnamese waited in deep, camouflaged bunkers. The 173d had not moved even 50 yards up the hill when they became involved in heavy combat.

It is still possible, given the terrain in which the U.S. Army might have to fight, that we may face enemy fortifications that even Vauban would find formidable. Since it is engineers who must help neutralize them, we can only hope that there will be a Vauban in the engineer ranks. Believe it or not, positional warfare still has a future. Don't throw away your pick and shovel. You may need them!

*Dr. Wright is the Chemical Corps historian at Fort Leonard Wood.*

## Endnotes:

[1]Clearly from experience during the Gulf War, precision munitions are very useful against specific types of fortifications and bunkers. However, the Iraqi forces underground, where fortifications were not readily visibile, were not damaged significantly by these attacks. Robert H. Scales. *Certain Victory: The U.S. Army in the Gulf War.* London: Brassey's Inc, 1998.

[2] The term "martinent" comes from this man. His training of the new army was exact, and French units moved with an almost straight line. Discipline was severe. Many of Frederick's soldiers were trained under this system. Lynn Montross. *War Through the Ages.* New York: Harper and Brothers, 1955.

[3] What made this Army so unique was it was a "standing army." Most of the armies of the period were not as large and usually were the king's or emperor's personal guard. Soldiers were formed only when needed. They also wore specific uniforms for specific duties as Gustavus Adolphus had pioneered with his Swedish Army. Archer Jones. *The Western Way of War.* New York: Penguin Books, 1985.

[4] The Minister of War was among the first of his type to recognize talent in other than the nobility and to promote soldiers on that basis. Napoleon was soon to follow this example. Many of his best leaders, such as Lannes and Davout, were drawn from the middle class. Alistar Horne. *So Far From Austerlitz.* New York: William Morrow, 1999.

[5] Montross.

[6] For a good understanding of the use of terrain, see David Chandler. *Marlborough as Military Commander.* New York: Charles Scribner's Son, 1973. Pp. 77-92, 151-165.

[7] Montross and Chandler.

## *The Engineer Writer's Guide*

We think engineers take a special pride in their profession, and *Engineer* is always looking for articles from readers who want to share their expertise, experience, and ideas.

If you are a potential contributing writer, here are a few "writer's guide" tips to steer you in the right direction.

Articles may discuss engineer training, operations, doctrine, equipment, history, or other areas of general interest to an engineer readership.

We're especially interested in articles that have a "how-to-do-it-better" theme. For instance, we're not looking for articles telling readers how you conducted a routine field exercise. But if you think you have a "new-and-improved" way of conducting a tactical operation, training exercise, or other operational procedure that may prove helpful to other engineers, that's what we need.

Articles should generally come from contributors with first-hand experience of the subject being presented. Articles should be concise, straightforward, and in the active voice.

Length should range from 2,000 to 4,000 words, and text should be double-spaced. Generally, each such page should contain from 200 to 250 words. Manuscripts should be originals or clear copies. Provide a 3 1/2-inch disk in Microsoft Word, Rich Text Format, or ASCII (please indicate word-processing format on disk or cover letter). You also may send articles by e-mail to *bridgess@wood.army.mil.*

Articles containing attributable information or quotations not referenced in the story should carry appropriate endnotes.

Contributors are encouraged to include black-and-white or color photos, artwork, and/or line diagrams that illustrate information in the article. Include captions for any photographs submitted. Hard-copy photos are preferred, but we will accept digital images originally saved at a resolution no lower than 200 dpi. Please do not include them in the text. If you use PowerPoint, save each illustration as a separate file and avoid excessive use of color and shading. Please do not send photos embedded in PowerPoint.

Include your full name, rank, current unit, and job title. Also include a list of your past assignments, experience, and education; your mailing address; and a fax number and commercial daytime phone number.

Reviews of books on engineer topics are also welcome.

Articles or book reviews may be mailed to: Editor, Engineer Professional Bulletin, 320 Engineer Loop, Suite 210, Fort Leonard Wood, Missouri 65473-8929.

All submissions are subject to editing.

If you have questions about an article you're working on—or considering writing—call Shirley Bridges or Lynne Sparks, at DSN 676-4104, or commercial (573) 563-4104. We look forward to hearing from you.

*Note: Due to the limited space per issue, we will not print articles that have been accepted for publication by other Army professional bulletins.*

# EOBC AND EOAC UPDATE

*By Captain Sam Hudson*

In the past several years, the Engineer Officer Basic Course (EOBC) and the Engineer Officer Advanced Course (EOAC) have undergone several changes. Because of these changes, many officers in the field may be unaware of the specific types of skills and the actual depth of knowledge that recent graduates of the EOBC and EOAC possess. This article outlines the EOBC and EOAC programs of instruction and briefly explains recent and proposed changes in the courses.

## EOBC

The EOBC provides general instruction on the basics of Army engineering. The 17-week course, which includes two weeks for in-processing and out-processing, is divided into four phases:

- **Common Core.** This three-week phase consists of 120 hours of instruction and covers topics in leadership, military justice, training management, and supply management. Engineer students receive instruction alongside chemical and military police officers in many of the classes.
- **Combat Engineering and Tactics.** This six-week phase consists of 238 hours of instruction, which includes bridging, demolitions, mine warfare, and combined-arms tactics.
- **Battalion Field Training.** This three-week phase consists of 345 hours of instruction and includes land navigation, Sapper Stakes, a four-day situational training exercise (STX), and a five-day field training exercise (FTX).
- **Construction Engineering.** This three-week phase consists of 120 hours of instruction, which covers both horizontal and vertical construction.

Focusing more on the "hands-on" application of the students' newly learned skills, only 37 percent of the total course comes in the form of classroom instruction. The remaining 63 percent is practical exercises (PE), the STX, and the FTX. In addition, a basic two-hour offensive/defensive computer exercise (CPX) allows students to integrate their tactical plans into a task-force plan.

Probably the most significant change to the EOBC was the switch from a "tracked" to a "straight-lined" program of instruction in 1997. Until then, students received two weeks of specialized instruction based on their follow-on assignment (such as combat engineering and tactics for combat engineers vs construction training for combat-heavy engineers). Now, instead of specialized training, students receive general instruction in all areas of engineering, regardless of their upcoming assignments. So it is important to realize that none of the students arrive at their first unit with an in-depth knowledge of any one area. To more fully develop their knowledge and skills, new officers must receive guidance, mentoring, and professional development from fellow officers in their new unit.

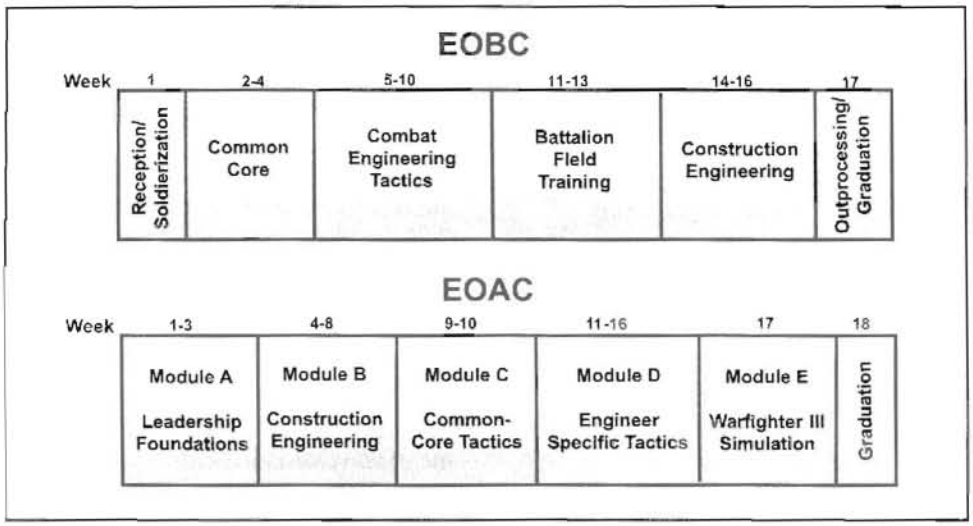
## EOAC

Under TRADOC's Captain's Professional Military Education (CPT PME) plan, the EOAC is now considered Phase I of the Engineer Captain's Career Course (ECCC) and is primarily designed to prepare engineer captains to command engineer companies and serve as staff officers in combined-arms task forces. While many officers perceived the old 22-week EOAC as a "gentleman's course," this is no longer the case. As of 1999, the course length was reduced to 18 weeks but maintained essentially the same amount of material. Thus, current EOAC students must cover a comparable amount of information in four weeks less than their predecessors.

In an attempt to integrate the branches and services of our armed forces, and to improve cooperation with other countries, a typical EOAC class consists of about 67 percent active-duty engineer officers, 16 percent international students, 8 percent nonengineer officers, 5 percent Reserve Component (RC) officers, and 4 percent Marine Corps officers. Under the CPT PME plan, all active-duty officers (except some who are pursuing advanced degrees) attend the six-week Phase II of the ECCC (the Combined Arms and Services Staff School, or CAS[3]) at Fort Leavenworth immediately following completion of EOAC.

EOAC is composed of five modules, with one week devoted to out-processing and graduation:

- **Leadership Foundations.** During this three-week module, students receive instruction on leadership, Army values/ethics, and unit cohesion/team building. In many of the classes, engineer officers are grouped with chemical and military police officers.
- **Construction Engineering.** During this five-week module, students are taught the basics of designing, planning, and procuring materials for construction projects in a theater of operations. The climax of this module is a construction capstone PE using a "real-world" project scenario.
- **Common-Core Tactics.** This two-week module provides the tactical foundation necessary in a combined-arms environment up to the brigade level. Students also develop a company mission-essential task list and plan a company STX.
- **Engineer-Specific Tactics.** This six-week module focuses heavily on the military decision-making process, knowledge of opposing-force equipment and capabilities, intelligence preparation of the battlefield, and the engineer battlefield




assessment. In addition, based on the premise that all engineers are "terrain experts," this module places increased focus on TerraBase II terrain analysis and requesting terrain-visualization and imagery products. Students ultimately apply their newly gained knowledge and skills to produce oral and written engineer-company operation orders (OPORDS) and engineer annexes to task-force/brigade OPORDS for both defensive and offensive operations.

- **Warfighter III Simulation.** During this one-week module, students serve as maneuver and engineer battalion commanders and staff, where they plan both defensive and offensive combined-arms battles using the deliberate military decision-making process. Once the plans are complete, they execute them in two separate CPXs.

The EOAC is structured so that roughly half of the instruction is lectures and discussions. The second half is small-group instruction, with a teacher-to-student ratio of no greater than 1:16. The military decision-making process is continuously emphasized in all aspects of training, and while students are ultimately evaluated on the final products they produce, much attention is paid to the process by which staffs produce their products.

There are several proposed initiatives to increase the quality and relevance of the EOAC program of instruction. For instance, there are plans to better incorporate military operations in urban terrain and stability and support operations into lesson plans. Additionally, there are plans to increase the emphasis on light engineer operations and update the practical exercises to better represent some of the current operational environments. Finally, with rapid increases in technology, future students may cover some course material via distance learning.

In conjunction with the EOAC, selected students have the opportunity to earn a master's degree in engineering management, civil engineering, or environmental engineering from the University of Missouri-Rolla or a master's degree in public policy administration from the University of Missouri-St. Louis. Students concurrently attend night classes during the EOAC, and then immediately attend Phase II of the ECCC (CAS$^3$) after EOAC. Once ECCC, Phase II, has been completed, students pursuing advanced degrees return to Fort Leonard Wood for various lengths of time to complete their studies, with the exception of students obtaining degrees in civil and environmental engineering. These students finish their degrees before attending ECCC, Phase II.

## EOAC-RC and ECCC-RC

The Engineer School divides the EOAC for Reserve Component officers (EOAC-RC) into two phases. These two phases constitute the first half of a four-phase ECCC for Reserve Component officers (ECCC-RC). Phase I consists of 207 hours of correspondence courses and is completed at the officer's home station. Phase II is a two-week resident course at Fort Leonard Wood designed to reinforce the knowledge and skills learned during Phase I through application and PEs. According to the CPT PME, officers must begin Phase II within one year after completing Phase I. During Phase III of the ECCC-RC, officers return to their parent units and conduct annual training. This helps alleviate the possibility of an officer's extended absence from his/her unit. Phase IV of the ECCC-RC is equivalent to Phase II of the ECCC. Students attend either the six-week resident course at Fort Leavenworth or at U.S. Army Reserve schools in their area. Students should complete Phase IV within two years after completing EOAC-RC.

## Summary

Both the EOBC and the EOAC will undoubtedly undergo more changes in the upcoming months and years. But with the information contained in this article, officers in the field, especially company and battalion commanders, will have a better understanding of exactly what these new officers have to offer their units.

*CPT Hudson is a training developer/writer in the Department of Instruction, Directorate of Training, USAES, Fort Leonard Wood. Previous assignments include company executive officer, B Company, 2d Engineer Battalion, Camp Castle, Korea; and platoon leader, 5th Engineer Battalion, Fort Leonard Wood. CPT Hudson is a graduate of the ECCC. His e-mail address is hudsons@wood.army.mil.*

# CTC Notes

## Battle Command Training Program

### Scatterable Minefield Request and Report Procedures

*By Major Fred Erst*

Combat engineers are increasing their reliance on scatterable mines to shape the battlefield. However, unless corps and division commanders specifically delegate emplacement authority to them, current Army doctrine does not provide brigade and task force commanders the authority to employ scatterable mines as tactical or situational obstacles. Should the corps or division commander withhold scatterable-minefield emplacement authority, existing doctrinal publications do not provide a consistent procedure to request planning or emplacement authority from the authorizing headquarters and do not clearly require units to submit scatterable-minefield warnings (SCATMINWARNs) before emplacing a scatterable minefield. As a result, engineers at corps, division, brigade, and task-force levels often have a wide interpretation of the requirements for requesting and reporting scatterable minefields. A recommended solution to this doctrinal problem is for units to establish procedures that incorporate a report matrix for tracking scatterable-minefield requests, warnings, and records.

### Doctrinal Considerations

Current doctrinal publications do not clearly and consistently define scatterable-minefield request and report requirements. FM 5-71-2, *Armored Task Force Engineer Combat Operations, Change 1*, 13 November 1997, includes a situational-obstacle execution matrix but does not specify scatterable-minefield dimensions, planned life cycle, triggers, observers, or purpose as required planning information. FM 20-32, *Mine/Countermine Operation*, 29 May 1998, states that the SCATMINWARN and the scatterable-minefield /munition field report and record (SCATMINREPORT/SCATMINREC) are the only two reports required for use with scatterable minefields or munition fields. The problem is that FM 20-32 combines the 19-line SCATMINREPORT/SCATMINREC work sheet into one document (Figure 8-7, page 8-23) without adequately explaining that it can be used as both a *report of intention* to request emplacement authority and a *record* after a scatterable minefield is emplaced. The format is very effective when it is used as a SCATMINREC. However, when it is used as a report of intention or as a request, the format does not provide authorizing headquarters with the essential planning information to command and control scatterable-minefield employment. This planning information includes triggers, observers, overwatching unit, purpose, and the field-artillery target number if the scatterable minefield is an area denial artillery munitions/remote antiarmor mine system (ADAM-RAAMS).

Additionally, FM 20-32 does not consistently require units to provide a SCATMINWARN before emplacing minefields. Chapter 3, page 3-10, directs that a SCATMINWARN will be sent to all affected units before emplacement. However, Chapter 8, page 8-24, states that a SCATMINWARN can be sent either before or immediately after mines are emplaced. FM 5-34, *Engineer Field Data*, 30 August 1999, describes the same scatterable-minefield request and report requirements as shown in FM 20-32.

A recent publication, FM 101-5-2, *U.S. Army Report and Message Formats*, 29 June 1999, established a new report, the scatterable-minefield request (SCATMINREQ) that is used to request authority to plan emplacement of scatterable mines. However, the SCATMINREQ is not addressed in any current engineer publications. Additionally, the formats for the SCATMINWARN and SCATMINREC specified in FM 101-5-2 are different from the reports outlined in FMs 20-32 and 5-34. While FM 101-5-2 states that the report formats are directive and prescriptive, it also states that branch-specific or technical reports complement the report formats specified in the manual and are not considered superseded by it.

FM 101-5-2 does attempt to establish a procedure for units to request and report scatterable mines in the general instructions of each report. The problem is that FM 101-5-2 does not clearly describe the overall process and does not specifically require units to disseminate a SCATMINWARN to subordinate units before execution. As a result of these differences in Army doctrinal publications, the lack of a clearly defined request and report procedure often compounds the problems that most brigade and task force engineers already have with planning and reporting scatterable minefields.

### Brigade Warfighter Exercises

Recent BCTP Brigade Warfighter exercises have shown that many brigade and task force staffs do not adequately plan and synchronize employment of scatterable mines as tactical or situational obstacles during the military decision-making process. During the fight, this often causes brigade and task force engineers to develop and submit additional "911" emergency requests for unplanned scatterable minefields or else to execute scatterable minefields without receiving emplacement authority. Staff engineers often have difficulty complying with scatterable minefield reporting requirements and struggle with tracking the status of SCATMINWARNs and SCATMINRECs. Typically, the result is an increased occurrence of minefield fratricides because of limited situational awareness and a decreased obstacle effect on the enemy's maneuver.

### BCTP Procedures

The procedures adopted by BCTP's Operations Group C to manage scatterable-minefield requests and reports during Brigade Warfighter exercises include a three-step process that parallels the doctrinal report flow for conventional minefields found in FM 20-32,

Chapter 5. This process uses a standard format for scatterable-minefield requests, which is based in part on the 52d Infantry Division's situational obstacle request form that the Sidewinder Team uses to train brigades at the National Training Center at Fort Irwin, California. This three-step process is also compatible with the standard formats and general instructions for the SCATMINREQ, SCATMINWARN, and SCATMINREC reports outlined in FM 101-5-2. Units can use these procedures when the division plans to withhold emplacement authority for all 4-hour-duration scatterable minefields and the corps withholds emplacement authority for all others. Units can also apply or modify the same procedures to maintain obstacle control when scatterable-minefield emplacement authority has been delegated to subordinate commanders.

These procedures also incorporate a matrix for both the units and authorizing headquarters to track scatterable-minefield requests, warnings, and records to ensure rapid dissemination of essential information (see figure on page 44). Emplacing units use lines 1 through 17 of the matrix to provide the required planning information through their higher headquarters to the authorizing headquarters. Each headquarters uses the last 5 columns (lines 18 through 22) to track the scatterable-minefield request and report process.

Emplacing units (brigades/task forces) use the following three-step process to request scatterable-minefield planning and emplacement authority and to report execution through their higher headquarters (division/brigade) to the authorizing headquarters (corps/division).

**Step 1: Submit SCATMINREQ** (serves as a *Report of Intention*). When a unit plans to emplace scatterable minefields, it submits a scatterable-minefield request (lines 1 through 17) for planning authority through its higher headquarters to the authorizing headquarters. The SCATMINREQ includes the obstacle number, scatterable-minefield emplacing system, dimensions, grid locations of the corner points, safety zone, type of minefield marking, unit observing/overwatching the minefield with fires, obstacle effect, purpose, life cycle, emplacing unit, triggers, and observers for each scatterable minefield used as a tactical or situational obstacle. If the scatterable minefield is an ADAM-RAAMS, the request also includes the field-artillery target number, aim points, and minefield attitude in mils. The emplacing unit submits the required information through its higher headquarters to the authorizing headquarters. The unit can revise this request or submit an additional request should the plan change during the fight. The G3/S3 of the authorizing headquarters reviews the information to ensure that the planned scatterable minefields do not interfere with future operations and either approves or disapproves the request.

**Step 2: Submit SCATMINWARN** (serves as a *Report of Initiation*). Before emplacing scatterable minefields, a unit submits a complete SCATMINWARN through its higher headquarters to the authorizing headquarters. The SCATMINWARN informs both headquarters that the unit intends to execute a specific scatterable minefield that was previously approved for planning. The unit may submit a SCATMINWARN anytime after receiving approval but should submit it at least 30 minutes before execution. This technique provides obstacle control to the authorizing headquarters so the commander can rapidly delegate or withhold emplacement authority based on the current situation. It also allows both headquarters sufficient time to further disseminate the SCATMINWARN. The unit then receives authority to emplace a scatterable minefield after the authorizing headquarters acknowledges receipt of the SCATMINWARN. The unit can cancel a SCATMINWARN for any minefield at any time and submit a new SCATMINWARN for other scatterable minefields that have been previously approved for planning.

Before executing the minefield, the emplacing unit should disseminate the SCATMINWARN via FM radio on command nets and operations and intelligence nets to notify subordinate and adjacent units that the area is no longer safe for friendly movement and maneuver. On command nets, the SCATMINWARN should include the obstacle number, type of scatterable minefield, planned life cycle, two 6-digit grid locations, and the safety zone at a minimum. Units should provide a more detailed SCATMINWARN on operations and intelligence nets. FM 101-5-2, Report Number S015, shows the most current format for the SCATMINWARN.

**Step 3: Submit SCATMINREC** (serves as a *Report of Completion*). This report indicates that the scatterable minefield is complete and functional. After execution, the emplacing unit must submit the SCATMINREC through its higher headquarters to the authorizing headquarters so all units can track self-destruct times and actual locations of scatterable minefields. Refer to Report Number S005 found in FM 101-5-2 for the most current SCATMINREC format.

## Planning Information

During BCTP Brigade Warfighter exercises, the division (authorizing headquarters) does not always immediately approve the request for planning authority if the brigade does not submit all of the required information on the SCATMINREQ. Units often have difficulty in defining the scatterable-minefield dimensions, obstacle effect, purpose, trigger, and observer. As a result, brigade and task force engineers should emphasize the following information during the planning process:

**Minefield Dimensions.** This refers to the length and width of the scatterable minefield in meters (m) rather than the safety zone. For example, ADAM-RAAM, 200 by 200 m, 400 by 400 m, or 200 by 800 m; Ground Volcano, 1,110 by 120 m, 277 by 120 m or 440 by 555 m; Air Volcano, 1,115 by 140 m, 278 by 140 m, or 557 by 440 m; Modular Pack Mine System (MOPMS), 35 by 70 m per dispenser, 280 by 70 m, or 280 by 105 m. The minefield dimensions should also match the six-digit grid locations for the corner points at the start and end of each scatterable minefield.

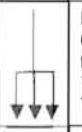
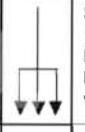
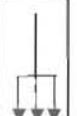
**Obstacle Effect.** This refers to the obstacle effect on the enemy (disrupt, fix, turn, or block).

# BCTP Brigade Warfighter

## Scatterable Minefield Request and Report Matrix

Line 1: DTG of Request 101500NOV00
Line 2: Unit Submitting Request: 1/52d ID (M)

Sheet # _____ of _____

| Scatterable Minefield Request (Lines 1-17) | | | | | | | | | | | | | | | | | Reports (Lines 18-22) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line 3 | Line 4 | Line 5 | Line 6 | Line 7 | Line 8 | Line 9-A | Line 9-B | Line 9-C | Line 10 | Line 11 | Line 12 | Line 13-A | Line 13-B | Line 14 | Line 16-A | Line 16-B | Line 16-C | Line 18 | Line 19 | Line 20 | Line 21 | Line 22 |
| Obstacle Number<br>Target** Number | Scatterable Mine Emplacing System | AT Mines | AP Mines | Minefield Attitude** | Minefield Dimensions | Corner PT Start Grids | Corner PT End Grids | Aim** PT Center Grid | Minefield Safety Zone | Minefield Marking | Unit Observing Minefield | Obstacle Effect | Purpose | Life Cycle | Emplacing Unit | Trigger | Observer | DTG SCATMINREQ Approved | DTG SCATMINWARN Approved | DTG SCATMINWARN Disseminated | DTG Self-Destruct | DTG SCATMINREC Sent to Higher |
| 1001<br>E1*SF01<br><br>AE1001 | ADAM-RAAMS Medium Density | Yes | Yes | 0 mils | 400 x 400 m | NK 505929<br>NK 505925 | NK 509929<br>NK 509925 | NK 550927 | 1500 x 1500 m | None | TM A<br>1-121-IN |  | Isolate OBJ FLA from OBJ TEXAS vic TAI-20 | 4 hrs | 4-118 FA Bn | Eastern CO 3-T80/8-BMP Repositions to West vic NAI-2 (NJ5490) | COLT TM-4 (ALT)<br>COLT TM-2 | | | | | |
| 1001<br>E2*SV02 | Air Volcano 160 Canisters | Yes | Yes | N/A | 1110 x 140 m | NK 500940<br>NK 500939 | NK 511941<br>NK 511940 | N/A | 235 m All sides | None | TM D<br>2-251 IN |  | Disrupt Enemy CATK vic TAI-25 | 4 hrs | B/52d Avn Bn | Enemy Res 3-T80/8-BMP CATK vic NAI-6 (NJ5595) Decision PT-3 | 2-251 Scout TM-1 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 1001<br>B1*SF01<br><br>AE2001 | ADAM-RAAMS Medium Density | Yes | Yes | 800 mils | 400 x 400 m | NK 525928<br>NK 523925 | NK 528925<br>NK 525923 | NK 525925 | 1500 x 1500 m | None | TF<br>1-121-IN |  | Separate 1st & 2d Echelons by 30 min vic TAI-22 | 4 hrs | 4-118 FA Bn | Eastern CO 3-T80/8-BMP Repositions to West vic NAI-2 (NJ5490) | COLT TM-4 (ALT)<br>COLT TM-2 | | | | | |
| 1001<br>B2ASV01 | Ground Volcano 160 Canisters | Yes | Yes | N/A | 555 x 440 m | NK 550850<br>NK 550846 | NK 556850<br>NK 555846 | N/A | 235 m All sides | 4-sided Frat Fence | TM B<br>2-252 IN |  | Turn 1st Echelon into EA Viper | 48 hrs | A/501st Engr Bn | 4-Sided Frat Fence complete. Execute NLT 121400 NOV | N/A | | | | | |
| 1001<br>B2ASV02 | Ground Volcano 160 Canisters | Yes | Yes | N/A | 555 x 440 m | NK 554844<br>NK 554840 | NK 560844<br>NK 560840 | N/A | 235 m All sides | None | TM B<br>2-252 IN |  | Turn 1st Echelon into EA Viper | 4 hrs | A/501st Engr Bn | Enemy FSE 3-T80/8-BMP crosses PL Bush vic NAI 15 (NJ5400) | 2-252 Scout TM-2 | | | | | |
| 1001<br>B2BSV01 | Ground Volcano 40 Canisters | Yes | Yes | N/A | 277 x 120 m | NK 560840<br>NK 560838 | NK 563840<br>NK 563838 | N/A | 235 m All sides | None | TM C<br>2-252 IN |  | Destroy FSE vic EA Cobra | 4 hrs | A/501st Engr Bn | Enemy FSE 3-T80/8-BMP crosses PL Bush vic NAI 17 (NJ5700) | 2-252 Scout TM-1 | | | | | |
| 1001<br>B2CSM01 | MOPMS<br><br>2-Dispensers using RCU | Yes | Yes | N/A | 70 x 50 m | NK 570840<br>NK 570839 | NK 571840<br>NK 571839 | N/A | 50 m All sides | None | TM D<br>2-252 IN |  | Close Lane Blue vic PP1 | 4 hrs | A/501st Engr | Enemy: AGMB Crosses PL Dog Friendly.A/2-252 completes RPOL vic PP1 | 2-252 Scout TM-3 | | | | | |

Line 15. Action: Request Authority to Plan Scatterable Minefields.
Line 17. Authentication: _____

** Note: Information required for all ADAM-RAAMS minefields.

**Purpose.** This refers to the "targeting" aspect of planning scatterable mines as tactical or situational obstacles. The purpose clearly defines the tactical effect on the enemy's maneuver. Two examples of a clearly defined purpose: "Disrupt enemy counterattack at Targeted Area of Interest (TAI) 25" or "Separate the enemy's 1st and 2d echelons by 30 minutes at TAI 3."

**Trigger.** The trigger should be integrated into a decision point on the maneuver commander's decision support template. Typically, the trigger is an enemy action at a specific location, such as a named area of interest (NAI). The trigger should consider the time it takes for the enemy to move from the NAI to the TAI. The trigger allows the emplacing unit enough time to decide, emplace, and arm the scatterable minefield. An example of an effective trigger: "Enemy reserve 3 tanks/8 BMP counterattack at NAI 20." An example of a less specific trigger is "Advance guard main body (AGMB) @ Phase Line (PL) Gold." Some scatterable minefields may also require a friendly event in the criteria such as "Team A completes rearward passage of lines (RPOL) at passage point (PP) 2. Units should not use a time-based trigger to avoid emplacing a scatterable minefield too early or too late.

**Observer**. Specify the unit that is tasked to observe the trigger. Often, engineers can use the same scouts and observation points (OP) from the reconnaissance and surveillance plan or the combat observation lasing team (COLTs) locations from the fire-support plan. The unit observing or overwatching the scatterable minefield with direct or indirect fires may sometimes be designated as the observer for the trigger.

## Conclusion

Brigade and task force engineers who incorporated the scatterable-minefield request and report matrix during BCTP Brigade Warfighter exercises demonstrated a definite improvement in employing and tracking scatterable minefields. Armywide, engineers must continue to improve the employment of 4- and 48-hour-duration scatterable minefields in support of the brigade and task force fight. At BCTP, engineer trainers remain committed to developing tactics, techniques, and procedures for planning, preparing, and executing scatterable minefields to successfully shape the battlefield.

*Major Erst is an engineer trainer in BCTP Operations Group C.*

# National Training Center (NTC)

*By Sergeant First Class Steven Bell and Sergeant First Class Robert Neal*

On today's battlefields, engineer leaders are, more and more, pressed for time. Therefore, they must make work efficiently between missions to reconsolidate, resupply, and prepare soldiers and equipment for future operations. Two recent trends in these areas have been identified during training at the National Training Center. First, companies and platoons often lack effective SOPs for tactical assembly area (TAA) operations. Second, too little focus is placed on preparing the unit's equipment for continued operations.

## Engineer Platoon TAA Procedures

**Issue:** Engineer platoons frequently do not have an SOP for TAA procedures.

**Discussion:** Engineer platoons often do not employ all chemical defense equipment (CDE). They also frequently do not establish tactical wire communications, protective obstacles, and listening posts/observation posts (LPs/OPs) for early warning.

**Recommendation:** Engineer platoons should develop specific SOPs for TAA procedures. The SOPs should be based on the company and battalion SOPs and doctrinal references such as FM 5-34, *Engineer Field Data*, pages 1-13 and 1-14. Emphasis should be placed on establishing priorities of work that enhance force protection. Security can be enhanced by performing quartering party operations, emplacing key weapons, emplacing CDE, establishing tactical wire (HOTLOOP) communications, maintaining radio listening silence on platoon FM nets, and performing "stand-to" procedures.

## Volcano System Maintenance

**Issue:** Engineer Volcano crews frequently conduct inadequate preventive maintenance checks and services (PMCS).

**Discussion:** Vibration during cross-country travel in the M548 chassis often causes bolts, nuts, and electrical connections to loosen during movement. This can result in three types of failures: mechanical failure of the mounting hardware resulting in damage to the launcher or display control unit (DCU) as the launcher shifts; electrical connectivity failure between the DCU and the launcher panels; and connectivity failure between the launcher panels and the canisters.

**Recommendation:** Units should conduct daily PMCS according to Training Manual 9-1095-208-10-1, *Operator's Manual for Dispenser, Mine, M139 w/Mounting Kits*. Units should conduct combat checks according to Graphic Training Aid (GTA) 5-10-42, *Volcano Preventive Maintenance Checks and Services*, during extended hauls. Crews should conduct PMCS according to GTA 5-10-42 and conduct a full built-in test (BIT) on the DCU in the assault position before execution. At a minimum, crews should conduct daily inspections of all mounting hardware for tightness and conduct a daily BIT test, especially after cross-country movement.

*SFC Bell is an engineer company trainer. SFC Neal is an engineer platoon trainer.*

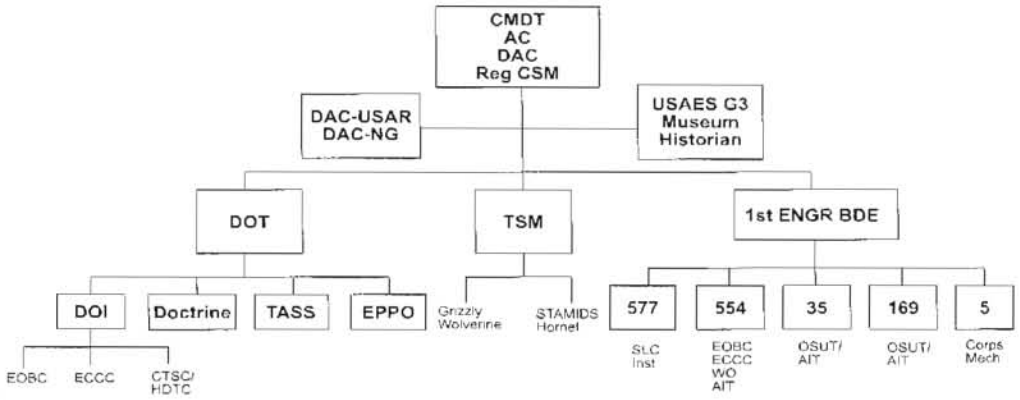
Commercial numbers are (573) 563-xxxx and Defense System Network (DSN) numbers are 676-xxxx unless otherwise noted.

## Deputy Assistant Commandant (DAC)

**Engineer School Organization Under the MANSCEN.** With the formation of the Maneuver Support Center (MANSCEN), the Engineer School has undergone a significant reorganization. The charts below show which organizations fall directly under the Engineer School and which fall under the MANSCEN, which provides general support to the Engineer School. The commandant of the Engineer School retains proponency for all doctrine, training, leader development, organizations, materiel, and soldier (DTLOMS) issues. It is through a matrixed organization—MANSCEN—that this support is provided in a synergistic (win-win) manner to the Engineer School.

POC is COL William Van Horn, -6192/8060.

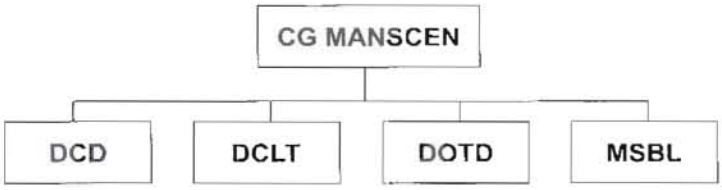
### USAES Organization Under MANSCEN




DAC - Deputy Assistant Commandant
DOT - Director of Training
TSM - TRADOC Systems Manager for Combat Systems
DOI - Department of Instruction
TASS - The Army School System
EPPO - Engineer Personnel Proponency Office
STAMIDS - Standoff Minefield Detection System
SLC - Sapper Leader Course

EOBC - Engineer Officer Basic Course
ECCC - Engineer Captains Career Course
WO - Warrant Officer
AIT - Advanced Individual Training
OSUT - One-Station Unit Training
CTSC - Countermine Training Support Center
HDTC - Humanitarian Demining Training Center

### MANSCEN Matrixed Support




DCD - Director of Combat Development
DCLT - Director of Common Leader Training
DOTD - Director of Training Development
MSBL - Maneuver Support Battle Lab

MANSCEN Web Site: *http://www.wood.army.mil/*
USAES Web Site: *http://www.wood.army.mil/eschool/*

## Directorate of Training Development (DOTD)

**Field Manual Update.** The following field manuals are at ATSC awaiting printing and distribution. They are currently available on the MANSCEN Publications Page at *http://www.wood.army.mil/PUBS/newpubs.htm*.

- FM 5-472, *Materials Testing*. This manual supersedes FM 5-530, dated 17 August 1987. It contains up-to-date technical information on how to obtain samples and perform engineering tests and calculations on soils, bituminous paving mixtures, and concrete. Many of the DD forms used to record and calculate samples have also been updated.

- FM 5-436, *Paving and Surfacing Operations*. This manual supersedes TM 5-331D, dated 21 April 1969; TM 5-337, dated 21 February 1966; and TM 5-337-1, dated 29 March 1971. It contains current information on construction materials and equipment and the mix design, production, placement, and repair of concrete and bituminous pavements.

- FM 5-434, *Earthmoving Operations*. This manual supersedes FM 5-434, dated 26 August 1994 and FM 5-164, dated 30 August 1974. It contains current methods and equipment used in planning, designing, and constructing earthwork in the theater of operations.

POC is Sandra Gibson, -4100.

**Draft Changes to Doctrinal Publications**. Another addition to our web site this month is seven draft changes to doctrinal publications supporting the 4th Infantry Division and the Division Capstone Exercise. Each draft change document addresses tactical operations conducted in a Force XXI (FXXI) digital environment. They serve as guides for FXXI engineers who use digital systems to plan, coordinate, and conduct digitized engineer operations. The draft change documents posted to *http://www.wood.army.mil/PUBS/fxxi.htm* and listed below are not stand-alone manuals (except for FM 5-105, *Topographic Operations*).

- C1, FM 5-71-100, *Division Engineer Combat Operations (Digital – CD)*
- C1, FM 5-100-15, *Corps Engineer Operations (Digital – CD)*
- C2, FM 5-71-3, *Brigade Engineer Combat Operations (Armored) (Digital – CD)*
- C2, FM 5-71-2, *Armored Task-Force Engineer Combat Operations (Digital – CD)*
- C1, FM 5-10, *Combat Engineer Platoon (Digital – CD)*
- C2, FM 5-170, *Engineer Reconnaissance (Digital – CD)*
- FM 5-105, *Topographic Operations*

POC is MAJ Ron Zimmerman, (573) 596-0131, ext 3-7332.

**Tactics, Techniques, and Procedures (TTP) Web Site**. To provide units with updated information and gain unit input to current doctrine, we have created the following web site for posting newly developed TTP that support the various working axes (DCX, JCF, LCD, I-BCT): *http://www.wood.army.mil/PUBS/ttps/engrttps.htm*. In the near future, we will be posting survivability TTP from the Waterways Experiment Station for various types of equipment. Please send comments and recommendations related to these TTP to *fmcommnt@wood.army.mil*.

POC is MAJ Ron Zimmerman, (573) 596-0131 ext 3-7332.

**2000 Engineer Unit Directory.** The directory, which is updated periodically, is available at *http://www.wood.army.mil/PUBS/dsd/dsd.htm*. Units may submit changes/corrections at any time via e-mail to Jennifer Morgan at *morganj@wood.army.mil*.

POC is Jennifer Morgan, -4104.

## 1st Engineer Brigade

**Engineer Diver MOS 00B10 Course, Phase One**. Previously taught at Fort Eustis, Virginia, this course has moved to Fort Leonard Wood, Missouri.The first nine-day course began on 20 February 2000. Phase Two, a 26-week course, is taught at the Naval Diving and Salvage Training Center, Panama City, Florida. For all reclassification requirements, see DA PAM 611-21, *Military Occupation Classification and Structure*; AR 611-75, *Management of Army Divers*; and AR 614-200, *Enlisted Assignments and Utilization Management*. The web site is *www.wood.army.mil/mosoob.htm*.

POC is SFC Patrick Andrews, DSN 581-2679, commercial (573) 596-0131 ext 6-2679.

**Combat Engineer Vehicle (CEV).** The CEV has been brought out of retirement for use in the Waco investigation.The CEV and crew will be sent to Fort Hood, Texas.

POC is CPT Kevin Hicks, DSN 581-8940, commercial (573) 596-0131 ext 6-8940/0224.

## TRADOC Program Integration Office-Terrain Data (TPIO-TD)

**Digital Terrain Data Requirements**. TPIO-TD, which coordinates the Army's requirements for digital map data, is currently reviewing digital terrain data requirements submitted by numerous Army agencies and units. Requirements include high-resolution imagery, digital elevation models, and "smart" vector maps. TPIO-TD is consolidating these requirements and will forward them to the National Imagery and Mapping Agency this summer. These geospatial information requirements will be a topic of a breakout session at this year's ENFORCE Conference.

POC is CPT Tom Stroud, DSN –5180, commercial (573) 596-0131, ext. 3-5180.

## TRADOC System Manager (TSM)

**Handheld Standoff Minefield-Detection System (HSTAMIDS).** This hand-held mine detector combines ground-penetrating radar and improved metal-detection capabilities to provide a robust probability of detection (Pd) for large and small metallic and nonmetallic antitank and antipersonnel mines. HSTAMIDS will significantly improve detection of the smaller, low-metal antipersonnel mines, such as the PMA-3, with a Pd that exceeds 95 percent. HSTAMIDS will reduce the frequency of false detections associated with detector operation in a metallic-cluttered environment, allowing the detector operator to "tune-out" metallic clutter that affects the AN/PSS-12. Six HSTAMIDS prototypes have been purchased by the Army to support contractor developmental testing scheduled for Yuma and Aberdeen Proving Grounds in April and May 2000. The Basis of Issue Plan for HSTAMIDS will be determined before Milestone III, Production and Fielding (FY03), based on training complexity and the level of soldier certification required to operate the system. Due to cost and training implications, HSTAMIDS fielding will supplement AN/PSS-12 systems already in the field and will not replace them on a one-for-one basis.

**Basic Hornet and Improved Hornet.** The Hornet is a smart munition designed to help the maneuver commander dominate his battlespace. The *Basic Hornet* engages tracked vehicles only and may be armed manually or by the M71 Modular Pack Mine System Remote Control Unit. Preplanned product improvement will result in an *Improved Hornet* munition with an advanced control station that operates through a standard Single-Channel, Ground and Airborne Radio System (SINCGARS). The *Improved Hornet* will include a remote on/off/on control to provide safe passage of friendly forces during counterattack, retrograde, or withdrawal; recovery and redeployability of munitions before arming; munitions with a built-in Global Positioning System; two-way communication between munitions and the control station; a more lethal sublet munition; and an improved probability of kill of both heavy wheeled and tracked vehicles. The primary recipient of the *Basic Hornet*, which is in production now, will be the 82d Airborne Division. The basic load of Hornets for a combat engineer battalion is 260 munitions. The current program schedule calls for the Army to receive the first *Basic Hornet* munitions in 4QFY00. The entire force will receive the *Improved Hornet,* with fielding to begin in 4QFY04. *Improved Hornet* control stations will be fielded to units as a Class VII item beginning in FY03. The Basis of Issue Plan for the control station is being developed. The expectation is that mechanized combat engineer units will receive one control station per squad, and light units will receive one per platoon. Maneuver units will receive one control station per company and one per battalion headquarters.

Information on both systems may be obtained at the TSM web site at http://www.wood.army.mil/TSM.

POC for both systems is MAJ Mark Thompson, (573) 596-0131, ext. 3-7347.

# Lead the Way

*By Command Sergeant Major Arthur Laughlin*
*U.S. Army Engineer School*

## Have a Little Faith

In March, I had the opportunity to brief LTG Ohle, the DCSPER. For me, this was a true education. It allowed me to see the workings of the Army at the highest levels. I came away from the briefing with the discovery that regardless of the level, things really don't change that much. To my surprise, I saw firsthand the concern LTG Ohle had about what young soldiers and sergeants in our Army were saying and thinking. He asked if our regiment's soldiers were aware of Chief of Staff GEN Shinseki's initiative to change the structure and man the field Army at 100 percent. He wanted to know how our soldiers reacted to that. He also asked how we were doing in the growing of our young sergeants and what percentage of our specialists were on the promotion list. I told him the results of my many conversations with our regiment's senior NCOs, but I knew he had put his finger on a great weakness in our regiment—a weakness we NCOs can fix by having a little faith.

Our regiment falls dreadfully short of the Sergeant Major of the Army's guidance to put 35 percent of eligible specialists on a promotion list. In nearly all of our MOSs, we fall short of where we need to be to build our sergeant ranks. We must do better. As NCOs, we must have the faith in our specialists to know they will be able to accept the responsibilities placed upon them. We also must give ourselves credit for being who we are and what we are capable of as NCOs and trainers. Our specialists will emulate their leaders, of that you can be sure.

Throughout my career, I have rarely seen an individual who is fully qualified before receiving that next stripe. The real training begins with pinning on the new rank. With the additional responsibility, these young leaders grew in ability and attitude to accept the challenges. They became junior leaders and better NCOs because mentors worked with them to *be*, *know*, and *do*. Mentors coached, guided, and forgave mistakes as each young leader grew in experience and knowledge. I know this was true in my case and for my generation of NCO leaders. Our senior leaders had a little faith in us and, through their senior leadership and risk taking, we became the NCOs we are today. So I ask you, why should it be any different today?

As NCOs, we have always prided ourselves on seeing the potential in our young soldiers. We saw and developed the qualities necessary to be a good leader. It wasn't always an easy call and, in some instances, we took a chance on soldiers and promoted them anyway.

Now, either we are afraid to promote and train, or we don't really see potential in most of the soldiers we recruit. I don't believe the problem is in the recruits, so the problem must be us. If that is indeed true, how do we change that? How do we regain the ability to see the potential of these future NCOs? How do we accept the challenge to have a little faith? This is our challenge. NCOs must be willing to invest in our subordinates, allowing them to join our ranks.

As I visit soldiers in the field, I hear first sergeants, platoon sergeants, and squad leaders tell me that soldiers must meet certain unit criteria to get boarded—criteria like appearing before soldier-of-the-month boards or successfully serving as team leaders or squad leaders. Great, but only if you are using these tools to identify talent really early. These are excellent tools to develop soldiers before they are eligible for the primary or secondary zone of consideration.

Don't use this unit criterion to hold back eligible specialists from promotion. Here is where you have to have a little faith or else you are holding your subordinates to a higher standard than I was or you were. Our regiment is in need of sergeants. It is up to us to train, board, promote, and train some more. So what are your standards? NCOs across the regiment have to be willing to invest in the potential of their subordinates. Take time and a little risk and have faith; your subordinates will follow you. The odds of success are in your favor.

Beginning 1 May 2000, your MANSCEN NCO Academy will begin an associate degree program. This is the first time I have seen such a program. If you are an NCO attending BNCOC or ANCOC, you will have an opportunity to earn an associate degree before returning to your unit. This is a great step forward for your professional development. More information is available at *http://www.wood.army.mil/mncoa/engin.htm.*

It is with great pleasure that I am able to announce the selection of CSM Bill McDaniels to be the new MANSCEN NCO Academy commandant. CSM McDaniels comes to us from the 864th Engineer Battalion in Fort Lewis, Washington. He has big shoes to fill after the outstanding leadership of CSM Jesus Gomez, but I am sure he will excel at this position. Please pass your congratulations and support to him. He will assume his duties in June 00.

Finally, the next time you encounter a subordinate, peer, or superior who doubts your ability to get a tough mission done, just look him or her in the eye and say, "Have a little faith. We can do this." Then, watch the twinkle in their eyes. Our specialists deserve a twinkle from us!

Essayons!



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