Engineer

July 1990

THE PROFESSIONAL BULLETIN FOR ARMY ENGINEERS
Headquarters, Department of the Army



Expanding Our Horizons

PB 5-90-2

Approved for public release; distribution is unlimited.

Sapper and Smoke Make a Perfect Mix

Place chemical companies in engineer battalions? This possibly radical concept has merit—the chemical company must be placed in peacetime where it can best be trained and maintained with a clear battlefield-enhancer focus.

By Lieutenant Colonel Herbert F. Harback

To win on the battlefield requires that a maneuver commander synchronize his forces in a timely manner while remaining attuned to the basic tenets of war. Current command and control doctrine for today's front-line smoke and decontamination (decon) company, however, lacks a knowledge of how to train and maintain this combat-multiplying force for peacetime proficiency and wartime success.

"Where does the smoke soldier and his combat chemical unit fit in?" and "How can the smoke company be best trained to provide a true tactical multiplier to the ground commander?" are timely questions the Army must answer. I believe the answer to both questions is the same.

Schoolhouse View

The chemical schoolhouse at Fort McClellan proposes that the division chemical officer, a non-primary staff officer located within the bowels of the G-3 section, is to be the higher headquarters of the chemical company. This proposal will not allow a chemical and decontamination company to attain its highest potential as a multiplying force.

"But the assistant division engineer (ADE) calls the shots on engineer assets," some might point out. Not true. The ADE is the assistant to the engineer battalion commander who, as a special staff officer and battalion commander, has a staff and is experienced in providing command and control to his companies.

Although the chemical staff officer is the subject matter expert on technical issues, he is not in a position to provide the daily mentorship and direct coaching needed in the care and welfare of chemical soldiers and their families. Nor can he provide the equipment and training needed by the chemical company. Simply stated, when a chemical company is placed under a staff officer, the unit will never reach its required level of readiness.

Support Approach

A second approach to finding a home for the chemical company is to insert the unit in a supply and service structure. The division support command (DISCOM) has been the most common depository under this concept. At first glance this approach is appealing because DISCOM has well defined command and control assets. But a closer look shows that these assets have a logistical slant and a rear area support outlook. It is a strained affair at best because the two organizations lack a common mission essential task list (METL) training focus.

The chemical company is a task force commander's combat multiplier and must be in a commander's hip pocket with the engineers and the fire support officer. If one believes that as we train (do our daily tasks within a certain structure), so will we fight, then the DISCOM solution offers little long-term gain.

Placing a smoke and decon company in a headquarters command (TDA type) is worse than placing it at DISCOM. This solution is a quick fix that leaves the combat chemical soldiers on the short end in battlefield tactics and wartime focus. Whether within a maintenance or supply battalion, or as a separate unit directly under a support brigade headquarters, the unit will find itself surrounded in a fog of mixed priorities, focus, and concern.

Battlefield Focus Solution

The solution to this dilemma is to properly define the role of the chemical company as an upfront battlefield enhancer. Then, match the company to a similar force that has an onboard staff capable of providing a command environment and training resources. This proposal is tactically sound, and it has been tried and found to be successful in caring for, training, maintaining, and leading combat chemical soldiers.

(Continued on page 29)

Engineer

July 1990 Volume 20 PB 5-90-2

UNITED STATES ARMY ENGINEER CENTER AND FORT LEONARD WOOD

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FEATURES

4 **After the Storm: Military Engineers and Hurricane Hugo**
by Major Jeffrey R. Sommerville

12 **Beyond the Battlefield—The Other Dimension of Military Service**
by Lieutenant General Henry J. Hatch

20 **French Engineer Alternatives for National Service**
by Colonel Jean-Claude Verite

26 **The Essayons Program: From Brainchild to Drawing Board**
by Chester A. Kojro

30 **Solving the Task Force Engineer Time Crunch**
by Captain Daniel P. McKenrick

38 **A British View on American ADSM**
by Major Alec A. Peebles

46 **Misplaced Compassion**
by Colonel Ron Dabbieri

DEPARTMENTS

Inside Front Cover: **Personal Viewpoint**

2 **Clear the Way**
3 **Bridge the Gap**
24 **Engineer Safety**
29 **Engineer Problem**
36 **Engineer Solution**
51 **Lessons Learned**
53 **Engineer Update**
57 **Past in Review**

ENGINEER (ISSN 0046-19890) is prepared quarterly by the U.S. Army Engineer School, ATTN: ATSE-TDM-PB, Fort Leonard Wood, MO 65473-6650. Second Class postage is paid at Fort Leonard Wood, MO, and additional mailing offices.

POSTMASTER; Send address changes to ENGINEER, the Professional Bulletin for Army Engineers, ATTN: ATSE-TDM-PB, Fort Leonard Wood, MO 65473-6650.

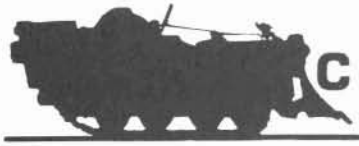
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CLEAR THE WAY

By Major General Daniel R. Schroeder,
Commandant, U.S. Army Engineer School

The past 12 months have seen exciting times at the Engineer Center! The Engineer School move was completed and we have graduated our first engineer officer basic and advance courses at Fort Leonard Wood. We now have all our engineer basic and advance leadership training colocated with our basic training. Now we have the opportunity to do shared training.

In the future, battalion precommand course students will be able to put together a staff made up of advance and basic course officers and advance noncommissioned officer (NCO) course students. When the officer basic course students go to the field to conduct a field training exercise, basic NCO course students and basic trainees can be added to the field unit to build platoons. We will keep you informed on these exciting opportunities.

Contingency operations are going to play an increasingly major role in the way we train and fight in the next decade. In these operations, we will have numerous opportunities to work with our North Atlantic Treaty Organization (NATO) and American, British, Canadian, and Australian (ABCA) partners. Almost everyone knows about our NATO agreements and who the partners are in this European-based organization. Not so with the ABCA agreements and our partnership in this organization. During the coming decade we may well find ourselves operating in this environment.

In the ABCA arena, the armies look at standardization of equipment and doctrine in low- and mid-intensity conflicts. Considering the current world situation, one can surmise that we need to look at this area more closely. Current operations in the ABCA arena show how we are preparing to ensure compatibility.

In March, your Engineer School participated in a project to write a *Strike Operations Handbook* for U.S. Army commanders operating in contingency operations. The draft of this manual should arrive in the field about the same time as this bulletin. It contains excellent guidance on how engineers will fit into these operations.

AirLand Battle-Future (ALB-F) will be based around brigade-sized combined arms task forces, which will be attached to divisional headquarters according to mission, enemy, terrain, troops, and time available (METT-T). In future operations, we may well find ourselves adapting ALB-F to an ABCA multi-nation organization. In some cases, you may find engineer units from other ABCA member nations better organized and equipped to handle the sustainment part of the operation than we are. Therefore, you must be knowledgeable about these units and do a good METT-T, mission analysis, and estimate before task organizing engineers into the ABCA force.

To help you become more knowledgeable about our companies fighting in the corps area, we are writing a field manual titled *Combat Engineer Company Operations*. A coordinating draft of this manual is scheduled for printing in the last quarter of this year.

When we look at the continuum of engineer involvement in the levels of conflict, you see our missions increasing instead of decreasing. Engineers may be on the ground doing nation assistance missions when the situation suddenly intensifies into a low-intensity conflict. These engineers would then clear the way for the maneuver and support troops and units introduced into the battle area. Therefore, we must be well trained on our individual soldier and unit METL tasks to ensure we are ready when the time comes.

We are currently writing a short-of-war field manual to provide guidance in this area; a draft manual is scheduled to be printed in the fourth quarter of 1990.

In the past few years, we have seen contingency forces deployed on exercises such as Golden Pheasant, in Honduras, and most recently, operation Just Cause, in Panama. These joint deployments tested and validated our current doctrine and training. The soldiers performed in a superb manner and engineers were there. Feedback from the soldiers consistently said drills paid off and training at the combat training centers was great preparation. The challenge for each of us is to develop ourselves and our soldiers to be combat engineers trained to standards, who stay ready to deploy on the next contingency operation.



By Command Sergeant Major W. E. Woodall
U.S. Army Engineer School

"Our leader development programs are some of the most important ways we maintain the quality force and are also our greatest legacy because they provide the leaders that will shape the Army of tomorrow."

General Carl E. Vuono
Chief of Staff, United States Army
2 March 1990

The noncommissioned officers' (NCO) role in training and caring for our soldiers has not changed, nor is it likely to. Just as they have always been, sergeants are our Army's first-line mentors, coaches, teachers, and role models.

What has changed is the complexity of how these missions are accomplished. This is primarily due to the tremendous advances in technology and how those advances have changed the way our Army does business. Technology has provided our Army with more deadly weapons, more efficient equipment, better communications gear, and systems of personnel and supply accountability that were unimaginable when many of us were privates. All of these improvements have impacted on how units operate, and they require today's NCOs to have skills and knowledge that simply weren't needed in the past.

The words "caring for soldiers" have also taken on a new meaning. Not too many years ago, a good portion of many units' soldiers lived in barracks and spent a lot of their free time in mess halls, snack bars, and day rooms. Today, more than half of the Army's enlisted force are married. The lives of our single soldiers have changed. They earn a fair living these days and can afford cars, TVs, and stereos. Soldiers, married and single, are free to come and go as they please in their free time.

As leaders, we must be better attuned to these human dimensions and understand what these soldiers want and need. We need to understand things like child care, off-duty educational programs, employment opportunities for family members, and other quality of life issues.

Although a lot of things have changed, NCOs are still charged with the same missions and responsibilities they had in the past. We must still set and enforce standards and provide our young soldiers with the role models many of them are seeking. We need to constantly work for self-improvement and increase our level of education so we can understand, explain, and execute the missions passed on from our commanders.

All of these changes demand that sergeants be proficient in all leadership competencies. We must know and implement FM 22-100, which provides the framework for leader development. The programs this manual outlines provide a broad category of skills, knowledge, and traits necessary for good leadership at all levels. The manual gives us a good yardstick to measure ourselves and our subordinates against. As sergeants major and senior sergeants, we are the key to the professional growth of the NCO Corps, and we must not fail or do the job halfway. Future conflicts and wars will place sergeants in roles more challenging than ever. Sergeants may easily find themselves the sole leader present in many engagements. With little or no guidance, they must be able to take charge, make decisions, take risks, and carry out their commander's intent.

Just as NCOs must continually prepare their soldiers for the demands of war, they must also prepare themselves. Today's sergeants must have a solid understanding of how the Army fights as a total force. Aside from having a handle on modern technology and understanding the enemy, NCOs must understand AirLand Battle doctrine and how their piece of the Army fits into the overall tactical picture.

Today's NCO education system goes a long way toward ensuring that our sergeants are prepared to meet present missions. But, we must change with the times and adapt our schools and training to match the realities of our rapidly changing world. As our missions change during peacetime, so must we.

In many ways we are the masters of our own destinies, and I challenge each of you to keep our NCOs strong and continue to improve the Corps.

After the Storm:

Military Engineers and Hurricane Hugo

By Major Jeffrey R. Sommerville

It's easy to imagine the Army marching out to meet a conventional enemy on the battlefield. But what happens when the enemy is a whirling mass of destruction, immune to bullets and bombs, large enough to be seen from space, and deadly enough to level everything in its path?

When it was clear that Hurricane Hugo was going to hit the East Coast of the U.S. last year, Army engineers went into action while the storm was still 100 miles from land.

Responding to a call from the governor of South Carolina, advance parties of a National Guard corps combat battalion moved into assembly areas west of the expected storm path.

These engineers became the vanguard of a military force that would give South Carolina, hardest hit by the hurricane, a head start on the road to recovery. During a three-week period, the group of engineers grew to more than 1500 men and women, and included members of the South Carolina National Guard and Army Reserve, active duty soldiers from other states, and Corps of Engineers personnel. Working as a team, they played a significant role in helping to put the infrastructure of the storm-stricken area back into operation.

First Call

The people of South Carolina watched closely as Hugo approached, and state officials took a number of precautionary measures to limit potential destruction by the storm. Coastal areas were evacuated, power grids were shut down, and emergency operation centers were activated.

The National Guard anticipated its role in the recovery, so it came as no surprise when the governor's office began activating units for state duty on the afternoon of September 21, 1989. The 122nd Engineer Battalion, a corps combat battalion, and the 125th Engineer Company, a mechanized company organic to a heavy brigade, were the engineer representatives among many Guard units called to duty by the state.

The call from the governor was in reality a warning order to prepare for area damage control operations. But at the time of the call-up, little was known of what lay ahead. Commanders analyzed the mission, assumptions were made, and units task-organized themselves as best they could with what information they had. Noncommissioned officers assembled and inspected their soldiers, vehicles were inspected and dispatched, and equipment was

prepared and loaded for movement. Radio and television provided the soldiers with the latest information on the path of the storm, and by the afternoon of the 21st, it was predicted that the storm would arrive on the coast about midnight. Forecasters said the center of the storm would hit somewhere between Myrtle Beach and the historic city of Charleston.

Advance Parties

As meteorologists firmed up their estimates of Hugo's speed and course, plans were made for the movement of the engineer units. The 122nd Battalion had assembled at its armories in the western part of the state, more than 140 miles from the coast. The battalion was considered far enough inland to be safe, but too distant to allow quick reaction once the storm had passed. To help speed the 122nd's movement into Charleston, the battalion moved advance parties closer to the coast. Their mission was to clear routes of storm debris so that the unit's main body could move quickly into Charleston early Friday morning.

The situation was different for the 125th Engineer Company. Their armory in Bishopville put them 100 miles from Charleston, and 90 miles from the coast at Myrtle Beach. This position was considered far enough inland to be safe and near enough to the coast to afford quick reaction, so they remained at their home station during the storm. The unit was directed to move to Georgetown, midway between Charleston and Myrtle Beach, at first light Friday morning.

The meteorologist's predictions for the time and place of the storm's landfall were accurate. What they did not foresee was a hurricane that would gain in intensity as it approached the coast. This additional strength gave the storm a boost that would carry it much farther inland than was expected. The result was severe damage in many inland areas up to and beyond the North Carolina boundary.

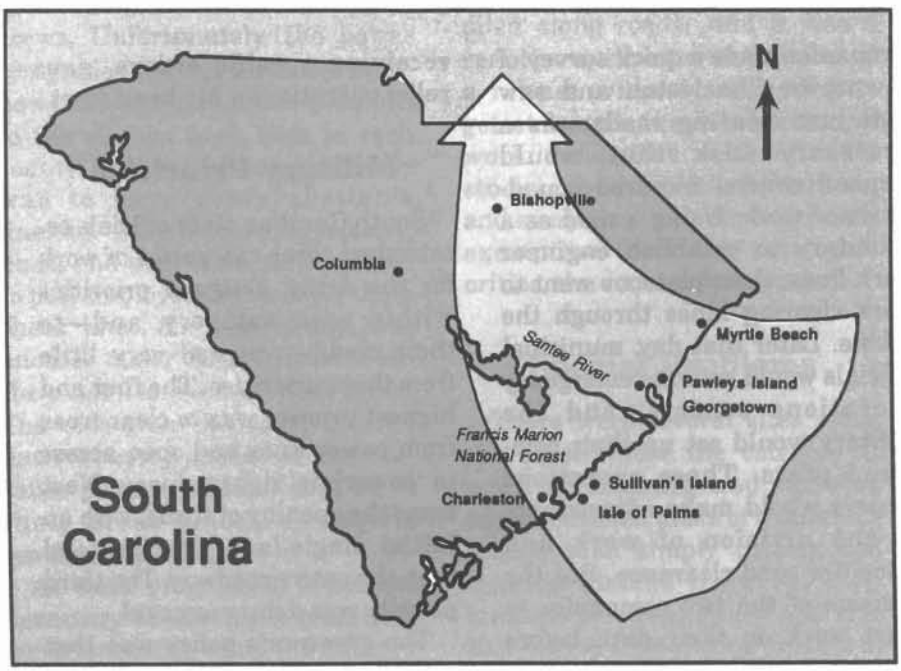
The engineers who moved into the area on the morning of September 22 were among the first witnesses to the destruction of the storm. As the soldiers neared the coast, their rate of march fell drastically as they encountered more and more fallen trees and other debris on the roadways. What would have been a 2-hour trip under normal circumstances became a 6-hour ordeal of clearing trees and removing rubble. Their paths into Charleston and Georgetown provided the first access into the cities for all other emergency and relief vehicles.

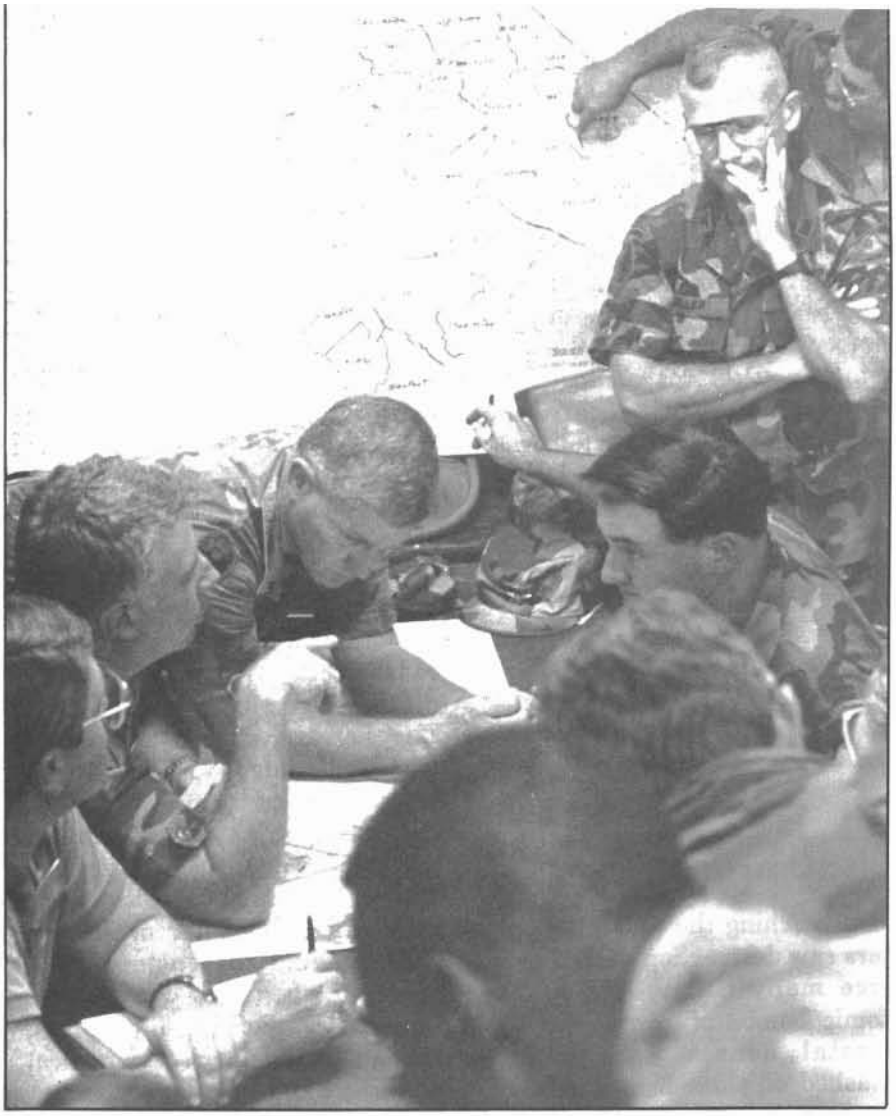
Coastal Chaos

On reaching the coast, the soldiers saw destruction caused by a force many times that of the atomic bombs of World War II. Coastal houses were either smashed on their foundations or lifted up and floated away. Power lines were down everywhere, and utility poles listed dangerously out of plumb. Thousands of tons of sand had been moved inland and deposited by the storm tides, completely burying large sections of coastal road. In suburban communities away from the beach, trees were down everywhere, turning neighborhood blocks into massive abatis networks. The Francis Marion National Forest, formerly several hundred square miles of pine forest, was devastated by the storm. From the air, it appeared that some giant scythe had sliced through the forest, leaving the trees neatly on the ground like so many rows of corn.

The first engineers arriving in coastal cities entered areas of mass destruction and confusion. They had arrived before local command and control was established. There was no communications network, the extent of damage was unknown, and work priorities had not been outlined. Cities were without power, water or sewage disposal. And the engineers did not know when their own support would be available, including fuel, rations, maintenance and medical assistance.

But in the midst of this chaos, they quickly made some simple and sound decisions. Two engineer





Commanders from the Reserve and Active Components conducted a joint planning session on the evening of September 26. The meeting resulted in a decision to divide the state into two areas of responsibility for military engineers (U.S. Army photo).

companies made a quick survey of downtown Charleston and saw that just clearing roads was a necessary task that would demand several hundred squad-hours of work. Using a road as a boundary to establish engineer work lines, their platoons went to work clearing lanes through the rubble. Later that day, municipal officials would activate emergency operations centers, and the military would set up their command posts. These operations centers would make adjustments to the division of work and prioritize road clearance. But the decision of the two companies to start work on their own, before receiving specific orders, gave relief operations a big head start.

Military Priorities

South Carolina state officials established three categories of work for the Army, assigned priorities within each category, and—to their credit—wavered very little from those priorities. The first and highest priority was to clear trees from power lines and open access to powerline rights-of-way. Next came the opening of roads, with an initial single-lane clearing, and then the entire roadway. The third priority was debris removal.

The governor's policy was that military units would work only on powerlines and roads, and that debris removal would be done by contract labor. Ironically, there were many times when it was necessary for the military to haul storm debris in order to accomplish their main missions. There were places, particularly in downtown Charleston, where the downed trees were so thick that crews had to haul away debris just to have room to work.

The 122nd Battalion coped with the problem by organizing day and night work shifts. The day crews would cut and stack and the night crews would load, haul and dump. This allowed them to use their equipment around the clock, while restricting the most dangerous work (chainsaw operations) to daylight hours.

The state assigned work to the military through its county emergency operations centers (EOCs). To draw a parallel with the Army's command/support terminology, the engineer units were attached to the state and put in direct support of a county. The state retained command of the units through the office of the Adjutant General. The state was responsible for their logistics support and allocated engineer companies to counties. Counties received support based on the availability of units, a declaration of the county as a disaster area, and a request for help from the county. Once allocated to a county, an engineer unit received its tasks and priorities from the county EOC.

The system ran smoothly as long as counties assigned work from the state-mandated categories I and II. Understandably, there was a temptation to assign engineers debris removal (category III) work, and the counties made many such requests. In most cases, these had to be disapproved by the engineers. The lack of a clear understanding by local officials of the state-intended role of

the Army engineers occasionally caused friction between the military and local civilian authorities.

Reinforcements Arrive

Hugo had sustained high winds all the way across the state, causing destruction over a wide area. Consequently, it took a long time for assessment teams to determine the extent of storm damage. On Monday, September 25, the governor decided to ask for help from the active Army. His request was made that evening, and within a matter of hours warning orders were being received by active duty engineer units in Georgia.

The 3rd Engineer Combat Battalion and the 92nd Engineer Combat Battalion (Heavy) from Fort Stewart, and the 43rd Engineer Combat Battalion (Heavy) from Fort Benning, underwent emergency deployment procedures the following morning. In addition to the line units, Fort Stewart sent its Victory Brigade, made up of combat support and combat service support units, into the state to support the engineers.

The response of the active units was so rapid that they were able to start their movement east toward Charleston before the state planners knew where they wanted to put them. As a result, some units began moving before their destinations were known.

Tuesday evening a joint planning session between Active and Reserve Component commanders was convened in Charleston. And once again, an engineer work line was used to give units their initial area objectives. In this case, the Santee River was used to divide the eastern half of the state into two sections, Area of Operations (A/O) North, and A/O South. A/O South would remain the work area for the 122nd Engineer Battalion, while A/O North became the responsibility of the active units and the 125th Engineer Company. County boundaries continued to be used to subdivide the state into company-sized areas of operation.

Inland Recon

There was a major difference between the engineer work effort on the coast and that further inland. In contrast to the widespread destruction along the coast, damage to the inland counties was sporadic. As a result, units assigned to the interior of the state had to devote a great deal of their energy to reconnaissance. Again, to relate the situation in military terms, the inland work was not a great expanse of abatis, with single worksites that could swallow up a platoon-week. Instead, it was an indiscriminate series of point obstacles, spread over hundreds of square miles. A squad could work for an hour or two in one place and finish the job, and then need a frag order to tell the location of the next work site.

Because of the reconnaissance requirement, engineers working the inland counties had a problem keeping their platoons busy. Other factors complicated their ability to work on storm damage. Powerlines could not be cleared until the area was declared safe for work crews. Unfortunately, the power companies did not have the manpower to escort engineer platoons to the various work sites in each county. The goal of power officials was to have every available lineman busy rehanging electric lines, and they were hard pressed to pull employees out to have them check lines. This constraint was another major difference between the coastal and inland work areas. The crews on the coast did not have to worry about hot lines because power had been shut off in their areas before the storm reached the coast.

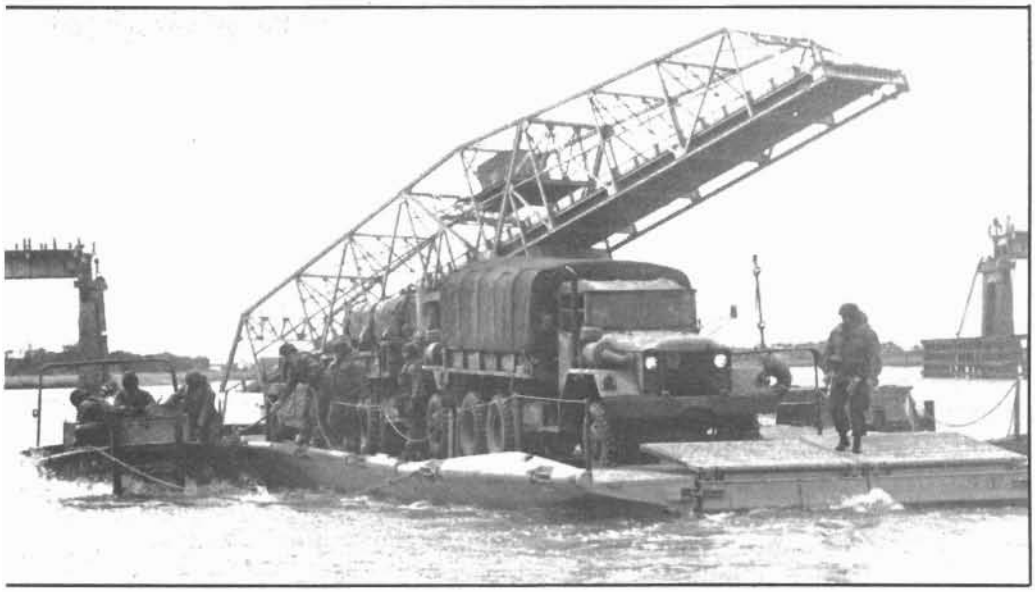
As work progressed, it became necessary to develop a procedure for determining when the military effort in a particular county had been completed. This was especially important in A/O North, where platoons often sat idle because of delays in the reconnaissance process. Company commanders wanted to either get their platoons working or move them on to another county, but they had no authority to leave.

The Guard had activated two brigade-level headquarters, one in A/O North and the other in A/O South. These headquarters were responsible for allocating and monitoring engineer units among the counties in their area. They did not want to move a unit out of a county without assurance that all road clearing and powerline work had been completed. But, they had no way of knowing if the work had been completed without being notified by the county director.

Predictably, the directors acted very much like an infantry task force S-3 would react if asked if he would mind giving up a direct support engineer platoon. Directors were usually reluctant to give up an asset, even if powerline work appeared to have been completed. It was especially difficult for them to approve the release of military engineer support while significant amounts of storm debris remained piled along roads. And it was a rare county director who approved a release without attempting to get at least some debris removal work done. But state officials stuck to the established priorities, and every time a county requested exemption from the state priorities, the request was denied.

Special Problems

There were several sites along the coast where the category II work of clearing and opening routes entailed tasks of a different nature than simply cutting and clearing windfall trees. The combination of wind, waves and tide had caused tremendous erosion in



Soldiers from E Company, 3rd Engineer Combat Battalion, an Active Component unit from Fort Stewart, use a ribbon bridge ferry to take South Carolina National Guard troops to Sullivan's Island. Hugo had put the Ben Sawyer Bridge, in the background, out of commission (Photo by Jonas Jordan).

some coastal areas. In one instance, a steel highway bridge had been removed from its abutments.

The south end of Pawleys Island is not much more than a large, narrow sandbar high enough to stay dry during most high tides. But it was also home to several families. Besides destroying many of the homes on the island, the storm had played a particularly troublesome trick on the islanders. It had cut the island in half. As waters from the initial storm surge receded back across the island, a section of the island's asphalt road was washed out. The water then tore away a chunk of the island itself, undermining and overturning a house. After the surge retreated, there was a breach in the island about 10 feet deep and 30 feet wide. Depending on the tide, water flowed through this breach at a rate of several hundred to several thousand cubic feet per second.

Initially, it was thought that a bridge, culvert or cofferdam would be needed to close the breach, but the decision was made to try and plug the gap with sand. The 122nd Battalion was given the task. Two early attempts ended in failure as the heavy tide flow quickly erased any evidence that men and machines had been at work. The engineers marshalled their resolve and resources. Brick and stone rubble were piled next to the breach. This would be used later to form an erosion-resistant base at the bottom of the gap. A full day was also spent stockpiling sand on the shoulders of the breach. When low tide arrived, they were ready for their third assault on the island breach.

Dozers working both sides of the breach first pushed in the rubble. Then the stockpiled sand was dozed into the breach as fast as the engineers could move it. The engineers worked their bulldozers continuously for 6 hours. Their dump trucks were kept running the length of the island, feeding more and more sand to the dozers. When the next high tide arrived, the engineers' hard-fought repair work held back the water and the island was joined together again.

The Island Ferry

The Isle of Palms and Sullivan's Island, two other coastal residential areas, were also isolated by the work of Hugo. Both islands had been connected to the Charleston suburb of Mt. Pleasant by the Ben Sawyer Bridge. The bridge was designed to allow ships through the navigation channel by rotating on a pedestal in the middle of the channel. Hugo had dislodged the abutments, rotated the bridge, then tipped the superstructure so that it slipped from its bearing on the center pedestal. One end of the bridge ended up in the channel, and the other end pointed skyward. The two islands serviced by the bridge faced long-term isolation and a bleak future.

The islanders' plight was answered by E Company, a bridge unit from the 3rd Engineer Combat Battalion at Fort Stewart. The company had arrived in Charleston the day after the governor's call for Active Component assistance, and was task organized under the 122nd Battalion.

After surveying the area, Echo Company leaders found that a launch ramp near the base of the Ben Sawyer Bridge provided an excellent access point. However the lack of a suitable abutment on the island side of the channel precluded construction of a bridge. An egress point was located further north on the island, and Echo Company soon had a ribbon bridge ferry in operation. The determination of who could use the ferry was handled by municipal authorities. This left the soldiers free to operate the raft and contend with the problems of crossing non-tactical vehicles on ribbon bridge equipment.

The Corps

While soldiers of the Active and Reserve Components were working in the media spotlight, the third leg of the engineer triad was busy at work behind the scenes. The Charleston District of the Army Corps of Engineers played

several key roles in the disaster relief operation, although very few of South Carolina's citizens were aware of their relief efforts. Much of their work was done from inside buildings and over the telephone, but they also performed duties on the highways and waterways.

One of the Corps' first tasks was to activate and dispatch damage survey teams to inspect areas hit by the storm. These teams formed part of the federal government's reconnaissance effort that would lead to the declaration of federal disaster areas within the state. These teams included electrical engineers, who assessed the power supply damage, and structural engineers, who looked for damage to bridges. They also surveyed the problem of debris removal, providing a state-wide picture of the significant trash disposal problem.

Contract negotiation was a critical and time-sensitive part of the Corps' relief contribution. While work was still being done to clear roads and restore power, a warning went out that an exceptionally high tide was due to arrive. The tide was expected to cause extensive damage in many coastal areas, unless artificial barriers could be constructed. With no time to waste, the Charleston District contracted with civilian companies for the construction of artificial dunes in the most vulnerable areas. Within a matter of days, the contract equipment was on site and piling sand. When the high tide arrived, the dunes were already in place, and the coast was protected.

Perhaps the most visible work by the Charleston District was the restoration of the Ben Sawyer Bridge. District crews used barges, tugs and a crane to lift the bridge back onto its pedestal and realign it with its abutments. Two barges were positioned to serve as floating abutments, and steel bents were constructed on the barges. A third barge was used to support a crane. The crane lifted the low end of the bridge, allowing the superstructure to be placed onto the two floating abutments. The tugs were then used to maneuver the floating abutments until the bridge was realigned with the approaches. Although unable to rotate on its center pedestal, the bridge was back in operation within two weeks of the storm.

Stand Down

Deactivation of Guard units and release of the Active Component soldiers began during the second week of recovery. The first unit released was the 125th Engineer Company, the Guard unit from Bishopville. The unit was faced with a situation unique among all of the Army units assisting the relief efforts, and it was felt they deserved an early release.

The 125th had been activated on September 21, just before the storm, and spent the night at their armory. At the time those orders were issued, it was believed that their home station of Bishopville and surrounding Lee County would not be significantly affected by the storm. But when they departed Bishopville the next morning, they left behind heavily damaged homes and property, and families that were stranded without power.

Several days later, Lee County was added to the list of counties that were federal disaster areas, and on September 27, a company from the 43rd Engineer Battalion was assigned to Lee County to perform category I and II missions.

The men of the 125th had left their homes without knowing whether their families were safe and their property secure. They went to work in neighboring communities to help fellow citizens, who in some respects were better off than their own families. But these soldiers followed their orders and made a personal sacrifice not often seen in a peacetime Army.

By the end of the first week of October, all road and powerline work in the state had been completed, and units were either on their way home or planning to leave soon. All components of the Army had responded quickly to the emergency, and had worked together well to restore order to the stricken communities.

Looking back at those few weeks of work in the wake of Hugo, a young training NCO from the South Carolina National Guard said, "This was the most real thing we have ever done...we cut our way into this city and found out there was...no power, no water, no toilets, nothing. And nobody knew what was going on. The chaos and confusion that existed in this place during those first couple of days has got to be the closest we'll ever get to battlefield conditions....But we got organized, we got busy, we got to work...and we got things done."

The men and women engineers who answered the call for help in the wake of Hurricane Hugo had worked selflessly to aid their own countrymen. And not only did they make a difference in the lives of thousands of fellow Americans, they gained experience that made them better soldiers.

Major Sommerville is the Engineer Team Chief, Readiness Group, Fort Jackson, South Carolina. He previously served as a project manager for the Louiseville District of the Corps of Engineers. His other assignments include company commander, assistant S-3, and assistant division engineer in the 9th Infantry Division. Major Sommerville is a West Point graduate, and holds a masters degree in civil engineering from Washington State University.

The Hugo Notebook:

Lessons from a Hurricane

Problem: *Availability of Maps*

Discussion: The engineer relief effort was slowed because of a shortage of maps. Additionally, the maps that were available did not provide the detail needed to support engineer relief operations.

Recommendation: Each county should establish a supply of large-scale maps which can be given to relief organizations. An engineer company needs about 30 maps. The ideal county map would show all roads, location of all powerlines, and have an overprint of the UTM grid system. The ideal urban map, for towns with populations over 10,000, would show all streets and roads by name. Each map would also show the location of all government buildings, including schools, armories, fire stations, court houses, etc. A map showing the entire power distribution network (minus the drops to individual buildings) would be helpful for all engineer headquarters, from company level on up.

Problem: *Combat engineer companies did not have enough chain saws to support the requirement for clearing roads and power lines.*

Discussion: Engineer companies have nine chain saws, one per engineer squad; one pneumatic saw; and one hydraulic saw with each Small Emplacement Excavator (SEE). There were not enough organic saws to keep the squads busy, and when saws had to be pulled off-line for maintenance, the problem became more acute. Fortunately, many privately owned saws were loaned to the engineers by local individuals and organizations.

Recommendation: For such intense relief work, provide one chain saw for every four workers, with an additional 30 percent maintenance float.

Problem: *Utilities companies were not able to identify work requirements fast enough to keep engineer units fully employed.*

Discussion: Engineer units were initially allocated at one company per county in the inland counties. Storm damage in these areas was sporadic, with many small areas of downed trees throughout affected counties. Often these areas required only a few squad hours to clear, leaving the squad free for a new mission in another area. However, utilities personnel were unable to identify work areas quickly enough to keep the engineers moving from site to site without delay. Delays in determining whether downed powerlines were "hot" also caused undue delays in relief work.

Recommendation: The work output of engineer units can be considerable, but they can be fully utilized only when jobs are available. While utilities companies are understandably strapped for personnel during such weather emergencies, an ideal arrangement would be to place a utilities representative with each engineer platoon. The representative should be equipped with a four-wheel-drive vehicle, a portable telephone, a large-scale map of the area, and the ability to determine if powerlines are hot.

Problem: *Private and commercial vehicles required special consideration for access and egress from ribbon bridge ramps.*

Discussion: Private and commercial vehicles often do not have sufficient power, traction or road clearance to load and off-load from a ribbon bridge. The steeper the slope of the ramp, the fewer non-military vehicles that can use it.

Recommendation: When a ribbon bridge is to be used by civilian vehicles, access and egress ramps should slope as gently as the ramp bay will allow.

Problem: *State-mandated work priorities for Army engineers were not fully understood by local civil authorities.*

Discussion: Early in the relief effort, the governor established priorities for engineer work. The priorities were well understood within the military community, and they did not change throughout most of the relief effort. However, there was a need to constantly reemphasize and restate those priorities to county officials who directed the engineer work. When work was requested that fell outside of the governor's guidelines, it was denied by the engineers. Unfortunately, this caused some unnecessary friction between civil and military personnel.

Recommendation: To avoid misunderstandings, the state should ensure that local officials are fully informed of the governor's instructions for the use of Army engineer assets.

Problem: *Congested roads in urban areas significantly slowed engineer relief efforts.*

Discussion: During the first several days after the hurricane, the city of Charleston remained open and relatively free of traffic. The lack of significant private or commercial traffic allowed engineer units to move freely among work sites. However, the situation changed drastically after the first few days. The roads became choked with returning property owners, commercial vehicles, and sightseers. With the roads only partially cleared of debris and traffic lights still out of operation, traffic in parts of the city reached gridlock.

Recommendation: Civil authorities should restrict access to urban areas as much as possible until roads are cleared and traffic lights operational. Also, traffic control units, military or civilian, are needed to ensure that the relief work of engineer units is not hindered by traffic snarls. If possible, some routes should be dedicated to military and relief vehicles.

Problem: *Units did not perform route reconnaissance before sending company convoys into the storm damaged areas.*

Discussion: Engineer companies were sent into damaged areas in the early morning of September 22, only hours after the storm had passed. Company convoys were put on the road without the benefit of either ground or aerial reconnaissance of the route. The convoys were frequently stopped by trees that blocked the roads. Movements that could have been completed in less than 2 hours on open roads took upwards of 6 hours because of downed trees.

Recommendation: A squad of engineers in a HMMWV, with a supporting SEE, bucket loader or backhoe, should be sent out as a point team to clear roads ahead of the convoy.

Issue: *Identification of storm damage categories and engineer work requirements.*

Discussion: During the relief effort, military engineers were used to perform the following tasks:

a. *Clearance of trees.* Clearing roads and powerlines of downed trees was the most common storm damage encountered by Army engineers.

b. *Rubble on streets.* Rubble, primarily roofing material, blocked many roads. Initial clearing efforts consisted of pushing most debris to the sides of the roads. In some areas, there was so much debris that it was necessary to haul it away. Salvageable property, such as private vehicles or even entire houses, sometimes blocked roads.

c. *Sand deposits on roads.* Roads in beach areas were buried under sand up to several feet deep.

d. *Erosion breaches around bridges and culverts.* Roadways were destroyed and hundreds of cubic feet of roadbed material were washed away by waves and subsequent tidal action.

e. *Landfill operations.* As landfills became full, it was necessary to use Army bulldozers to keep the landfills open.

Recommendation: Military engineers with hurricane-related area damage-control missions can use this list of damage categories for their initial operations planning.

Issue: *Use of the Small Emplacement Excavator (SEE) during relief operations.*

Discussion: Engineer units of the South Carolina National Guard used their recently issued SEEs during the Hurricane Hugo relief effort. The SEEs were found to be very reliable and well suited to the mission. The vehicle's high mobility allowed it to keep up with engineer work teams moving in HMMWVs and dump trucks. It had sufficient power to push and/or lift tree trunks that blocked roadways. The hydraulic chain saw was used extensively. It was found to be lightweight, easy to use, reliable, and powerful. In some cases, the bucket of the SEE was used to provide an elevated work platform for engineers who were clearing tree limbs from power lines.

Recommendation: None.

Beyond the Battlefield -

The Other Dimension of Military Service

1989 Kermit Roosevelt Lecture given by
Lieutenant General Henry J. Hatch,
Chief of Engineers

Recently, General Carl Vuono, Chief of Staff of the United States Army, wrote an article for the Armed Forces Journal. In that article General Vuono said, "The U.S. Army, like the nation's intercontinental nuclear force, is a strategic force. The Army is an essential element in the execution of national military strategy which aims to deter conflict at all levels, and if necessary, to fight and terminate wars under favorable conditions."

The thesis of my presentation is that if the Army is to be fully effective in carrying out this vital strategic role, it must be capable of projecting power to the point of influence in its peacetime operations as well. In addition, to be successful in this regard, the leaders and planners of the Army must engage in strategic thinking, and must institutionalize a process for sound long-range planning.

From my perspective, the concept of a strategic force involves two dimensions. The first of these is familiar and is usually the focus of discussion among defense strategists and national security analysts. The Army must be prepared to win on the battlefield. Forces must be organized, trained, equipped, and positioned to deter and—if necessary—successfully wage war. In other words, the Army must be prepared for war fighting.

The "other" dimension of military and strategic service is less familiar. The Army must be prepared to address a broad range of national security concerns during peacetime. It, more than any other service, must step up to the role as the nation's general military servant. This role requires the Army to carry out a range of tasks beyond the battlefield—to prevent war—to manage peace—to undertake the nation's most difficult and tedious tasks. Soldiers fighting forest fires in the American west and engineer units building roads in Central America are just two contemporary examples of these tasks.

The concept of a strategic force implies more than reacting to requirements as they develop. A strategic force must actively anticipate needs, and position organizations and resources to meet these needs. It must think and plan strategically. The Army must not only be willing to perform dirty and difficult jobs in the nation's service, it must do them well. This "other" dimension of a strategic force is not a secondary role. It was central to the development of the United States. It is important today; it is an imperative for tomorrow.

Thus, it is my intention to expand on the concept of the Army as a strategic force by focusing on this "other" dimension. Along the

way, I will briefly review the U.S. Army's service to our nation in an historical context, and then discuss some of the changes taking place on the international scene—the external influences. Finally, I will address strategic thinking and planning, and sketch out some possibilities for the Army's future—beyond the battlefield.

Historical Context

The histories of the United States and its Army are inextricably linked. For much of the 213-year history of our nation, the Army has indeed been the loyal military servant, and it has undertaken a variety of tasks—international and domestic. Before we turn our attention to the Army's historical roles as a general military servant, however, I reiterate that our basic business as soldiers is to serve the nation well on the battlefield.

The history of the American Army in combat—as this audience well knows—pre-dates the founding of the United States. The fledgling Continental Army had to immediately engage a well trained, seasoned, highly professional force in a war for American independence. I can't help but note with some pride, as the Chief of Engineers, that from the outset combat engineers played a pivotal role in that conflict. For example, General George Washington selected Colonel Richard Gridley to serve as the first Chief Engineer of the Continental Army, and immediately put him to work preparing defensive fortifications on the high ground overlooking Boston.

These fortifications were needed to prepare for an imminent attack from British regulars. That attack came on June 17, 1775, and the colonials held firm behind the hastily constructed earthworks. This action, known as the Battle of Bunker Hill, demonstrated the importance of combat engineering to the Continental Army, and foreshadowed the significant contributions that were to come.

General Washington recognized that his poorly trained, ill-equipped troops needed every tactical advantage they could gain against their superbly trained adversary. Sappers of the Continental Army played an equally important part in the last campaign of the War for Independence, the siege of Yorktown. Here, their abilities to support offensive operations were tested as they sought to breach British defenses. The engineers were successful, and ultimately the combined efforts of American and French ground forces and the French fleet brought about the termination of the conflict on favorable terms—at least from an American perspective.

From these beginnings emerged a tradition of an Army that always served the nation well in war time. This tradition continued through the 19th and 20th centuries to the most cataclysmic conflict in the history of warfare, the Second



The hastily constructed fortifications on Charleston Heights overlooking Boston, during the Revolutionary War, proved the value of engineers to the Continental Army. This illustration is viewed from behind the patriot lines.

World War. The many engagements of World War II provide examples of some of the most remarkable feats of arms for both the British and American armies as they fought shoulder to shoulder.

At the risk of sounding too parochial, I will cite one example which highlights combat engineers fighting as infantry but which also illustrates those qualities which are essential to success on the battlefield—sound leadership, initiative, tenacity, and courage.

In December of 1944, the Germans launched a final, desperate offensive through the Ardennes. This armored thrust caught the American 99th and 28th Divisions completely by surprise, and their lines were quickly breached. As the German armor rolled forward, at least two engineer units, the 291st and 51st Battalions, were forced to shift quickly from cutting timber and graveling roads to fighting tanks. In the confusion, officers gave orders to sergeants with whom they had little prior contact, and those sergeants led motley collections of soldiers from various units. Acting in small groups to erect road blocks, hold key road junctions, and do whatever had to be done, these men stood fast.

In the end, the initiative and independent actions of junior officers and noncommissioned officers blunted one of the key spearheads of the German attack, and allowed other units to get into position. I might add that this action, known to Americans as the Battle of the Bulge, is also an excellent example of cooperation between our two armies as control of American forces north of the German penetration was passed smoothly to Field Marshall Montgomery.

In sum, the history of our Army includes numerous chapters which were written on the battlefield. The colors of the United States Army are decorated with 168 battle streamers, and I have no doubt that more will be earned.

However, there is another dimension to this history. For two centuries the Army has carried out a broad range of tasks in service to the nation. For example, the Army contributed to the opening of the continent, development of the engineering profession in America, and construction of transportation networks. These contributions beyond the battlefield are in many ways as important as the Army's primary peacetime role of preparing for war.

In the early 19th century, the nation sent explorers such as Captain Meriwether Lewis and Lieutenant William Clark to open unchartered territories in the west. From 1804 to 1806, these two officers led an expedition to the headwaters of the Missouri River, across the Continental Divide to the Pacific Ocean, and back. Their expedition covered some 7600 miles by boat, on horseback, and by foot. They brought back the first primitive charts of the area, and collected botanical and zoological specimens. This expedition, together with the efforts of other Army explorers, transformed the west from a great unknown into a territory which captured the imagination of the American people.

A second area in which the Army made a major contribution was in the development of the engineering profession in the United States. In March of 1802, the United States Army Corps of Engineers and the U.S. Military Academy at West Point were established by the same act of Congress. This act began a lasting association not only between these two institutions, but between the Army's military engineers and the civil engineering profession.

I might digress to note that we owe a debt of gratitude to the British army for the concept of the military academy. Your army was the first to recognize the importance of higher technical education for military officers. As a result, the military academy at Woolwich for engineering and artillery studies was established in 1721. West Point was established as the first engineering school in the United States in response to the demands of a growing nation for trained scientists and engineers.

Military engineers at the academy adapted European engineering theory to the practical applications required by a growing America. This combination produced an engineering curriculum and trained engineers that served as the foundation for all engineering education in the country. Graduates of West Point surveyed, designed, and built roads, canals, and railroads throughout the United States.

The legacy of this early relationship between military engineers and the engineering profession remains alive as my command, the U.S. Army Corps of Engineers, is responsible for a host of civil functions, including flood control and management of navigable waterways.

Thus, in the broad sweep of history, the contributions of the Army to the United States have gone far beyond the battlefield. However, in recent decades we have been more focused on war and preparing for it.

The Cold War

For the past 40 years the U.S. focus on national security has been the rivalry between the United States and the Soviet Union. This rivalry, with its military, economic, and ideological dimensions, has dominated the national security agenda for government officials,



The forward deployment of forces was a centerpiece of our national security. The stationing of Army units in Europe, like these engineer and armor soldiers, was widely accepted by the American public as a deterent against the Soviet threat (Photo by Specialist Bob Bastedo).

soldiers, and the American public. The United States was perceived to be in a life-or-death struggle with an extremely powerful and dangerous adversary. The Soviet Union was seen to be steadily extending its reach, and the communist states were seen as a monolithic block.

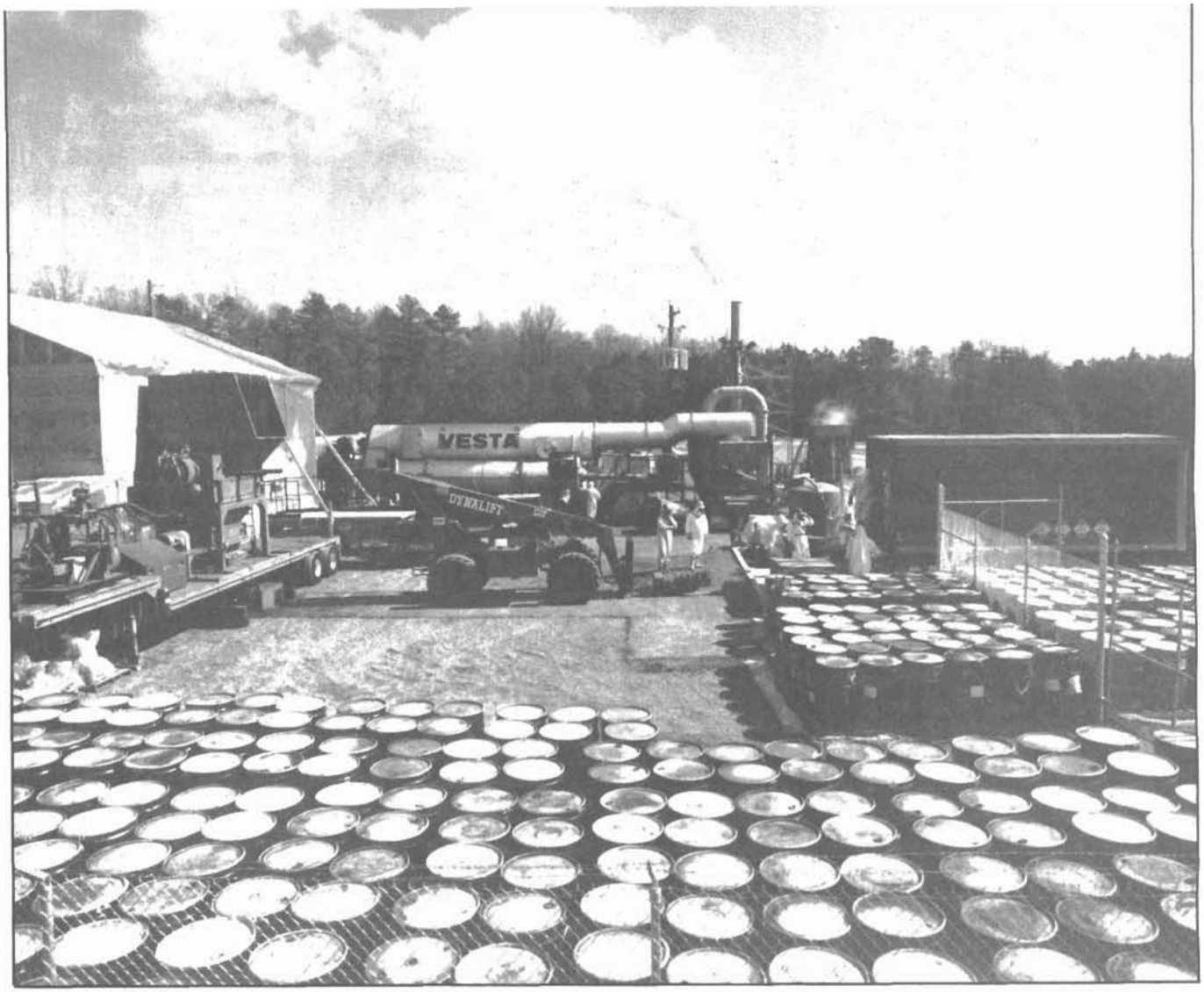
The defense of our allies, particularly those in Europe, was the highest priority, but this strategic competition was carried on in the less developed nations as well. The centerpieces of national security strategy were the nuclear deterrent, large standing forces, and forward deployment of substantial portions of these forces. The imminence of the Soviet threat was widely accepted by the American public and our allies.

Changing International Environment

However, during the last two decades, trends have emerged which have begun to change the nature of the international system and the nature of the threat. Although I believe that the United States remains ahead as an economic and military superpower, its lead along both of these dimensions has diminished. The nations of Western Europe—including the United Kingdom—and Japan have fully recovered from the Second World War and are major economic powers. The industrial democracies look to each other as both trading partners and economic competitors.

Economics and military power have become further diffused in what used to be called the Third World. Many of these developing nations have become significant industrial powers and have acquired quantities of modern armaments. Many nations and even sub-national groups can now pose military threats—at least on a regional basis.

Meanwhile, the perception of the Second World has changed sharply. Differences and disputes



The degradation of our environment has evolved into a major factor of global significance. The Army's Toxic and Hazardous Materials Agency recently completed on-site treatment of 1,138 drums of dioxin and herbicide-contaminated soil and other materials by incineration (U.S. Army photo).

among the so-called socialist states have shattered the images of a communist bloc. The communist model of economic development—autarky and tight central control—has been widely discredited. The economic progress achieved by the Soviet Union in the years immediately after the Second World War was selective and could not keep pace with the rest of the world. Virtually all of the communist countries are looking toward some type of market mechanism to overcome gross inefficiencies in their economies, and are simultaneously struggling with the implications of the attendant loss of political control.

Other changes have taken place in the international environment. It has become increasingly difficult, especially for the major powers, to convert military resources into usable political power. Rapid and widespread communication has made it more difficult for governments to control internal debate on the causes and conduct of war. The superpowers are constrained in their use of force by the risk of direct confrontation with each other. Several conflicts have demonstrated the potency of nationalism as a motivating force. Lesser developed countries and sub-national groups have used terrorism and irregular warfare to achieve their objectives.

These factors have served to raise the costs and reduce the benefits of the direct application of military force. These changes are beginning to have a profound effect on the very meaning of

national security. It warrants continued re-definition.

Direct conflict with the Soviet Union has been made less likely, and more costly should it occur. This point underscores the concept that henceforth the principal function of military forces will be to deter—not wage—war. Of course, preparing to prevail in any conflict remains a central element of deterrence, but the focus is somewhat different. The principal functions of military forces become preventing and limiting conflict, and projecting power to the point of influence in a world at peace to manage threats to that peace.

The limits on direct use of military power and the problems which the Soviet Union must confront serve to lessen the perception of a Soviet threat..., and in democracies the public is quick (perhaps too quick) to accept good news. I note as an aside that Mr. Gorbachev knows this too well. His initiatives have time and again generated pressures for reduced defense spending—reductions which are premature at best for a force that must be responsive to an enemy's capabilities, not words.

Future threats to national security will increasingly emanate from economic and demographic issues in addition to political or ideological differences.

And, finally, there is at least one more trend that has evolved into a major factor of global significance. That is the degradation of the environment itself—everything from climate change to nuclear waste to ocean dumping to the destruction of jungles and wetlands, to name a few. I can assure you that the destruction of our global environment and its rapid impact on all species of life, including man, is certainly a national security issue. The questions for the Army are the degree of threat and what the Army's response should be.

Requirements Across the Strategic Continuum

Today our Army is oriented on a war-fighting spectrum from low intensity conflict to general war, with the primary focus on deterring the latter while recognizing the higher probability of the former. If the low intensity conflict is more likely, should we not move beyond the end of our conflict spectrum and conduct peacetime military operations that will deter at that end as well?

No longer can security be considered narrowly in the context of the U.S.-Soviet rivalry, with its focus on military power. The national security objectives of the United States now include references to meeting the challenges of a global economy, and efforts to address the root causes of regional instabilities. The result is a much broader view of national security.

The view of national security that has been dominant until now has led the Army to concentrate on tasks associated with war fighting. Army leadership has focused—quite properly—on fielding a well trained, well equipped force that was prepared to win the AirLand Battle in Europe.

The Army has been structured around a strategic concept that calls for sizable forward-deployed forces that could rapidly be reinforced. Virtually the entire Army, both Active and Reserve Components, is geared to this task. I hasten to note that one exception is the recent addition of light infantry divisions to the force. These divisions have added flexibility and diversity to the Army's ability to respond.

Now the Army is at a turning point. The tough thing about a turning point is that you cannot see around the corner. The future cannot be illuminated directly (without some mirrors). Only a keen imagination can improve our vision and illuminate alternatives.

In view of the changes evident in the international system, the future may well bring a reduction in forward-deployed forces and a commensurate reduction in the size of the Army overall. This is particularly true if the Army continues to define its mission and corporate identity in terms that are seen to be less relevant to the national security environment of the future. Thus, if the Army is to continue to serve the nation well, it needs to (again) diversify beyond war fighting.

The Army must step up to the task of projecting power to the point of influence in order to counter peacetime threats to our national security interests. This may or may not be on the battlefield. In fact, I question whether the paradigm of the battlefield has continued validity as the Army's sole strategic organizing concept. As a tactical concept, yes; as a concept to train young soldiers and their leaders, yes; but the future role of the Army—its vision of service into the next century—must go beyond the notion of the battlefield.

Implications for the Future

The relationship between our two nations, the United Kingdom and the United States, is one that carries a rich history. It is a relationship based on shared values and a common political heritage. Today and in the future, the interests of our nations will continue to transcend the mere physical defense of our homelands.

These interests will be based on the maintenance of a degree of global stability which preserves our values. Broadly stated, U.S. national interests include the

survival of the United States as a free and independent nation with its fundamental values intact, its economy healthy, its environment sound, its institutions and people secure. A second component of these security interests is a stable international system that promotes human freedom and dignity, a sound global environment, and a fair and open economic system.

To be a strategic force in service to these national security interests, the Army must project power across the entire range of the operations continuum. We must be prepared to wage and win a general war, and we must also be prepared to contain peacetime threats such as terrorism and low intensity conflict.

What are some of the new paradigms of projecting power in this context? It goes beyond the threat or presence of combat forces. It will mean influencing people, institutions, and events through infrastructure development, medical assistance, communications, and training. It will mean developing judiciary and financial institutions. In other words, projecting power will mean reflecting to the world our way of life, our economic system, our form of government, and their intrinsic value. This is the elegant use of power to influence and stabilize. It will be those stabilized countries that will lessen the risk of conflict and, thus, enhance peaceful coexistence.

Projecting power to the point of influence through our peacetime operations is indeed managing the peace. Asking the Army of today to increase its emphasis on this dimension of military service—managing the peace—requires strategic thinking and long-range planning by its senior leaders. The reference points for this kind of thinking are not usually found in today's in-box. Simply extrapolating from the threats and responses from the past and present to 20 or 30 years out will not work. It's like trying to illuminate a playing field with a laser beam.

". . . the Army has the strength to prevail on the AirLand Battlefield, and it (can) influence the management of peace on a restless planet."

What is needed is a floodlight—perhaps several floodlights shining from different positions and at different angles. Sometimes thinking strategically about the world three decades from now requires us to leap out and consider the broad picture. We cannot predict the specifics, but we can consider the trends, evaluate alternative scenarios, and consider the enduring basics.

Let me give you one example. Our Chief of Staff says that one of his principal priorities is maintaining a quality force. I think we could agree that whatever our armies will do in the year 2020, they will want a team of quality players to do it. I haven't said anything about forward deployed forces, or how they are armed, or whether they will be using laser weapons, and so on. Regardless of those concerns, we will want a force capable of responding to its mission. That means we must attract, motivate, and retain an effective and productive force.

And what does that mean? From my perspective, one of the things it means is that we must look carefully at the quality of life for our soldiers on our installations. We need to consider issues like housing, child care, and facility maintenance. I suggest that this realm of a quality force is one that should be illuminated with strategic floodlights. A broad range of alternative scenarios should be considered, and then this analysis should be brought back to today...to position ourselves for the future. Mere extrapolation will not work.

Now, let's turn on those floodlights to illuminate another of the possibilities for the future. The political and economic instability of the developing world poses a clear threat to western interests. Part of the response to this threat is to attack the roots of this instability—grinding poverty, ignorance, and inadequate and uneven economic development.

What is required is a process of nation building. In many instances, Third World countries lack the most basic facilities for health care, and have poor transportation and communication networks. In fact, the United Kingdom, the United States, and virtually all of the developed nations have directed substantial sums of developmental assistance to alleviate these problems.

I suggest that the U.S. Army, principally though the use of support units, can lend assistance in this area. This assistance can range from the construction and management of major projects, perhaps entire cities, to the provision of advice on the construction of wells, to visits from medical teams. However, these activities must be undertaken within the broadest context of our own foreign policy objectives, and with sensitivity to the culture of the host nation.

An example of this type of assistance is presently underway in Central America. There, Army engineers from our Active and Reserve Components and civilians from my own command are engaged in projects ranging from construction of roads and airfields to drilling water wells. Over the past four years, we have had 70,000 engineer soldiers—60,000 of them from the Reserve Components—gain experience in Central America. Similarly, doctors and other health care professionals from Army medical units are carrying out humanitarian and civil assistance activities. The bonds that can be established by these efforts foster trust and mutual respect—essential ingredients if a program of this type is to succeed.



In Central America, the Army is helping to support regional stability through projects ranging from construction of roads and airfields to drilling water wells. Over the past four years, 70,000 Army engineers—60,000 of them from the Reserve Components—have participated in such projects (Photo by Sergeant Richard Creed).

To leap out and think strategically about the possibilities of this nation-building concept means considering ways it might be expanded. Why not, for example, use more extensive involvement of military engineers in development assistance? Why not the expansion of this concept to other geographic areas? Why not to Southeast Asia? Or Africa?

Conclusion

In our early history, the Army provided the principal federal capability to establish, expand, and protect our nation on the American continent. Although, a myriad of federal, state and local governmental agencies have assumed a greater public sector role in our country through the years, there remains an essential place for our Army in the American scene—both at home and abroad.

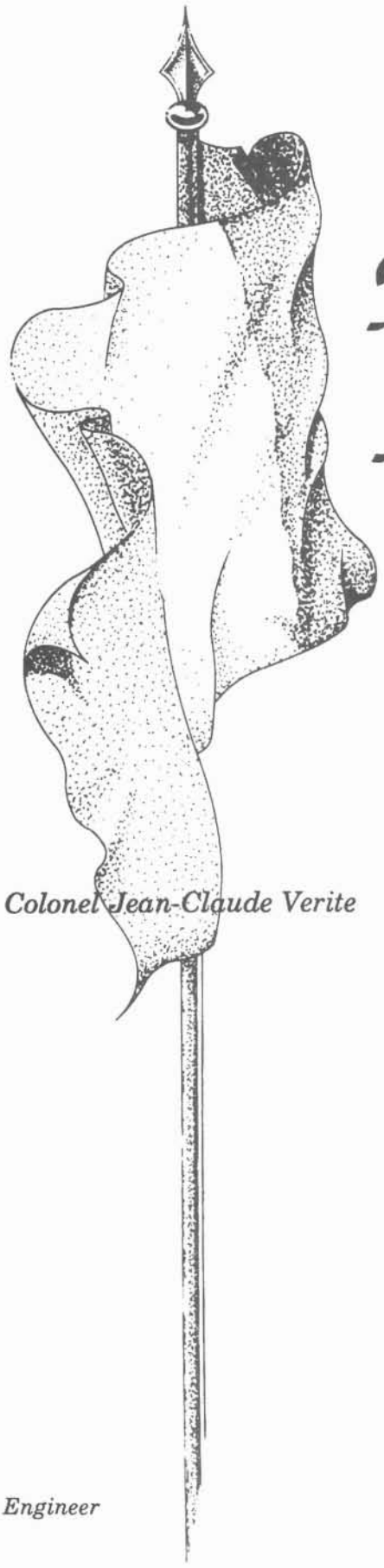
Our role ranges from providing a maturing experience for our young men and women, who will later take their places as productive citizens in private life, to responding to national disasters, to securing the peace by deterring armed conflict across the entire conflict spectrum.

Armies are relevant and must project that relevancy to the publics they serve. For if we fail in that, and are weakened during a perceived lull in external threats, we may ultimately fail our nations in their hour of need.

Our Army must maintain its credibility and relevance in the public mind, even while the perception of threats to our national security are constantly changing. We must be viewed as a multi-purpose asset in the support of national objectives both within and beyond our national boundaries. We must have diverse utility while maintaining our essential war fighting capabilities.

The United States Army is a strategic force. It is the American citizen's general military servant. As a strategic force, the Army has the strength to prevail on the Air-Land Battlefield, and it has the capability to positively influence the management of peace on a restless planet. God willing, the Army's leadership of today and tomorrow will have the strategic vision to lead us beyond the battlefield...to a nation and a world at peace.

Lieutenant General Henry J. Hatch has served as the Chief of Engineers and Commander of the U.S. Army Corps of Engineers since June 1988.



French Engineer Alternatives For National Service

By Colonel Jean-Claude Verite

As Lieutenant General Hatch said in his 1989 Kermit Roosevelt Lecture, (page 12) "The Army...must step up to the role as the nation's general military servant. This role requires the Army tc carry out a range of tasks beyond the battlefield—to prevent war—to manage peace—to undertake the nation's most difficult and tedious tasks. Soldiers fighting forest fires in the American West and engineer units building roads in Central America are just two contemporary examples of these tasks."

The French Army too, because of historical circumstances, has had to face this expanded dimension of military service. For many years, French engineers, in addition to maintaining their readiness for combat missions, have successfully met "beyond the battlefield" missions.

Here, I will cover four major areas of French engineer contributions to national service, including nation-building in Africa, the Paris Fire Brigade, Civil Safety, and Adapted Military Service.

The Nation-Building Effort

As the French colonial era was drawing to an end, we signed accords with former colonies that were designed to continue French assistance in the development of newly independent nations. Many government agencies are involved in this on-going effort, and the French Army has also taken an important role.

In addition to any straightforward military training that may be requested by these nations,

French engineers give extensive training in construction techniques to these new countries. Officers and NCOs have provided the citizens of these former French colonies with instruction in both vertical and horizontal engineering. They also participate in the design and construction of badly needed nation infrastructure. In addition, some highly qualified engineers, as part of their one-year mandatory military duty, are selected to serve as technical advisors in these developing areas.

The Paris Fire Brigade

Following a disastrous Paris fire in 1867, the French government decided that the Army would take over the responsibility for firefighting in the capital city.

Since that time, the Brigade des Sapeurs Pompiers de Paris, a military engineer unit, has accomplished the mission with professionalism and efficiency. The unit carries out an average of 300,000 missions every year. The brigade's motto, "Save or Perish," has been proven many times, as French sappers have died trying to save the property and lives of their fellow citizens. About 400 engineers are injured every year in firefighting duties in the Paris metropolitan area.

The 7,200-man brigade includes three Fire Groups of eight companies each. The force has 250 officers, and about 1,000 of the enlisted men are draftees.

The fire brigade enjoys immense popularity among Parisians, and they are always greeted with applause when taking part in the annual Bastille Day military parade. Their popularity is well earned, though, because they face the threat of death and injury daily in their duties.

In addition to their Paris-based duties, members of the brigade are also called upon to serve as reinforcements for fire and rescue teams sent to help foreign countries during major disasters.

Civil Safety

Another area of French engineer contributions to national service is Civil Safety, which is served by the three Training and Rescue Units for Civil Safety (UIISC). These units, created in 1968, are part of the Engineer Corps, but are equipped and manned by the Department of the Interior. Such close cooperation between civilian government agencies and the Department of Defense has been a keystone to the Army's national service program.

Career soldiers devoted to Civil Safety include 92 officers and 235 noncommissioned officers. Of these, 75 percent are engineers. Also assigned to these units are 1,250 draftees.

The general mission of these soldiers is twofold: to rescue people from accidents, disasters and other incidents, and to protect the environment. Their area of responsibility includes not only the entire country, but overseas areas as well.

The units are equipped to fight forest fires, clean up environmental pollution, and rescue victims of earthquakes and other casualties. These units have a dual responsibility and could be called upon to perform the same duties in combat areas as well.

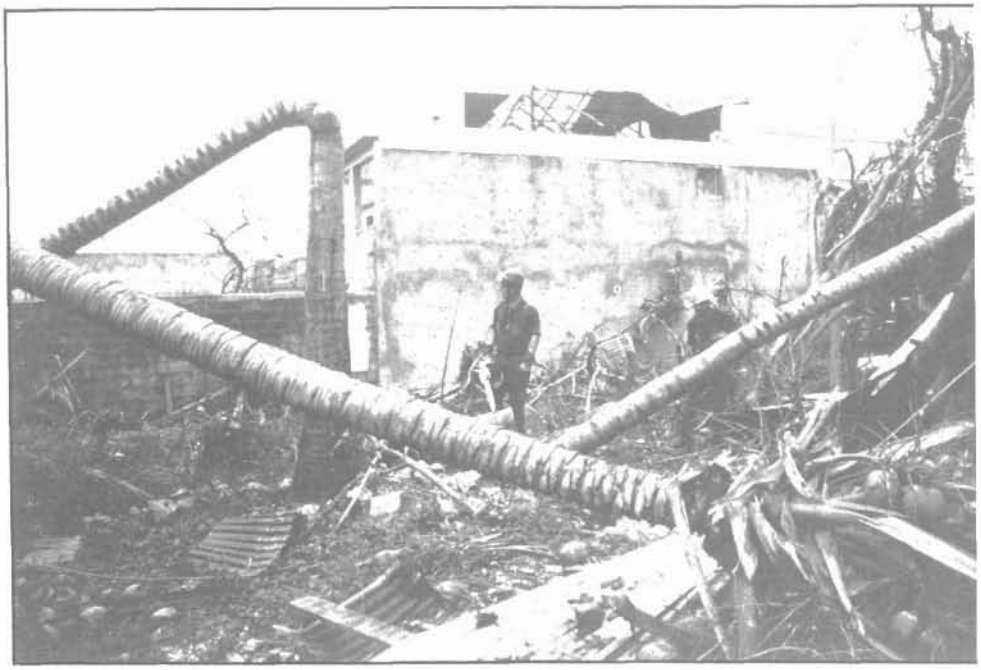
The accompanying list of major missions conducted by the UIISC, on page 22, indicates the diversity of missions performed by these units.



A member of the French Engineer Paris Fire Brigade listens for possible survivors of the 1985 earthquake in Mexico City. Such specialty teams have been highly successful in saving lives, and they are often sent to overseas disaster sites (French Army photo).

Major UIISC Missions Since 1976:

1976 - Earthquake rescue, Frioul, Italy
1978 - Environmental clean-up, Amoco Cadiz tanker, Brittany, France
1980 - Environmental clean-up, Tanio tanker, Brittany, France
- Earthquake rescue, El Asnam, Algeria
- Earthquake rescue, Mezzo Giorno, Italy
- Flood relief, Savoy, France
1981 - Flood relief, Nice, France
- Avalanche relief, France
- Flood relief, near Paris
1982 - Flood relief, Andorra
- Hurricane relief, Auvergne, France
- Avalanche relief, France
1983 - Hurricane Veena relief, Tahiti
- Rescue, terrorist attack, Beirut, Lebanon
1984 - Hurricane Kamisy relief, Comores Islands
1985 - Earthquake relief, Mexico City
1986 - Emergency snow clearing for southern France
- Earthquake relief, Kalamata, Greece
1987 - Storm relief, Brittany, France
1988 - Environmental clean-up, Brittany/Normandy, France
- Technical firefighting assistance, Peru
- Flood relief, Nimes, France
- Earthquake relief, Armenia
1989 - Building collapse relief, Toulon, France
- Hurricane Hugo relief, Guadeloupe, West Indies
- Medical assistance, Rumania



Civil Safety (UIISC) soldiers prepare to clear storm damage from Hurricane Hugo on the Island of Guadeloupe in 1989. The UIISC performs duties both overseas and at home in France (French Army photo).

Adapted Military Service

Efforts to correct the root causes of regional instabilities are part of the new strategy for military forces of the future. The French Army's Regiments du Service Militaire Adapte (SMA) (Adapted Military Service Battalions) support that strategy in overseas areas. These unique units provide assistance to French overseas territories in education, civil works, and other supporting programs. This assistance is provided in cooperation with the French government's Department of Overseas Districts and Territories.

Created in 1960, the SMA units serve Martinique, Guadeloupe, Guyana, Reunion, Mayotte, and New Caledonia.

The SMA program helps overseas territory draftees, during their initial military training and subsequent national service, to develop a moral and civic sense of duty. The SMA also prepares these young citizens for their professional life by giving them a technical education. The soldiers are then given the opportunity to participate in local community work programs.

The different job specialties taught by the battalions include agriculture, commercial fishing, horizontal and vertical construction, forestry and saw mill operations, mechanics, and food service operations.

This combination of vocational education and real work experience benefits the community and allows the soldiers to reenter civilian life with job skills. In 1989, more than 2,000 draftees received training in these skills.

The SMA units also provide assistance with disaster emergency plans and operations. Recent rescue and clearing efforts include Hurricane Firinga on Reunion Island, and Hurricane Hugo in Guadeloupe.

By giving young people basic job training and making them more conscious of their responsibilities as citizens, the SMA units make a significant contribution to the welfare and stability of French overseas territories.

"Always To Serve"

In this rapidly evolving world, when long-standing ideas of the military threat are changing before our eyes, national defense



Above: **A UIISC rescue team searches earthquake rubble for victims with a specially trained dog. This rescue and relief mission to El Asnam, Algeria, in 1980, is one of many such operations conducted by French Army engineers (French Army photo).**



Right: **Members of the Paris Fire Brigade make a final check of a Paris train wreck in 1987 during the final stages of a rescue operation. The unit carries out an average of 300,000 firefighting and rescue missions every year (French Army photo).**

policies must be reevaluated. Nations around the world are examining the role of their military forces, and many have scaled back both the budget and the manpower of their armies. To maintain a key role in national service, armies must seek and adapt to new missions. These new missions, accomplished in addition to their traditional military roles, must demonstrate to the nation the value of army expertise and professionalism.

French Army engineers have been innovators in these new dimensions of national service. Faithful to their motto of "Sometimes To Destroy, Often To Build, Always To Serve," French engineers have demonstrated their ability and willingness to serve "beyond the battlefield."

Colonel Verite is the French Liaison Officer to the Engineer School. He previously served as district commander, Engineer Military Construction District of Marseille, France. He has served as Chief Engineer Officer, United Nations Interim Force in Lebanon, in 1984-85; Project Officer for the Military Construction District of Tahiti, and deputy commander of the 5th Foreign Regiment (French Foreign Legion) in Mururoa, Polynesia. He is a graduate of St. Cyr Military Academy and the French Army War College.

Training to Standards

By Ken Foster

"Failure to follow procedures" is a term frequently used in connection with accidents, and it is a common safety denominator within the engineering community. Situations that fall in this category include supervisors who allow unqualified personnel to operate equipment, backing vehicles without ground guides or adequate vision, and failure to follow misfire procedures when training with demolitions. The results of our failure to follow procedures are very costly in terms of dollars, equipment, and human resources.

During fiscal year 1989, 610 engineer soldiers were accidentally injured, 24 of them fatally. This number of injured soldiers equates to three company-sized units. Their injuries cost $3,574,335, and damage to government property amounted to $599,000, making a total cost of more than $4 million.

During the 5-year period October 1984 - April 1989, 16 fatalities occurred in engineer units during demolition training, fast water training, and Army motor vehicle operations. "Failure to follow procedures" was a primary factor in all of these accidents.

The purpose of safety in military training is to enhance soldier proficiency not to inhibit or remove realism from the training. We must remember that the soldiers' welfare is our first consideration, and that a well trained force is a safe force.

Preventing accidents requires a pro-active approach to all we do through education, engineering and enforcement. However, once an accident happens, we must establish procedures to properly analyze it. The first step is a thorough investigation to establish the who, why, when, what, where and how of the incident. This step is essential to properly identify all the causes. The second step is to develop and implement countermeasures that will prevent similar occurrences in the future.



Soldiers at Fort Leonard Wood, such as Private Greene, are taught the correct throwing procedures while using inert grenades. By learning proper procedures, they reduce the risk of serious accidents (TASC photo).



Motor vehicle accidents are expensive in terms of human resources and equipment. The operator of this forklift was descending a hill at excessive speed for conditions when he lost control and overturned. Such accidents cost the government thousands of dollars each year (TASC photo).

The best solution, of course, is to remove the source of the hazard but this is not always possible. For example, if a bush creates a blind spot at an intersection, the hazard can be removed. When it cannot be removed, as in demolition training, the next best thing is to reduce the accident risk by using a physical guard or controls and educating personnel exposed to the hazard.

Accident prevention includes the enforcement of proper procedures, which is important leader business. Leaders who fail to enforce established procedures should expect an increased accident rate within their area of responsibility. Safety is not just commander business, it is NCO and individual business. We all share a part of safety responsibility.

Supervisors need to lead by example, set high standards, and conduct operations to meet those standards. Supervisors and commanders must ensure that soldiers know and become proficient with the equipment they operate. They must motivate their soldiers to work safely and to identify and control risks. If we teach soldiers the benefits of safe performance, they will be motivated to perform to standard.

Safety must be integrated into all operations. Safety awareness should become a way of life for our soldiers—on and off the job.

We will never eliminate all engineer-related accidents from our work environment because the calculated risk dictates otherwise. However, we can and must reduce the accident risk by ensuring that our personnel follow and understand prescribed procedures.

Because we learn from sharing experiences, we need to hear from you. Help us share your knowledge and experiences with the rest of the engineer community. Send letters to: Headquarters, U.S. Army Engineer Center, ATTN: ATZT-S, Fort Leonard Wood, MO 65473-5000. Or, call (314) 563-5000, AV 676-5000.

Ken Foster is a safety specialist assigned to the Engineer Branch Safety Office at Fort Leonard Wood, Missouri.



The Essayons Program:

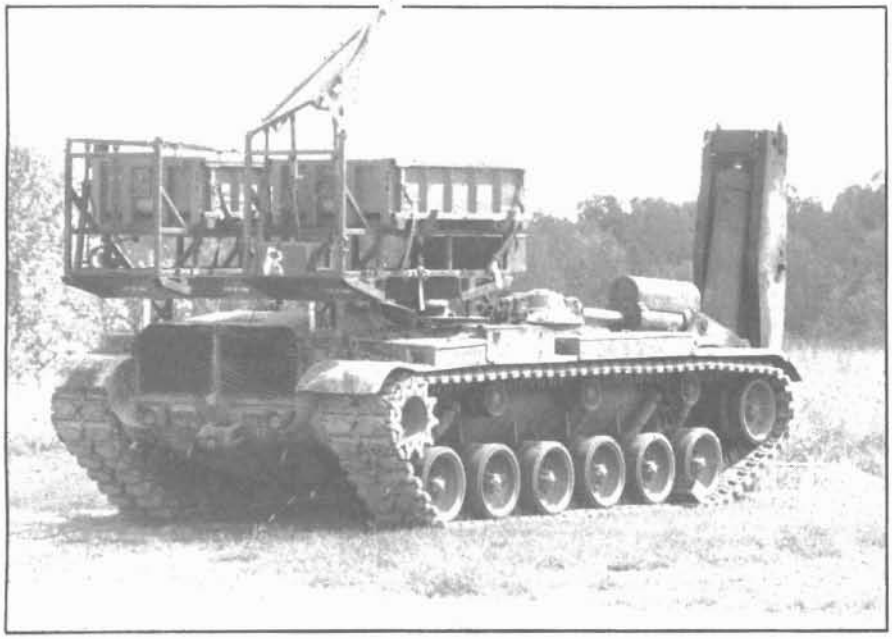
From Brainchild To Drawing Board

By Chester A. Kojro

Sometimes, like the old saying goes, "you can't see the forest for the trees." And like any other large organization, that occasionally applies to the military. Despite the best efforts of a long line of experts involved in developing Army equipment, doctrine, force structure or training, mistakes and shortcomings can happen.

The Engineer Center knows that the best solutions to problems often come from the soldiers who have to confront those problems on a daily basis. To provide engineers with easy access to "the system," the Engineer Center developed the Essayons Program. The program is designed to solicit recommendations for changes in engineer systems or concepts.

Since the program began in September 1988, several recommendations from field units have been evaluated, including a Demolition





Three Essayons Program recommendations: opposite page, the Engineer Squad Vehicle (ESV); top, the Armored Vehicle Launched MICLIC, and the Demolition Effects Simulator (DES), in its bangalore torpedo configuration (U.S. Army photos).

Effects Simulator (DES), the Armored Vehicle Launched MICLIC (AVLM), and the Engineer Squad Vehicle (ESV). An overview of these three evaluations follows.

Demolition Effects Simulator (DES)

In 1988, soldiers from the 65th Engineer Battalion, 25th Infantry Division (Light), developed and produced the prototype of a demolition effects simulator. Through the Essayons Program, they submitted the project to the Engineer School for evaluation.

The battalion's DES comes in two configurations. First, satchel charges or other above-ground demolitions are simulated using a chalk charge. This consists of a detonator with a large knot tied into detonating cord (det cord), and placed into a sandbag filled with powdered chalk.

The second configuration simulates a bangalore torpedo, and consists of det cord placed inside a 6-foot long cardboard tube. The tube is filled with approximately 7 pounds of powdered chalk and sealed with tape. Prepared tubes can then be connected and detonated together. The detonation system for both consists of an M60 fuse ignitor, a time fuse, and a nonelectric blasting cap.

Testing of the DES was done at Fort Knox by the Engineer Test Division of the Test and Experimentation Command (TEXCOM), and the Armor-Engineer Board (ARENBD), September 11-15, 1989.

The chalk charge was used to simulate steel-cutting and tree-cutting (abatis) charges. The bangalore configuration was used to simulate wire and mine obstacle-breaching missions.

Both configurations were found to be effective training simulators. Soldiers were able to work with real fuse ignitors, time fuses, det cord and blasting caps without actually destroying trees, bridges or other targets. The cardboard tubes did a good job of simulating bangalores, although further modifications now under study would enhance realism.

Armored Vehicle Launched MICLIC (AVLM)

The AVLM concept was developed by the 16th Engineer Battalion to improve the survivability of soldiers deploying a mine clearing line charge (MICLIC). They proposed providing these soldiers with a self-propelled armored vehicle. For evaluation purposes, an armored vehicle launched bridge (AVLB)—minus the bridge—was

temporarily modified to permit the mounting of two MICLICs.

The test configuration was constructed by attaching a frame, fabricated from two I-beams and various pieces of scrap metal, to the rear deck of the AVLB. The MICLIC launchers were then connected to the frame with clamps.

Testing was conducted at Fort Knox by the Engineer Test Division, again by TEXCOM and ARENBD, September 1-29, 1989. The AVLM is much more mobile than the trailer-mounted MICLIC. Compared to the AVLB with its bridge mounted, an increase in vehicle speed was noted. Visibility and vehicle access were also improved.

Installation of the proposed MICLIC assembly required less than one hour on all test missions, using equipment common to an engineer battalion.

A drawback to the proposal is that the AVLB's bridge-launching "foot" partially blocks the MICLICs, requiring the foot to be lowered prior to firing. This resulted in delayed launch time. Too, this configuration left the MICLIC assemblies exposed and vulnerable, and prevented the use of the AVLB for its primary role of launching bridges.

While this proposal has merit, its limitations are still being studied by the Engineer School's Directorate of Combat Developments (DCD).

Engineer Squad Vehicle (ESV)

This recommendation called for converting a turretless tank into an engineer squad vehicle that would have a tank's mobility and survivability. The concept is similar to the Israeli Puma, which combines a Centurion tank chassis with a new armored superstructure, or casemate. The Engineer School envisions the ESV as an interim step toward the planned Sapper Vehicle.

"Changes begin with the soldier, and the Essayons Program continues to be a useful tool for evaluating ideas from the field."

The ESV would consist of an Abrams chassis with an armored crew compartment and superstructure. A small rubble-clearing blade would also be mounted. An Abrams hull was not available for the test, so an M60A2 chassis was used. The steel superstructure was fabricated by ARENBD.

Crew access was through the track commander's (TC) hatch on top, and two gull-wing shaped doors in the rear of the superstructure. Seven seats were mounted within the superstructure, in addition to the normal driver's station. Large steel tool boxes replaced the tank's side fender sponson boxes, and a storage rack for munitions and personal equipment was added above the engine compartment.

During the test, a mineplow from an Abrams was attached to the vehicle using fabricated adaptors. The plow was used for excursion testing in mine breaching, and was not intended to be an ESV capability.

Testing was conducted by the Engineer Test Division of TEXCOM and ARENBD at Fort Knox from September 22 through November 30, 1989. During the evaluation, the ESV was compared against an M113 for its effectiveness as a squad carrier.

The ESV was found to be operationally effective, and has improved armor protection and increased external equipment storage space. Unlike the M113, the ESV can employ tank-mounted mine plows and rollers, providing the potential for alternate mission capability.

It does have drawbacks, however. Entry and exit times are much longer than the M113, and there is less internal storage space.

Since the test superstructure was made of brassboard and total vehicle weight was not realistic, ESV mobility could not be tested.

The operational tradeoffs of a tank chassis-based engineer carrier are still being evaluated by the Engineer School's DCD.

Send It In!

Changes begin with the soldier, and the Essayons Program continues to be a useful tool for evaluating ideas from the field.

While not every proposal makes it to the test stage, all are thoroughly staffed before a final decision is made.

Engineers are encouraged to send your Essayons recommendations to : Commandant, U.S. Army Engineer School, ATTN: ATSE-CDT, Fort Leonard Wood, MO 65473-6620.

Mr. Kojro is a combat developments materiel analyst for the Engineer School's Directorate of Combat Developments. He is a former Armor officer, and previously served as a branch chief for the Directorate of Combat Developments at the Armor School. He is a graduate of the University of Illinois.

(Personal Viewpoint, continued)

When not under an active duty chemical battalion, a chemical company needs to be within the daily command and control of a corps or divisional combat engineer battalion. This places the company in a well defined and functional battalion environment with solid combat-multiplier experience and like-type battle focus.

Like a combat engineer company, the chemical company must be able to provide combat multiplying expertise to the task force commander. Both engineer and smoke assets shape the battlefield through obstacles and obscuration. Also, mobility and countermobility are mission-essential tasks for both of them. Thus, a similar type of leadership development is needed for both the castle and the crossed retorts wearers. That depth is found in the engineer battalion, where company commanders maintain a clear fix on maneuver support.

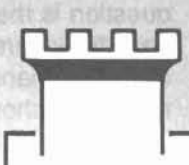
Other factors favor this solution. The chemical company's type and density of equipment are familiar to the engineer motor pool, and the engineer battalion is structured and experienced in handling the maintenance challenges. In addition, flexibility in independent operations and proficiency in METT-T configurations are common in both engineer and chemical maneuver support.

The bottom line is clear. We must organize and train in garrison and field as we will be in battle. The mentoring, training, maintaining, caring, and leading of a chemical company are essential to its overall readiness. It is not logical to place this asset under a staff officer or within a rear battle organization. We must avoid branch parochialism and subscribe to a true battle-focused doctrine.

Can a chemical company find its niche, happiness, and combat proficiency within a combat engineer battalion? Absolutely! Since February 1989, the 761st Smoke and Decon Company, a forces command corps-level unit located at Fort Ord, California, has been an integral part of the 14th Combat Engineer Battalion. Before that time, the 761st was located within a mixture of unique TDA and TO&E units under a medical battalion. Operational readiness levels, maintenance systems, administrative actions, professional development, and (most importantly) battle focus were a mixed lot. Given this situation, the company could not be expected to reach any solid level of sustained readiness. Now, as part of a combat battalion, the combat chemical soldiers are properly oriented and rock-solid ready.

This relationship is the answer. And it is not new. In World War II, the 14th, as part of the 36th Combat Engineer Regiment, accumulated 10 battle streamers. Within that regiment were a smoke company and a decon company. As an integral part of the 14th, the 761st Smoke and Decon company is now on a winning azimuth. Together they have shown where the chemical company needs to be.

Lieutenant Colonel Herb Harback is commander of the 14th Combat Engineer Battalion (Corps),. Fort Ord, CA. He has served in various command and staff positions, including executive officer, bayonet combat support command, 7th Infantry Division; deputy commander, 7th Engineer Brigade, VII U.S. Corps; brigade S-3, 7th Engineer Brigade; aide-de-camp to the commanding general, Western Command; company commander, 15th Engineer Battalion, 9th Infantry Division; and assistant division engineer, 3rd Infantry Division.



Engineer Problem

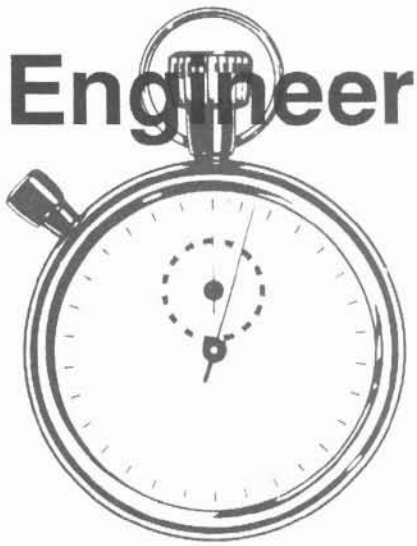
You are a combat heavy platoon leader in Panama. Your mission is to design a roadside ditch for a main supply route. The ditch must accommodate runoff from an area measuring 12 acres.

Additional Information:

Soil type - ML without turf
Slope of ditch - 4 percent
Reference manual - FM 5-335

Engineer Solution on pages 36 and 37.

Solving the Task Force Engineer Time Crunch



"It is very easy to accept dogma...when one reaches the comfortable state of believing that because certain ideas have worked in the past, it is not necessary to ask whether they can be improved upon."

S.L.A. Marshall

Almost every task force engineer (TFE) wishes he had more planning time. Often we find the TFE producing a written countermobility matrix, a survivability matrix, a time-line of events, an engineer annex instruction page, and an obstacle overlay. Without a doubt, this paperwork nightmare is a bad dream for both the engineer and the TF he serves. The TFE must be able to immediately develop a realistic plan and quickly record it in a readable format. This article proposes a fast defense planning method that makes effective use of that valuable time.

Through the years, task force planning has evolved into a drawn-out process loaded down with repetitive paperwork. This process is described in FC 5-71-2, *Engineers in the Tank and Mechanized Infantry Task Force.* It also takes too much time to complete. The time-line contains redundant information that is on the matrices. It is normally used only to present a clear picture to the maneuver commander. Calculating a bill of material for each obstacle, as is often done, is a long process that should be performed by the squad leaders. Have you ever seen the look on the face of a maneuver commander after he receives the orders brief? He tends to look a little puzzled at all the pages of engineer planning and wonders what part of it involves him. Chances are, he's not going to read it at all. And if he doesn't, you've been wasting your time.

The answer to the "There must be a better way..." question is the planning method which follows. It is easy to understand and offers speed, simplicity, and clear command and control. An overview of this method is shown at Figure 1.

Essentially, the process revolves around two documents: the obstacle overlay and the engineer execution matrix. You can record all engineer tasks, coordinating instructions and details on one form. You may add more forms if the defense is particularly long in duration. The obstacle overlay is drawn in standard fashion. One overlay and one matrix—that's all. It's fast and easy to understand.

Engineer Execution Matrix

A vertically oriented time-line serves as the framework for this method (Figure 2, page 32). Across the top are blank spaces for unit designations (normally engineer platoons) and heavy equipment teams. The first column on the left is an hour time scale, which ranges from the beginning of the defense preparation to a time after the expected attack. Increments of an hour or two work best.

By Captain Daniel P. McKenrick

Below the time-line area are several blocks used for specific unit missions, such as class IV recovery, lane closings, scatterable mines, etc. Under that is a remarks block for operation-specific needs and the priorities of support or work (if not stated earlier, in paragraph three of the operations order [OPORD]). At the bottom of the form is a sample mission block with its elements explained and any abbreviations spelled out. Simple, but it prevents misunderstandings.

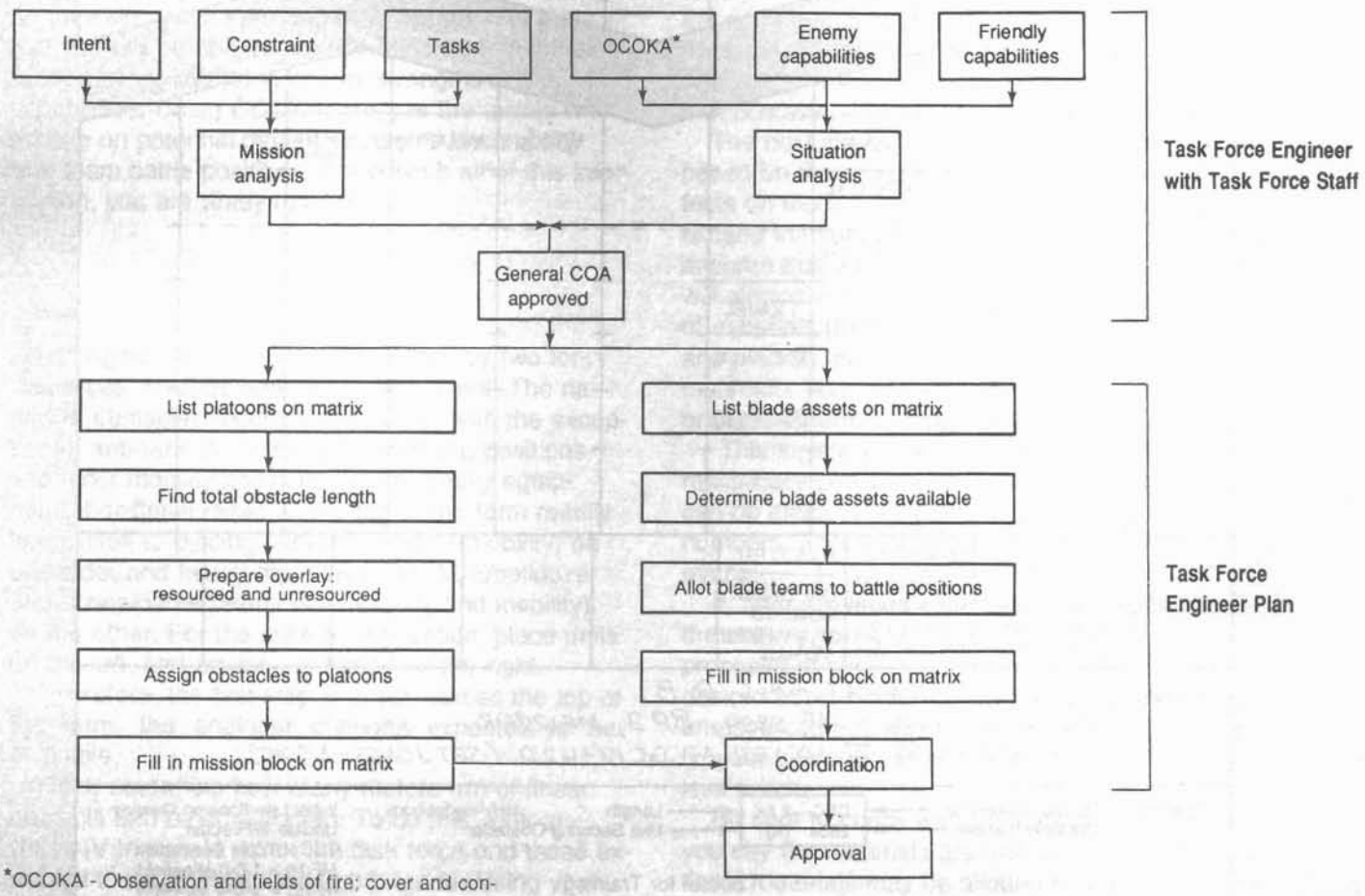
Before trying out this method on a task force defense, there is one reference that can simplify life for any task force engineer. It is an obstacle logistics and manpower reference sheet (Figure 3, page 33). You will have to create this from several field manuals and temper it with experience. It is important that the hours for obstacle construction accurately reflect your unit's capabilities. Later you will see how this makes planning much easier.

Gathering Information

Once you receive the mission, immediately move to the task force tactical operations center (TOC). Get with the TF commander or S-3 for a briefing on the concept and intent of the operation. If you train often with the task force, you are familiar with how the boss thinks and can quickly put things into perspective. By developing a satisfactory plan the first time around, you'll save a lot of time.

The old saying, "know your boss," still holds true. Read the brigade order, focusing on the commander's intent and the engineer annex. From the order, determine the brigade obstacle belts, obstacle-restricted areas, quantities of class IV and mines, the expected time of attack, and the presence of other engineer units that may augment you.

Making the Plan



*OCOKA - Observation and fields of fire; cover and concealment; obstacles; key terrain; avenues of approach.

Figure 1

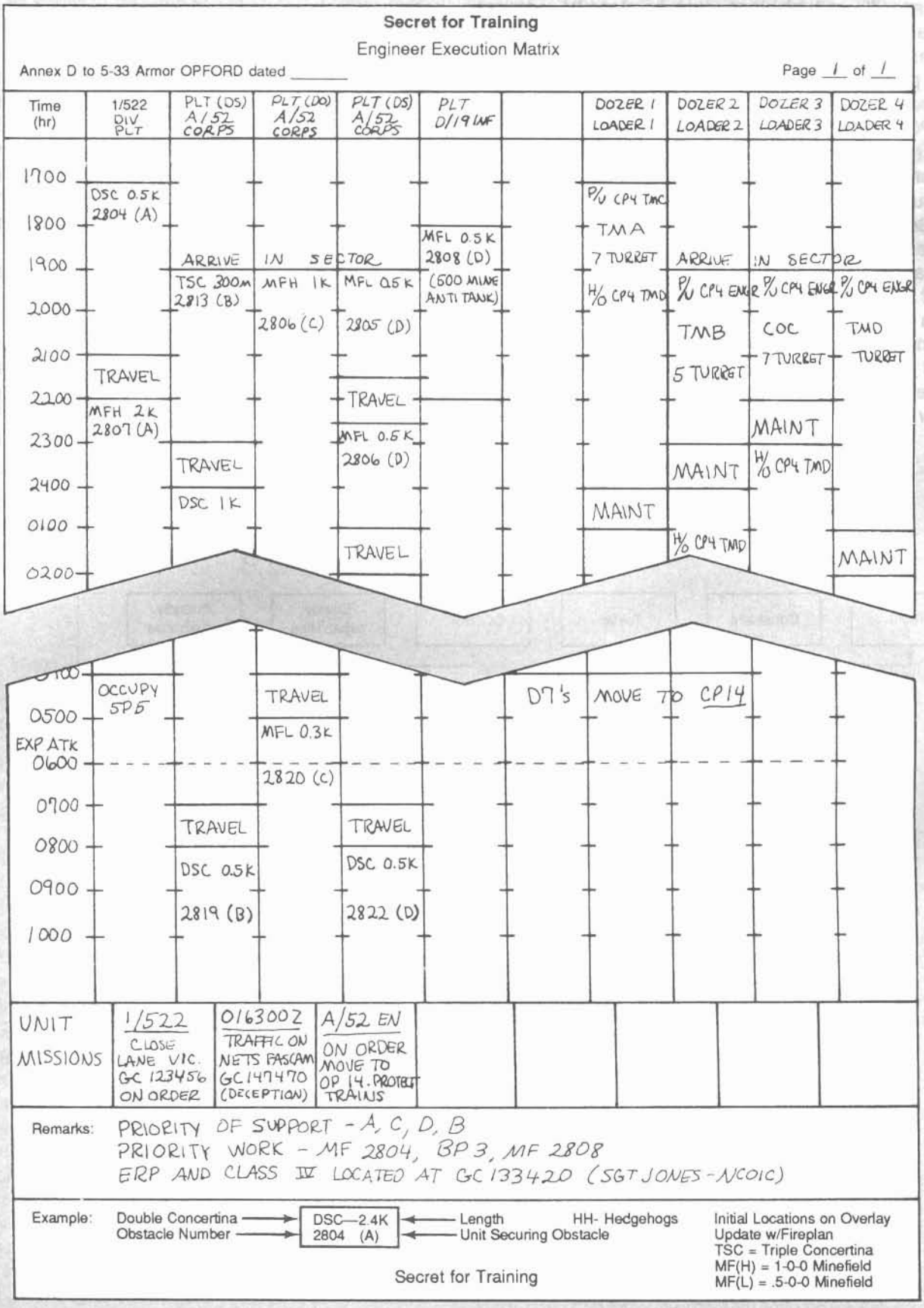

Secret for Training
Engineer Execution Matrix
Annex D to 5-33 Armor OPFORD dated _____
Page 1 of 1
Time (hr)
1/522 DIV PLT
PLT (DS) A/52 CORPS
PLT (DO) A/52 CORPS
PLT (DS) A/52 CORPS
PLT D/19 INF
DOZER 1 LOADER 1
DOZER 2 LOADER 2
DOZER 3 LOADER 3
DOZER 4 LOADER 4
1700
1800
1900
2000
2100
2200
2300
2400
0100
0200
0500
EXP ATK
0600
0700
0800
0900
1000
DSC 0.5K 2804 (A)
ARRIVE
IN SECTOR
TSC 300m 2813 (B)
MFH 1K 2806 (C)
MFL 0.5K 2805 (D)
MFL 0.5K 2808 (D)
(500 MINE ANTI TANK)
TRAVEL
MFH 2K 2807 (A)
MFL 0.5K 2806 (D)
DSC 1K
OCCUPY SP5
MFL 0.3K 2820 (C)
DSC 0.5K 2819 (B)
DSC 0.5K 2822 (D)
P/U CP4 TMC
TMA 7 TURRET
H/O CP4 TMD
P/U CP4 ENGR
TMB 5 TURRET
COC 7 TURRET
TMD TURRET
MAINT
H/O CP4 TMD
D7's MOVE TO CP14
UNIT MISSIONS
1/522 CLOSE LANE VIC. GC 123456 ON ORDER
0163002 TRAFFIC ON NETS FASCAM GC 147470 (DECEPTION)
A/52 EN ON ORDER MOVE TO OP 14. PROTECT TRAINS
Remarks:
PRIORITY OF SUPPORT - A, C, D, B
PRIORITY WORK - MF 2804, BP 3, MF 2808
ERP AND CLASS IV LOCATED AT GC 133420 (SGT JONES - NCOIC)
Example:
Double Concertina
Obstacle Number
DSC—2.4K
2804 (A)
Length
Unit Securing Obstacle
HH- Hedgehogs
Initial Locations on Overlay
Update w/Fireplan
TSC = Triple Concertina
MF(H) = 1-0-0 Minefield
MF(L) = .5-0-0 Minefield
Secret for Training

Figure 2

Obstacle Logistics and Manpower Reference Sheet

DIST (m)	PKT TSC	PKT DSC	CONC TSC	CONC DSC	BW	MINE 0.67-	MINE 1-0-	PHR TSC	PHR DSC	PHR M.67	PHR M1-
100	55	20	20	14	1	70	100	1.25	0.75	0.75	0.5
300	165	60	60	42	3	200	300	4	2.5	2.5	1.5
500	275	100	100	70	5	335	500	6.5	4	4	2.5
700	385	140	140	98	7	470	700	9	5.5	5.5	3.5
1000	550	200	200	140	10	670	1000	13	7.5	7.5	5
1300	715	260	260	182	13	870	1300	17	10	10	6.5
1500	825	300	300	210	15	1000	1500	19	12	12	7.5
1700	935	340	340	238	17	1135	1700	22	13	13	8.5
2000	1100	400	400	280	20	1335	2000	25	15	15	10
2300	1265	460	460	322	23	1535	2300	29	18	18	12
2500	1375	500	500	350	25	1670	2500	32	19	19	13

Figure 3

Review enemy intelligence with the S-2, focusing on opposing engineers and their assets. It is likely that you will be able to provide important information to the S-2 by analyzing enemy strengths and capabilities. Using OCOKA, analyze the terrain with an eye on potential digging problems in company and team battle positions. Armed with all of this information, you are ready to begin.

Obstacles

Engineer tasks are accomplished by two forces: soldiers and heavy equipment. The nature of obstacles requires manpower, with the exception of anti-tank ditches. Vehicle fighting positions and most mobility positions require heavy equipment. For these reasons, the top of the form readily lends itself to placing platoons (countermobility) on one side, and heavy equipment like ACE/bulldozer and scooploader teams (survivability and mobility) on the other. For the sake of convention, place units on the left, and equipment teams on the right.

Therefore, the first step is to list, across the top of the form, the engineer platoons expected to be available.

Next, determine how many meters (m) of linear obstacle can be constructed. To do this, look at Class IV materials within the task force and those expected to be available through brigade. Using your obstacles logistics and manpower reference sheet, enter the quantity of material available and record the corresponding obstacle distance, in meters, from the table. Since many obstacles require more than one type of material, choose the limiting amount for that obstacle.

The next step is to prepare an obstacle overlay, based on the commander's intent, the desired effects on the enemy, and the terrain. Take care not to exceed the sum of meters logistically possible. This ensures that your obstacles can be completed, and will eliminate the need for drawing up a separate bill of materials (BOM) for each obstacle. Let the squad and platoon leaders calculate the BOM to draw the materials. You only need to know that there is enough material to construct the obstacle.

This logistics constraint leads to an overlay which realistically portrays the number of obstacles that can be effectively emplaced. Now assign obstacle numbers. These will be used to cross-reference the matrix.

If, after allocating all available materials based on the commander's priorities, you find that your proposed obstacles are unable to produce the desired effect on the enemy, you can now plan the unresourced obstacles. If you have planned properly, your unresourced obstacles will be those with less priority.

Be sure to check with the task force S-4 before you say the materials are unavailable. Often, additional materials may be allotted to you because of changing priorities. It is very important for the

"Practice this method with your task force staff. . . They will be able to see the 'big picture,' and the execution of the TF engineer plan will be a lot easier."

commander to know which planned obstacles are not resourced. I suspect he will be very interested in these. You are telling him that they are essential to the defense—but you cannot build them because of material shortages. The subject of important but unresourced obstacles tends to get quick "radio publicity," and may help you get the necessary materials.

Now, assign the specific obstacles as tasks to the platoons. Often the corps company and the divisional platoon have missions that take them from one end of the battlefield to the other. Because engineers often travel long distances, elements are difficult to control and responsibilities may become foggy. By establishing a convention, this problem can be solved.

Begin by assigning the foremost obstacle on either the left or right of the battlefield to a platoon. Working from front to rear, assign that platoon tasks until it has no available time. Then, working from front to rear again, assign tasks to the next platoon. Assigning tasks across the battlefield in this manner is much like hanging wallpaper. You start at the top, work your way down, and then repeat the process.

Using this technique to assign missions ensures that the most important tasks are started first across the whole sector. It also creates convenient areas of responsibility. There is no need to establish formal boundaries because the task force will want to maintain flexibility.

Also, each engineer squad will know which company team it is supporting and who commands that unit. This is an advantage when the squad leader coordinates the placement of obstacles. Later, if the company/team commander discovers a problem with an obstacle to his front, he need not wander the battlefield to get it straightened out. The engineer unit that constructed it will still be to his front. This lends itself to a working relationship between the overwatching maneuver unit and the engineers who support it. And the closer coordination between the two will solve many problems encountered under the present system.

The next step is to schedule the tasks on the form. This requires a few rules. Between each task, the engineer platoon needs some time, generally 30 minutes to an hour, to obtain materials, make site coordination, and reorganize. Be sure to block that time out, and call it "travel time." The platoon should enforce a sleep plan (the obstacle logistics and manpower reference sheet reflects this) so the entire platoon doesn't have to shut down during obstacle construction.

To fill in the block, draw a line across the platoon column at the hour the mission is to start. From the overlay, determine the length of the obstacle. Refer to the logistics and manpower reference sheet to determine the platoon hours required. This amount of time determines how far down to draw the end of the task line. Between these two lines, place the four key elements of information. (Hint: When you are filling it out, the elements are listed at the bottom of the form for you—and everyone else—to see.) Enter the obstacle number, which can be referenced to the overlay to provide the type and location of the obstacle, the distance to the obstacle, in meters, and the unit overwatching the obstacle. Complete the "travel time" block next, and you are ready for another mission.

If needed, list obstacle locations in the mission blocks. However, this tends to cause limited coordination with overwatching units and is inaccurate when the obstacle is emplaced. Aside from direct observation, actual obstacle locations can be obtained from the company/team commander, who will report his fire plan obstacles to the TOC. In addition, the engineer unit constructing the obstacle will report actual locations through engineer channels.

The overlay shows the location and intent of obstacles. No one knows where an obstacle will actually end up until the maneuver unit sites it in. The task force engineer must approve any obstacle that varies significantly from its original location because moving the obstacle may alter its intent.

Heavy Equipment

Planning for heavy equipment use is much easier. Initially, you need to determine the number and types of fighting positions needed. Also determine mobility and anti-tank ditch requirements. These are usually secondary to survivability.

Now find out what equipment is available for the jobs at hand. A few equations make planning easy. Multiply the number of available ACE/bulldozers by the number of hours available for the defense.

Blades X available hours = blade hours

Subtract one-eighth to allow for maintenance and refueling. This means that every 8 hours the equipment will not operate for about an hour. This 1-hour block goes on the form later.

Blade hours X 7/8 = blade hours of work

Now divide the operating hours by the average time needed to construct a fighting position.

$$\frac{\text{Blade hours of work}}{\text{Hours per position}} = \text{number of positions}$$

This provides the number of fighting positions that it is possible to build under the current circumstances. If there are other equipment needs, subtract those hours out before working the equation.

Now that you have a clear understanding of what is needed and what is available, allocate positions to the maneuver teams. Keep in mind the commander's intent, and the impact of the differing terrain on each company and team area.

Staying consistent with the commander's priorities, schedule the equipment on the form. To do this, draw a line across the column of the specific equipment team at the time it is to begin work. Determine how long it will take the equipment team to complete the task by multiplying the number of the team's assigned fighting positions by the average time needed to construct a position. Then draw an end-of-task line across the column at that time. Now, just as before, enter the four essential elements of information:

- who uses the equipment,
- how many positions are expected,
- pick-up information, and
- hand-off information.

After the end-of-task line, allow an hour to get the equipment to the next company battle position.

It is also helpful to put in the 1-hour maintenance blocks before recording any missions. Remember to stagger the maintenance blocks so that not all equipment teams are stopped at the same time. The contact team with the maintenance truck can only be in one place at a time.

If one equipment team takes too long to complete a priority mission, allocate another equipment team to assist. The stated mission priorities are your guide to solving allocation conflicts. Repeat this process until there are no teams available. If there is an equipment shortage, quickly request more assets from higher headquarters, using your form to support the analysis.

The Advantage

In a very short time, the analysis, planning, and recording of engineer support for the defense is complete. Copy the overlay and the one page matrix and you are ready for the orders brief.

The matrix time line and block format make it "maneuver" readable. The final plan is realistic and closely reflects those obstacles that will be on the ground at the expected attack time. Compared to the standard way of doing TF engineer business, the planning process is simpler and the writing requirements are significantly reduced. Informal command and control areas for engineers greatly assist leaders in the execution of the plan. Overall, this method allows the engineer to quickly arrive at a realistic plan and to record it in a readable format.

This method has proved valuable in all task forces of the 194th Armored Brigade on several deployments and exercises. Based on the recommendations of former maneuver battalion commanders, this method is taught to officers at the Armor School for their use in planning.

Practice this method with your task force staff. Train them on your new system. They will be able to see the "big picture," and the execution of the TF engineer plan will be a lot easier.

Captain McKenrick is an Army Reserve officer in New Jersey. While on active duty, he served with the 19th Engineer Battalion, and the 522nd Engineer Company, 194th Armored Brigade. He was also an instructor in the Engineer School's Department of Combined Arms. He is a graduate of West Point.

Engineer Solution

Use the Field Estimate Method to determine runoff:

$$Q = 2ARC$$

where: Q = Quantity of water, in cubic feet per second (cfs)
2 = Constant
A = Area, in acres
R = Rainfall intensity (Panama = 2.5 inches per hour)
C = Coefficient of runoff (ML soil without turf = 0.40)

Follow the ditch design procedure beginning on page 4-7 of FM 5-335.

1. Calculate Q:

$$Q = 2(12)\ (2.5)\ (0.40)$$

Answer: Q = 24 cfs

2. Determine cross section area (Aw), using the Continuity Equation:

$$Q = V \times Aw$$

where: V (velocity) = 4 feet per second (fps)

$$Aw = \frac{Q}{V}$$

$$Aw = \frac{24}{4}$$

Answer: *Aw = 6 square feet*

3. Select ditch side slope ratios:

Answer: Roadside ditch is 3:1 to 1:1 ratio

4. Select ditch shape:

Answer: Because Q is less than 60 cfs, use a Vee-shaped ditch.

5. Compute depth of water:

Note: X and Y are the horizontal components of the side slope ratios; X = 3 and Y = I.

Engineer Solution

$$depth = \sqrt{\frac{2\,(Aw)}{X + Y}}$$

$$depth = \sqrt{\frac{2\,(6)}{3 + 1}}$$

$depth = 1.73$ feet $\not\emptyset$ **Answer: 1.7 feet**

6. Calculate cutting depth (CD):

$CD = depth + 0.5\ (freeboard)$

$CD = 1.7 + 0.5$

Answer: *CD = 2.2 feet*

7. Calculate top width of ditch (TW):

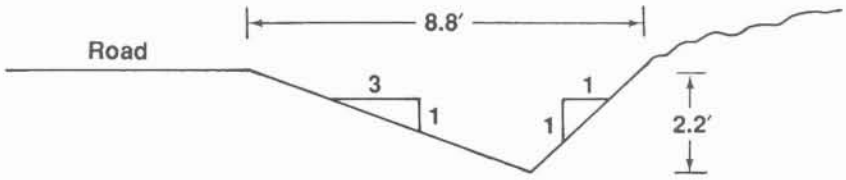
$TW = (X + Y)\ CD$

where: $X = 3$
$Y = 1$

$TW = (3 + 1)\ 2.2$

Answer: TW = 8.8 feet

8. Provide a sketch of the ditch



Erosion Control

The slope of the ditch is greater than 2 percent. Therefore, erosion control must be considered. Use check dams or line the ditch with rip rap.

This problem was submitted by CPT Michael F. Malsom, a drainage instructor at the U.S. Army Engineer School, Fort Leonard Wood.

A British View on American ADSM

Author's Note: This article, as differences in word spellings will attest, was originally written for a British audience. While my views on the use of ADSM are not official in nature, I thought they might be of interest to readers on both sides of the Atlantic.

—Major Alec Peebles

Scatterable mines are a fact of life on today's battlefields. The United States, Soviet and West German armies already have scatterable mine systems in service. The United Kingdom will have the capacity when MRLS II and Vehicle Launched Scatterable Mine Systems (VLSMS) are in service in the 1990s. It is timely and relevant, therefore, to consider some of the practical lessons learned by our allies whilst we develop our own tactical doctrine.

The U.S. has had a family of scatterable mines (FASCAM) in service for some years. The artillery delivered element is an integral part of brigade and battle group level force-on-force training at the National Training Centre (NTC), where the effects of artillery delivered scatterable mines (ADSM) are simulated by fire markers and controllers.

In consequence, a number of effective tactics for the use of ADSM have been developed along with the practical techniques needed to ensure that ADSM is completely integrated into the all arms battle. Recently the U.S. 2nd Brigade Combat Team, from 4th Infantry Division (Mechanised), deployed to the NTC for a 3-week rotation. In my role as brigade engineer and British exchange officer, I was in a unique position not just to observe, but to be a principal player in all aspects of the use of ADSM.

Aim

The aim of this paper is to show, using the American experience, how ADSM should be used to fight the brigade deep battle, and to illustrate the degree of integration necessary between both staff and all arms units.

The Battlefield

The National Training Centre (NTC) is the United States Army's premier training facility. Several aspects of the facility are unique and, because of them, the facility offers the most realistic and demanding training environment possible for manoeuvering troops. Some of the unique features are:

- A permanent motor rifle regiment (MR Regt)-sized opposition force (OPFOR) is established at the NTC. This force is trained in Soviet tactics, is equipped and organised as a Soviet unit, and fights according to Soviet doctrine. They are not a controlled enemy but are free players who have the advantage of an intimate knowledge of the terrain.

By Major Alec A. Peebles, Royal Engineers

- A permanent, fully equipped team of observer controllers (OC) are established as direct support (DS) down to platoon level. They also provide a higher formation control and flank information input.
- All vehicles (including helicopters and aircraft) are equipped with Multiple Integrated Laser Effects System (MILES) so that the effect of battlefield fire is realistically portrayed. Similarly, each soldier has individual MILES equipment so that casualties and the need for reconstitution is a major battlefield problem.
- An electronic system of tracking combat vehicles to within 10 meters (m) anywhere on the battlefield is centrally controlled. The information is displayed in real time on an electronic screen and kept as a permanent record for immediate and very thorough after action debriefs.
- The NTC is a 50 mile x 40 mile manoeuvre area whose only restrictions are its terrain features.
- A very real determination exists in both players and controllers to produce the real effect of actions taken (whether good or bad).

Although the NTC is not designed specifically to test equipment, it is the prime training vehicle for mechanised combined arms training. It has become, in consequence, the proving ground for equipment in a battlefield environment. More significantly, it has become the testbed for developing the tactical doctrine and necessary techniques for integrating equipment into the all arms AirLand Battle. A perfect example of this is the use of ADSM.

The Weapon

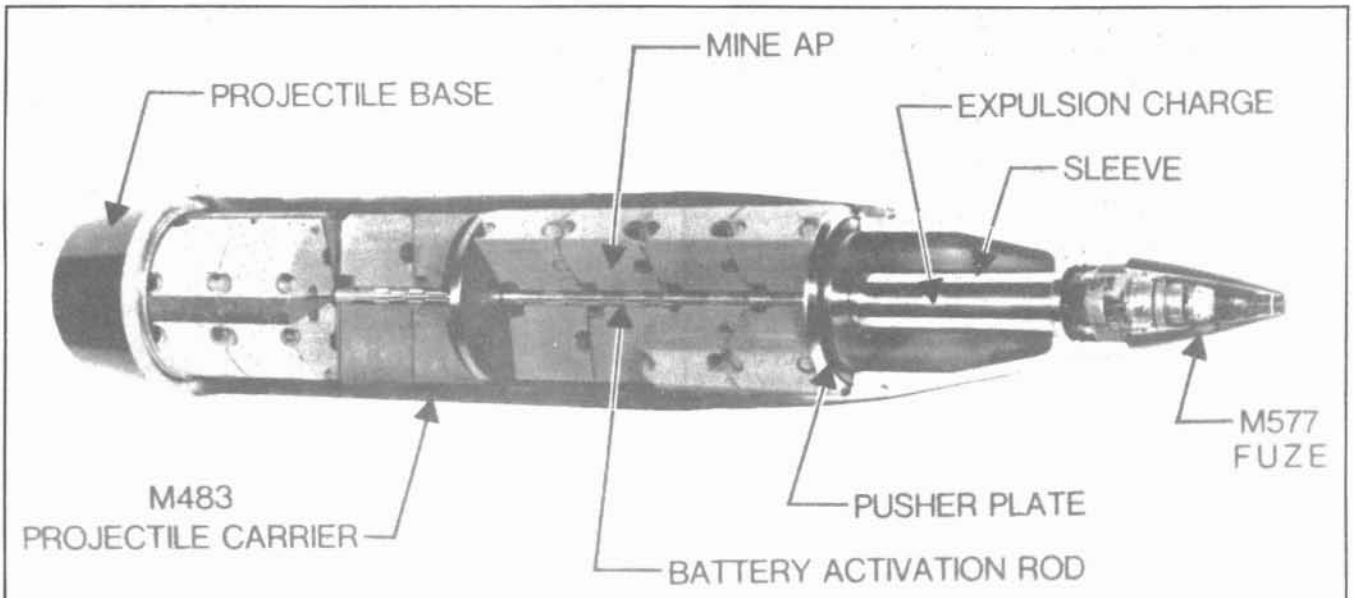
The rules of engagement for ADSM remain constant for each battle at NTC:

- Four low-density, two medium-density, or one high-density minefield are available.
- Only short delay fuses are used at brigade level, i.e., 5 hours to self-destruct. Longer length fuses are reserved for higher formations.

All ADSM fire missions must be authorized by division before firing. In practical terms this means that 10-12 minutes must be allowed to get divisional approval and a minimum of 7-10 minutes from firing until mines land and are armed on the ground (for a registered target).

The Players

On rotation 89-10, the 2nd Brigade Combat Team (BCT), part of 4th Infantry Division (Mech), deployed to NTC for 3 weeks, including 14 days continuous force-on-force manoeuvres in the field. The brigade consisted of two balanced task forces, each with two armor companies, two infantry companies, one engineer company, and one DS artillery battalion, plus brigade-level assets of a support battalion, chemical company (smoke and decontamination), military intelligence (MI), and air defence artillery (ADA) assets. Fixed-wing air, Army aviation, and division-level artillery were allocated for all battles depending on real availability and weather. The brigade commander, Col J. Dickey, is a very experienced brigade commander and veteran of



PROJECTILE, 155MM, HE, M692 / M731 (ADAM)

Photo courtesy of Honeywell, Incorporated

several NTC deployments, including one as brigade commander. This deployment was typical and included four attacks, three movements to contact and two defence battles.

Planning-Effects

The physical effect of a scatterable minefield once it has been emplaced is the same as for a conventionally emplaced minefield, i.e., it will cause some casualties, will probably impose some delay (if only from forcing the enemy to carry out a battle drill or to avoid the area), and it may cause the enemy to turn or divert.

The criteria for an effective and successful minefield must be related to what it is designed to achieve. However, two elements are critical for success. Namely, that it must be covered by effective fire (either direct or observed indirect) and that it must be observed so that the fire can be effectively controlled.

ADSM minefields are unique in that they allow the tactical commander to do two things he was previously unable to do. First, he is able to produce an effective obstacle anywhere on the battlefield within artillery range without committing ground troops or exposing their dispositions or strengths. This allows the tactical commander to extend the range over which he can directly influence enemy movement. The ADSM will also increase the effectiveness of those weapons which can be brought to bear on the enemy at those ranges, e.g. close air support (CAS), attack helicopters, and artillery. Second, the weapon gives the tactical commander the ability to shape the battlefield in response to a changing or developing tactical situation.

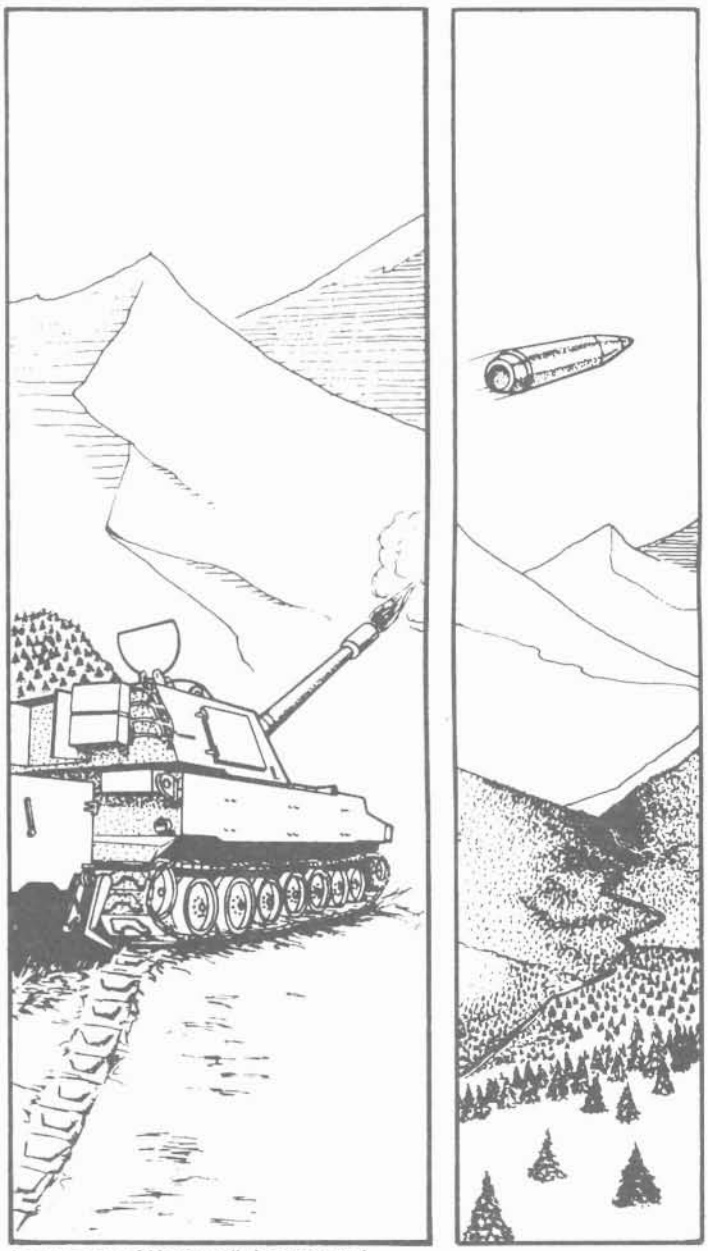
The combined effect of these two extra factors is that the tactical commander now has a number of new options available to him on how to fight the brigade deep battle. These, when coordinated with other assets, give him an opportunity to seize and retain the initiative from the enemy.

Planning-Options in Defence

In the brigade deep battle, that is, forward of the direct fire zone, engagement areas (EA) will have been identified and coordinated. The ADSM can be used as a combat multiplier either to delay an enemy force within the EAs and/or to deflect a moving enemy into them. The targets are thus concentrated and slowed, thereby enhancing the effect of those weapons targeted on the engagement area. Conventional obstacles may also achieve this if they are properly constructed and concealed. The advantage of the ADSM is that there is likely to be a number of EAs in the brigade area, and it allows the tactical commander to tailor his countermobility plan to the tactical situation while not prematurely obstructing his own mobility corridors.

ADSM can be used to orchestrate the battle to limit the number of enemy units with which the defenders are confronted. The aim is to achieve separation of the enemy's first and second echelon forces before they enter the direct fire zone. ADSM is thus used to disrupt the enemy's ability to mass.

Typically, a Soviet motorized rifle regiment will attack either three motor rifle battalions (MR Bns) in column, or two MR Bn up and one (the trail) 15-20 minutes behind. (The "trail" is ready to reinforce the more successful lead MR Bn.) In either case, the



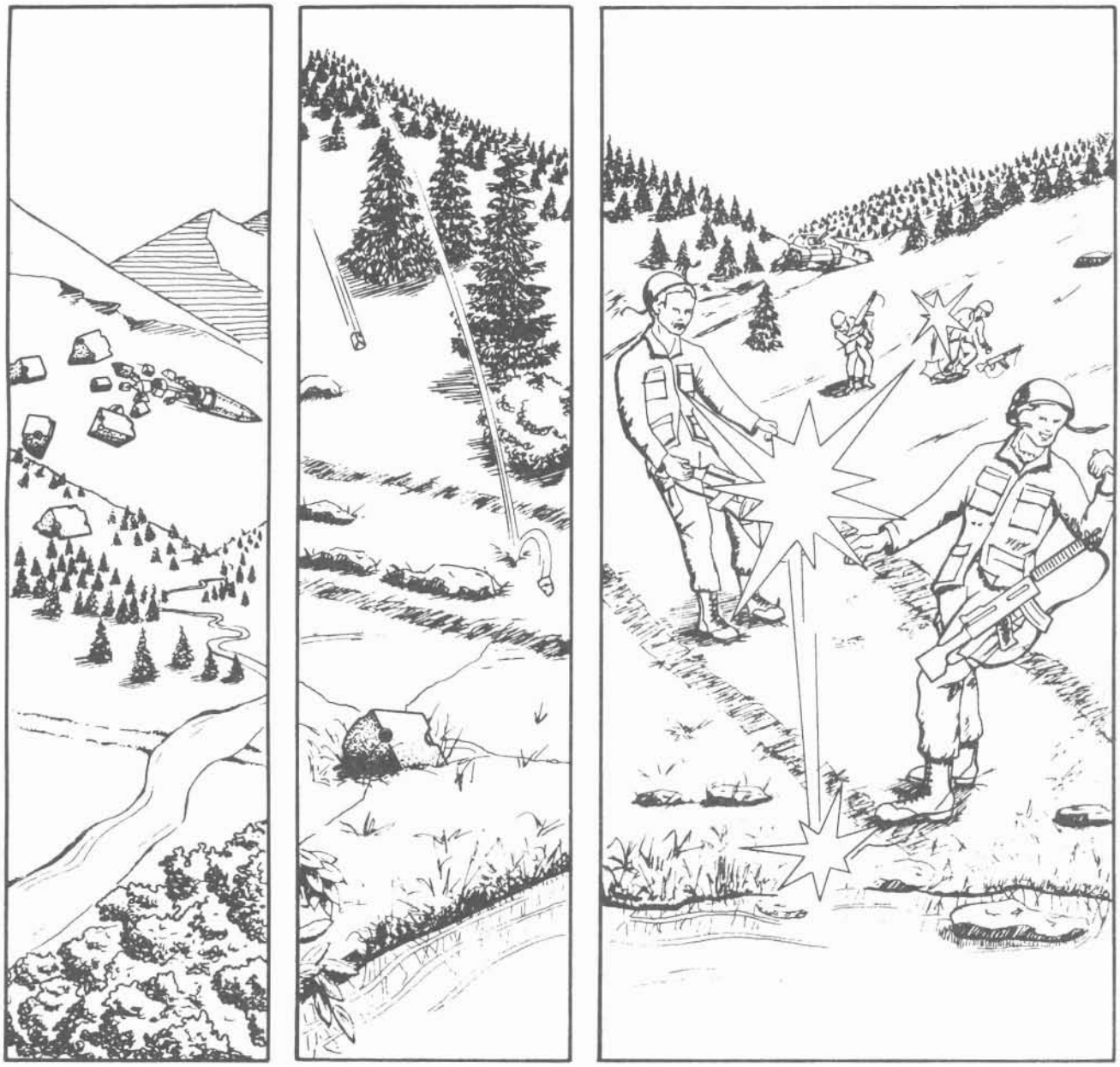
Art courtesy of Honeywell, Incorporated

ADSM is targeted to separate the trail (or third MR Bn), allowing the defending ground forces to concentrate on the lead MR Bn. Other brigade-level assets, e.g., CAS, attack helicopters, or MRLS destroy the trail MR Bn. Thus, by denying the enemy the ability to reinforce quickly or to commit fresh troops to a weakened point, the defending force is given time to mount a counter penetration operation or to readjust their dispositions—in effect, to develop their own mass to meet the threat.

This has been one of the most effective uses of ADSM at the NTC, where even a seemingly insignificant delay of 5-10 minutes has been the decisive difference between success and failure of a defensive battle.

In the direct fire zone, the ADSM may equally be employed to delay and disrupt an enemy force in the direct fire weapon killing areas. It could also be used to enhance the obstacle plan which shapes that area. (This may have to be done as an expedient measure if there has been insufficient time or resources to complete the obstacle plan, or if it has been ill-conceived and gaps have been left.) It is more effective to use ADSM to reestablish obstacles which have been breached or to use it in conjunction with a preplanned counter-penetration task. The complications of how these are best controlled and by whom on a confined and confused battlefield will be addressed later.

When moving a force of any size, an ADSM plan to



target likely enemy avenues of approach into an exposed flank is both sensible and obvious. However, the options for using ADSM in offensive operations are even more diverse than in defensive operations.

In a meeting engagement scenario, ADSM can be used initially to fix in position the enemy lead elements. Subsequently, ADSM can be targeted to enhance natural terrain features, e.g., an impassable ridge, thereby allowing mechanised infantry to establish a hasty defence to restrict the enemy's ability to conduct a flanking movement. The ability to do this quickly requires very slick battle procedure. A decisive commander with a clear battle picture combined with the artillery's ability to deliver the mines accurately and quickly is essential. Limiting your own freedom of movement is a danger in a rapidly changing situation.

In an attack, the ADSM should be used to restrict the enemy's ability to mass by preventing him from repositioning, i.e., by firing the ADSM on top of his known static locations or by selecting a suitable choke point through or round which he must pass. Clearly, the prime target in attack is the enemy counter-attack force, which will probably also be the priority target in attack for other brigade assets, such as army aviation or fixed-wing assets.

Often the enemy tactic is to use hide positions and only occupy prepared positions at the last moment (to avoid the artillery preparatory fire). When this is the case, two additional options are open. The first is to target the hide positions if they can be identified. The second is to target the prepared positions to prevent reoccupation. Either course will be influenced by the need for friendly forces to use the same ground and by the quality of intelligence information available. It is possible to time the ADSM to self-destruct before friendly forces arrive on the target.

The list of options given is not exhaustive, but it illustrates that a clear understanding of the weapon's capabilities is needed if the unique qualities are to be utilized.

Essentials For Success

Concept. The ADSM plan must have a clearly defined aim and be designed to support the overall concept of operations. At brigade level there are likely to be several contingencies dependent on the enemy threat. The ADSM plan must be capable of a quick and flexible response.

Targets. The ability to respond flexibly means that many more targets must be planned than can be fired. Routinely at the NTC this meant about 20-24 targets per mission, although a maximum of four ADSM targets are authorised. It is also possible to shape the target to suit the ground, e.g., 800m x 200m centred on grid 123456 oriented north-south, although at the NTC a standard 400 x 400 square minefield was used for control simplicity.

Time. The planning time to obtain release authority from division is approximately 10-12 minutes, while the lead time from firing until the mines have landed and armed is approximately 7-10 minutes for registered targets. There is, therefore, a clear requirement for an intelligence trigger if the ADSM is to be in position in time to affect the immediate battle. The circumstances needed to trigger individual targets must be defined.

Triggers. The circumstances (triggers) which cause an ADSM mission to be fired are worked out according to three factors:

- A straight time/distance calculation, based on the location of the target and the best speed of the enemy moving towards it.
- The projected enemy decision points, which are either terrain related, e.g., when he has to commit himself to a particular avenue of approach, or event related, e.g., when the enemy has to commit his trail MR Bn to reinforce one of the lead MR Bns.
- Enemy action may force our own troops to a particular course of action for which planned ADSM targets may be detrimental. A comparatively simple decision support matrix format is used for control and to keep all players informed (see chart at right).

Intelligence. The receipt of the necessary battle information or intelligence assessments is, therefore, crucial if the ADSM is to be fired in time. The solution to the problem depends on gearing the intelligence collection plan to provide the necessary information for ADSM triggers. In practical terms, this is a major coordination effort that includes specific taskings for reconnaissance assets on the ground, and utilizing longer range assets, e.g., fixed wing, army aviation, direct fire assets, etc.

Equally vital sources of information are division and flank formations. (Often enemy decision points and friendly trigger lines lay outside the brigade boundaries.) Similarly, it is often possible for division assets to confirm battlefield reports or vice versa. The whole process also has the effect of focusing the division intelligence system on the information that is critical to the brigade plan. It also helps the rapid release of firing authority.

Assets. When the decision to fire ADSM has been made, execution still depends on three factors:

- That the artillery and ammunition are still available, i.e., they have not been destroyed or were on the move.

Scatterable Mine (FASCAM) Decision Matrix Example

Target number	Location	Aim	Trigger	Trigger Location	Division Clearance	Priority	Remarks
DB0001	398118	Separate trail motorised rifle battalion from lead MR Bn	1. Enemy committed to southern approach 2. Enemy trail MR Bn committed to southern approach 3. Enemy lead MR Bn reaches target location	Easting 44Sth of Northing 14 passing hill 876	With effect from 10 June 0500 Fired at	1	Low density minefield; coordinated with Aviation Liaison Officer for attack helicopters from attack position Charlie
DB0002	298153	Delay enemy in southern pass defile	1. Enemy committed to southern pass at decision point 4 track junction	Easting 34N of Northing 12	Not yet given	3	Low density minefield 800 x 200 N - S
See note 1		See note 2	339140	See note 3	See note 4		

Notes:

1. Standard 4th Infantry Division target numbers.
2. This defines the intent of minefield. There may be several different sets of circumstances which will trigger the FASCAM. Equally, the minefield may meet several aims which would be defined separately.
3. The trigger point ideally should be related to a terrain feature to assist the observer asset tasked to oversee it.
4. The authority release time, the time the decision to fire was made, and the time the FASCAM was in place.

- That authority for release has been obtained from division.
- That the priority of fire has been given to the ADSM mission. In practical terms, to fire two low- or one medium-density minefield means being without a 3 x 8 artillery battalion for approximately 4-5 minutes, not counting the subsequent movement.

Effectiveness. In order for the ADSM minefield to have the maximum effect it, like any other obstacle, must be covered by fire. In the case of the brigade deep battle, this means coordination of other assets, e.g., artillery, attack helicopters or CAS, together with the surveillance assets to direct them on the target. Equally important is to report their effect on enemy movement and the number of casualties. Orchestrating the types of fire to complement the ADSM and increase its effect is also possible. For example, conventional artillery fired on an enemy moving in columns in front of a minefield causes the enemy to disperse into battle formation. This causes them to incur more casualties from the mines. Similarly, the OPFOR tend to reform into columns after passing through a minefield when conventional fire is again more effective.

Clearly, the quantity and detail of coordination necessary from all elements of the staff as well as those engaged on the battlefield is considerable. The planning sequence and responsibilities are outlined below.

Level of Control

Control is best retained at brigade level. ADSM has most influence when it is used as part of the brigade deep battle and in conjunction with brigade-controlled fire assets throughout the whole brigade area. It is most effective when used on brigade level tasks, such as separating the enemy echelons, preventing his repositioning or by delaying his counterattack force.

Speed of reaction to the enemy situation or in obtaining release authority is critical if the ADSM is to

be fired in time. The brigade headquarters is the focus for the intelligence collection plan, and with the best communications to division can keep delays to a minimum.

Conversely, delegating the control of ADSM to the battle group level only produces a problem for the brigade commander. He has neither the intelligence assets, time, nor communications necessary to anticipate when ADSM is to be fired to be effective. The temptation is to fire ADSM before battle is really joined to avoid "losing" indirect fire assets at a critical time.

Similarly, delegation of control requires a commitment to one or other of the battle groups. Hence, the flexibility of response to the enemy action is lost or at least complicated. The NTC experience is that even when ADSM targets are fired in the direct fire zone, they are best fired by the brigade in direct support of the battle group action rather than controlled by the battle groups themselves.

Planning Sequence

Initial staff work on receipt of mission. In addition to the normal brigade engineer officer (BEO) input into the Intelligence Preparation of the Battlefield (IPB) by the brigade S-2 (intelligence officer) such as terrain analysis, battlefield obstacle update, and likely enemy engineer courses of action, the BEO identifies terrain suitable for ADSM targets. It may be necessary at this stage to tailor target shape and orientation of ADSM to ensure the minefields on the ground are effective, e.g., extended across the whole width of a defile.

At the same time, the BEO and fire support officer (Arty Ops) must confirm what ADSM has been allocated and what restrictions apply, e.g., release authority, available fuses, or which artillery is to execute the missions (this may impose a range restriction).

Tactical commander's outline concept. Based on the IPB, which includes the templated enemy positions and his possible courses of action according to doctrine, the tactical commander decides on the brigade concept of operations for each eventuality. As part of that process, the overall aim and possible uses for ADSM are identified. The crucial elements are to clearly identify what effect on the enemy the ADSM is designed to achieve and to establish which circumstances are to trigger the decision to fire ADSM.

This process allows the BEO to produce a combined target list and decision support matrix. This is the basis for the control of the ADSM during the battle. It contains not just locations, type and shape of the ADSM targets, but also the decision criteria and triggers for each one. The ADSM decision support matrix is included in the brigade order in parallel with the brigade obstacle plan with which it has been coordinated.

Subsequent staff actions and coordination. The decision support matrix is used by the brigade S-2 to identify priority intelligence requirement (PIR) and to incorporate them into the intelligence collection plan tasking brigade and battle group assets accordingly. Similarly the PIR are passed to the division and flank formations via the intelligence net. The FSO (Arty Ops) uses the matrix to register targets in the digital tacfire systems. It is often possible to checkfire and adjust the targets and thereby to rehearse and prove both the artillery execution and the reconnaissance/surveillance assets tasked to oversee them. In defence, the registration can be done by the artillery target surveyor system (PADS) to keep the target location secure. Other artillery targets are planned in conjunction with the ADSM to complement it. Artillery problems can also be identified at this stage, e.g., for a movement to contact, artillery assets sometimes have to be moved forward early to provide the necessary range.

The BEO passes the ADSM plan to both the division engineer and the division G-3 (operations), requesting release authority from the latter for the top priority targets. This is sometimes given early although usually with some qualification, e.g., release given from 30 minutes prior to line of departure time (H hour).

The battle group commanders, after a similar initial planning sequence at the lower level, may identify further ADSM targets to support the close contact battle, or seek adjustments to the brigade target list. These are agreed and are incorporated into the brigade decision support matrix rather than be a separate list. For each new target or adjustment to the list, all the staff actions have to take place. This takes considerable time and effort.

Further coordination with the air liaison officer (ALO) and the aviation LO is needed to preplan how those assets will be orchestrated and controlled on the battlefield to make maximum use of the opportunity ADSM provides. This is part of the overall coordination of fire plan when detailed control arrangements and priorities of fire and of targets are coordinated.

The final function to be performed, which is crucial to achieving success, is a full staff rehearsal of the plan. This staff rehearsal on a large-scale sand model is a brigade staff prebattle SOP for the whole battle. It is the means whereby all those who will be or could become involved in fighting the battle are fully informed and made to understand the concepts and priorities of the battle, and how it is to be executed and controlled. It includes not only all principle staff but the ALO, attack helicopter LO, air battle

captain, and those who will be running the battle from the TOC (main HQ), jump TOC (alternate HQ), and tac HQ. The rehearsal does not necessarily include subordinate commanders, although they are desirable. The rehearsal often exposes shortfalls and the need for further coordination. It is also used as the vehicle to design some redundancy into the plan particularly in communication aspects.

Battle Fighting

The long, involved and time-consuming planning and coordination process is proved justified when the battle is fought. It clarifies the responsibility of the principle staff, who are therefore better able to anticipate requirements and react quickly. The responsibilities are:

The brigade commander, or XO, fights the battle and makes all executive decisions either to fire or to change the priority of ADSM targets.

The brigade S-2 (intelligence officer) coordinates the information from all agencies plotted on the operations map and from which he produces his assessment of enemy intentions.

The FSO (Arty Ops) executes the ADSM and keeps the brigade staff updated on likely reaction time if the executive order is given.

The BEO is the overall coordinator of the ADSM battle. This involves correlating all the intelligence information with the ADSM decision support matrix and recommending to the commander which targets should have priority and what the trigger events are. He is also able to assess how much time is available to make the decision. When changes are needed, which is often, the BEO obtains release authority from division, warns the other staff, e.g., FSO, ALO and aviation, and passes the scatterable mine warning report up to division.

Once the executive order is given to fire the ADSM, the BEO ensures that it is properly recorded and reported. An accurate report on its effect is often difficult to obtain in a confused battle, however. The reporting is critical to maintain an accurate battle map, and to record when short time delay self-destruct fuses have been fired.

The distribution of responsibility serves two other important functions besides ensuring that the ADSM is used effectively. First, it allows the battle commander to concentrate on making decisions while being sure he is being fed the right information to be able to react in time. Second, it ensures that the engineer has a real and crucial part to play in fighting the battle, often carrying out functions which are usually S-3 (Operations) actions. This serves to relieve the pressure on the operations staff at critical times in the battle.

Summary

The main points are:

- Artillery delivered scatterable mines (ADSM) can be a decisive battle-winning factor in both offence and defence.
- ADSM are most effective when used in the brigade deep battle, where they can allow the tactical commander to seize and retain the initiative.
- ADSM must be used to support the overall concept of operations and are most effective when used to disrupt the enemy's ability to mass.
- Their use must be planned and controlled at brigade level, where a specific member of the brigade staff should be responsible for overall coordination of planning and control during battle.
- Firing scatterable mines in response to enemy action requires significant lead time. Clear trigger lines and decision criteria must be identified in the plan and integrated into the intelligence collection plan using all available assets if these lead lines are to be met. The decision support matrix is a simple, well proven technique to assist in this process.
- It is insufficient to regard ADSM as a weapon which can be pulled out and used if the right circumstances arise. It will simply not operate in time.

Conclusion

It is not possible to make detailed comparisons between the U.S. Army artillery delivered scatterable mine (ADSM) system and our MRLS 11. The weapons, organisations and philosophy of how to fight are very different. However, the fundamental employment options and the requirements for planning and control to use the weapons effectively are the same for both systems. A study of the proven American tactics and techniques is, therefore, relevant and should be studied and applied to the British organisation when developing our own tactical doctrine.

Major Peebles is a British engineer exchange officer assigned to the 4th Infantry Division, Fort Carson. His previous assignment was as an instructor at the United Kingdom Combined Arms Tactics Course. He is a graduate of the Royal Military Academy, Sandhurst, and holds a civil engineering degree from the Royal Military College of Science, Shrivenham.



MISPLACED COMPASSION

By Colonel Ron Dabbieri,
Chief, Combat Support Career Division,
Enlisted Personnel Management Directorate,
U.S. Total Army Personnel Command (PERSCOM)

A Speech Presented at the Signal Corps Association Regimental Dinner, Fort Gordon, Georgia, April 25, 1990

Over the next few years the Army will be faced with some significant leadership challenges. My intention here is to explain a philosophy as to how we, as leaders, should approach these challenges. A few years ago when I was commanding the 2d Engineer Battalion, 2d Infantry Division, in Korea, I had an executive officer named Major (now Lieutenant Colonel) Tom Tindall, who introduced me to the term "misplaced compassion." Since then I have run across the same concept termed "tough caring," among other things, and I have tried to apply it in my dealings with both situations and people. The best way to explain it is to use a couple of examples.

A good tactical example would be when a unit goes through MOPP training in chemical protective gear during the summer. Although it may become uncomfortable, unless troops are endangered by the training, being merely uncomfortable is not a reason to compromise the training. Because troops only do in combat what they have practiced in training, a leader who feels sorry for his troops and allows them to cheat and remove their protective masks in training is setting them up to do the same if they were to ever get into an actual chemical environment.

Another good example is physical training. Not making troops get into shape during peacetime means they will not have the stamina to survive in combat. Is it not much more compassionate, more humane, to make them do the right thing in training so they will not die in combat?

Although it is very clear how misplaced compassion applies to training, it has a definite application in the personnel business, and I want to explain how all leaders should use this concept to guide their actions in dealing with subordinates.

Both the command sergeant major and sergeant first class promotion lists were recently released. As is always the case when a list is released, I was deluged with phone calls from soldiers asking "why wasn't I selected?" and from leaders (some with four stars) asking "why wasn't my main man selected?" Because I've been asked this question so many times during the two years I've been in PERSCOM, I have done some extensive research into what enlisted centralized selection boards look for in a selectee. I have thoroughly analyzed two years worth of after action reports prepared by each panel for branch proponents, interviewed members of nine promotion panels, and screened thousands of records of selectees and non-selectees. I feel that I have developed a fairly good understanding of what promotion boards for the branches I manage (Signal, Engineer, Aviation, Transportation, Military Police and Military Intelligence) are looking for. The most important attribute is outstanding performance in the tough TOE leadership positions.

The Attention Getter

Whenever I talk to leaders, especially officers, I get their attention by questioning how much interest they really have in their enlisted soldiers. I do this by asking what the selection rates to major, lieutenant colonel, and colonel were this year. Almost every officer, even second lieutenants who don't have a prayer of being retained past their initial term of obligated service, can tell me within 2 percent the right answers. (Just for comparison it ranges from about 70 percent for major to 40 percent for colonel).

Then I ask what the selection rate was for sergeant first class for the list released in March 90, and I get blank stares. After I give the hint that a staff sergeant had a 42 percent greater selection chance this year than last I start getting guesses from 60 percent to 80 percent. The real answer is this year the SFC selection rate soared up to 15.6 percent, which is 42 percent greater that it was last year when it was 11.2 percent. This year the selection rate to master sergeant was 17.1 percent, the highest it has been in years. Last year it was 12.7 percent. Today a staff sergeant has a less than 3 percent chance of ever making master sergeant!

With these low selection rates, boards are not only looking for outstanding NCO Evaluation Reports (NCOERs), they are looking at what the NCO was doing when he got the outstanding NCOER. They refer to jobs like platoon sergeant, first sergeant, and other TOE leadership jobs as being the "high risk-high payoff" positions. An NCO who wants to get promoted can't afford to sit back, he has to go out and aggressively seek those tough leadership jobs. Commanders and leaders also have an obligation to help worthy NCOs by putting them into those "high payoff" jobs. All too often, NCOs avoid these positions either because they are afraid of them due to their lack of previous leadership experience, or they are complacent and happy to let someone else do the tough jobs.

Why Me?

We all know NCOs who are delighted to spend many years behind the podium as a service school instructor, going home at 1600 hours every night. They can perform any mission, just so long as it is under environmentally controlled conditions—air conditioned in the summer, close to a heater in the winter, and within arm's reach of a coffee pot. Letting them stay there forever—is that true compassion? Yes, soldiers who do this are selecting themselves for non-selection. Yet, even though they know the end result is being "passed over" for promotion, these are the first guys to call me when the board results are released asking "why wasn't I selected?"

True compassion is to make these NCOs move to a location where the job they need for professional development is available, tell them what that job is, and encourage them to seek those tough leadership challenges. Many of these NCOs were simply afraid to try the TOE positions, but after being forced to, they do well. They just needed to mature into them. With the number of NCOs that have repetitive platoon sergeant tours back to back and done well in them, it is obvious that in most Career Management Fields (CMFs) there are more than enough to go around. Some NCOs feel comfortable doing them over and over again after they have gotten the first successful tour under their belt. Commanders and leaders need to show real compassion by encouraging all

good NCOs to seek these "high risk-high payoff" positions and helping them develop into "promotable" leaders.

Chauffeurs vs. Leaders

Sometimes commanders and leaders are either selfish in using soldiers or don't understand the effect they have on the NCO's career by the jobs they keep them in. The best example of this occurred at 0730 hours on the morning the last SFC list was released. PERSCOM got two calls from two senior generals asking "why didn't my driver get selected?" With the short suspense I had, it was fortunate I had done an analysis of selection rates of VIP chauffeurs a few months earlier to provide professional development counselling for one of these same two NCOs. Both were primary zone SFC non-selects with excellent records, high GT scores, high school degrees, ANCOC graduates, and outstanding NCOERs—all with three-star or above raters. My analysis a few months earlier was that it would have been a miracle if either one of these two NCOs were to have ever been selected!

SFC promotion boards are asking the question "Do I want this NCO to be a platoon sergeant for me?" and if the answer is no, then the NCO is a non-select. In this case, these generals had been keeping these drivers with them as they went from assignment to assignment, or arranging for them to drive for other generals. Unfortunately, the members of the Transportation Promotion Panel do not recognize the "leadership" associated with driving a general officer, so they rarely select them for promotion.

Jobs and Careers

This does not mean that one tour as a VIP driver ends a career. I'm talking about the NCO who stays a driver and avoids the tough TOE leadership position. With a 15.6 percent selection rate, there are more than enough soldiers who have been truck platoon sergeants and maneuver support platoon sergeants to fill the quotas without selecting soldiers who have never served in a tactical leadership position. Misplaced compassion is helping that NCO avoid the tough job that might have allowed him to be selected.

Now, understand that the Transportation Corps is not alone in having jobs that must be done but that are less than career enhancing. MPs have accident investigators and dog handlers, and engineers have repair and utilities NCOs. And it doesn't help for anyone to work out of their MOS.

Sometimes commanders just must have a job done, but they need to realize the effect it has on the NCO's career. And they need to make sure that don't keep that soldier in that position for too long. If you don't have a supply sergeant and you absolutely have to put your 31Y commo chief in there to hold it together, recognize the fact that—even if you give him great NCOERs—he is still going to be hurt by it. Promotion boards promote people because of how well they perform in their own MOS, not in another one.

Another good example of misplaced compassion is when a commander or leader helps a subordinate get off an overseas assignment. First, it should be noted that selection boards view overseas service favorably. Soldiers who have performed their fair share of the tough overseas duty tend to have better career patterns, more varied assignments, more leadership experience, and higher selection rates. Selection panel members tell me they know what the turn around times are in their CMFs and it is obvious when someone has not done his fair share. When a soldier is selected for an overseas assignment, he is the most eligible to perform that duty. Overseas assignments must be filled, so when a soldier is deleted from the assignment, another less eligible soldier has to take his place, and he gets a lot less lead time. When leaders, believing they are being compassionate, help a soldier manipulate the system to avoid an overseas tour, they need to show a little compassion for the other poor soldier, who is less eligible, but who now has to replace the shirker.

The system is fair. If everyone takes his fair turn in the rotation for both long and short overseas tours to USAREUR, Korea, and Panama, then there will be a maximum turn around time for everyone. Commanders, do what is right and show compassion for all soldiers.

The Rush to Reclassify

Another phenomena occurs right after a promotion list is released: the number of soldiers who clamor to reclassify, and the number of commanders who blindly sign the recommendation for approval on the DA Form 4187, without even talking to the soldier. First, understand that in many cases reclassifying out of a grossly overstrength dead-end MOS is a good career move, but the soldier needs to be smart about it.

My research shows that very few NCOs, staff sergeant and above, who reclassify out of their CMF, and especially out of their branch, ever get promoted. I have questioned panel members why this occurs. I've been told that there is no bias

against them, but when an NCO reclassifies, he gets Skill Level 1 training and maybe BNCOC if he is lucky. Then he is expected to supervise soldiers who have been in the MOS for years. This can be a "mission impossible," and normally their first few NCOERs are not good. With the low selection rates, you don't need too many mediocre NCOERs to be non-competitive. Also, selection boards have more than enough "home grown," in-the-branch NCOs with outstanding records to fill all the promotion quotas without looking for opportunists who came into the branch late in life.

As a battalion commander, if your XO came in to see you about a branch transfer to be a dietitian because they had a 100 percent selection rate to LTC this year and your branch didn't do as well, wouldn't you set him down and counsel him? Wouldn't you say to him "Look, you've been a platoon leader, company commander, and now a battalion XO in this branch, what do you know about being a dietitian? Yes, they had a good selection rate but they're not going to select you!"

Instead of giving your NCO the instant gratification of approving his request, don't you owe it to him to counsel him so that he makes the right decision? My advice is to stay in the same branch where there is a great deal of transferability of skill, and the members of the promotion boards have been members of your branch all along.

"Not in my Army!"

Another area where I see many instances of misplaced compassion is mandatory reclassification actions where an NCO has lost qualification for an MOS through his own misconduct. A security clearance is required to hold many MOSs, especially in the Signal Corps, Military Intelligence, and Military Police branches. I have seen numerous instances where an NCO has committed repeated acts of misconduct, in many cases without any disciplinary action being taken, and the commander simply wants me to move the individual out of his branch. The attitude seems to be "this NCO is good enough to be in the Army—just not my Army!"

If it's possible, I leave the individual in the MOS and return the action back to the commander to reevaluate the NCO's retention potential. PERSCOM mandatory reclassification rules leave the soldier in the same CMF or branch if possible, then he stays in the same category (Combat Arms, Combat Support, Combat Service Support). In these circumstances, if I could, I would enter this substandard individual (along with the commander who wants to keep him in the Army) into the Married Army Couples Program so they could be together for the rest of their careers. The problem is, if we do retain one of these soldiers on active duty, some other branch has to take him and he blocks a promotion for some other good soldier who has paid his dues in the MOS—and that is *not* fair.

Commanders, when you have a soldier who must be reclassified because of his own misconduct, take care of your own dirty linen and don't just shuffle your problem off to another branch. This is truly the definition of misplaced compassion, when you show compassion for a substandard NCO. You don't want him in your branch or unit, yet you allow him to continue to take up space and stripes in our Army that rightfully belong to a good and deserving soldier. Here, what we need is a little compassion for the other soldiers that this guy is holding back—or the soldiers being subjected to this NCO's substandard leadership.

If you have been reading the Army Times, you know about as much as anybody about Army force structure and strength reductions in the years to come. We have already begun to draw down forces and inactivate units at Fort Lewis and Fort Knox, and are planning for reductions at Fort Hood.

Tomorrow's Army

The future size of the Army will be influenced by national strategy, the changing threat, and the budget. The strength of the Army will be adjusted to keep authorizations and inventory in sync. The number most commonly quoted is about a 580,000 soldier Army by FY 96/97. This would mean about a 35,000 loss every year between now and then. The Chief of Staff guidance has been not to sacrifice readiness and, as a matter of fact, he expects readiness to improve. Some things to consider—today's Army is built on volunteers, they are quality soldiers not eager to leave the service. This is not a demobilization exercise like after our wars where people were eager to get back to civilian life.

Given this, the personnel principles we will be guided by are:

- Protect quality
- Care and compassion
- Shape the force for the future
- Common sense
- Sustain readiness

So what have we already done in FY 90?

- Reduced by 18,000 the number of new accessions into the Army.
- Reduced MACOM first term reenlistment missions from 34,400 to 27,000.
- As of April 1, 1990, greatly reduced reenlistment options. Career soldiers with 10 years or more time in service can reenlist Regular Army or leave service. Several other options have also been greatly reduced.
- Curtailed Selective Reenlistment Bonuses (SRBs) to cover only the most critical MOSs.
- This year an estimated 1100 substandard NCOs will be eliminated as a result of Qualitative Management Program (QMP) actions. The zone of QMP consideration for the July 1990 master sergeant board will include all sergeants first class with one year time in grade. Previously, only those NCOs in the zone of consideration for promotion were scrutinized.
- Granted commanders authority to separate early those soldiers barred from reenlistment, if they volunteer for such action and the commander feels the soldier is not capable of overcoming the bar. Here, it is incumbent upon the commander to counsel the soldier on the merits of cutting his losses and starting over as a civilian rather than hanging around until ETS.
- Provided authority to separate soldiers up to 90 days prior to normal ETS. We are seeking authority to separate soldiers up to one year early in units affected by reductions, who do not intend to reenlist, provided there are no loss of benefits.
- Internal to PERSCOM, liberalized standards for approving "exception to policy" retirements. The two year lock-in for promotion is routinely waived for soldiers who want to retire immediately rather than accept an overseas assignment. A warning here is that you must submit immediately and retire as soon as you reach 20 years service. Don't expect to be allowed to decline an unaccompanied assignment and then, six months after you come down on instructions, be allowed to submit your retirement.

And what do I see coming up in FY 91 and beyond?

- Continued reductions in accessions.
- Continued early separations for substandard soldiers (bars and QMP).
- Possible reductions in reenlistment control points (RCP).

I can't provide any guarantees, but it is the Army's position to do everything possible to avoid an enlisted reduction in force (RIF).

As commanders and leaders—what can you do to help?

Be selective in reenlisting soldiers. Go for the quality. Remember, if you allow a less-than-quality soldier to reenlist today, he may displace a good soldier who we won't have room for tomorrow.

When a soldier commits an act of misconduct that requires you to revoke his security clearance—take a hard look at him. Don't just hand him off to another branch by reclassifying him. Do the right thing even if it means separating him.

Straight Talk

Be frank and honest with your soldiers when you counsel them. As a commander you can tell when a soldier does not have the potential to complete a successful career. Tell that soldier to cut his losses early and get out. It is much more compassionate and humane for that individual to get a new start as a civilian after a first term of service than to invest 12 or 15 years in service only to be QMP'd or separated. It is also much more compassionate for other soldiers so that they are not subjected to substandard leadership from an inferior NCO. It also clears the way for more capable junior leaders to be promoted.

In closing, I would like to relate this all back to compassion. A really compassionate leader cares for his subordinates, he makes them do the tough things that prepares them for promotion, and he is frank with them in providing the very best advice he can. It may not be what they want to hear but is always what they need to hear.

When a commander or leader does the right thing morally and ethically, invariably it is the right thing for the Army and the right thing for the soldier. The soldier just may not know it at the time.

Colonel Dabbieri is an engineer officer and former enlisted soldier. Commissioned from Engineer OCS, he served in Vietnam and has commanded four companies. He served as the executive officer of the 19th Engineer Battalion, 194th Armor Brigade, and commanded the 2d Engineer Battalion, 2d Infantry Division, in Korea. He is a graduate of Command and General Staff College and the National War College.

LESSONS LEARNED

By Captain Neal T. Lovell, DOES

This column concentrates on Honduras, where several Army engineer units have been involved in humanitarian construction projects over the past several years. It is a sample of the information available upon request from the Engineer School. For more information write to: Commandant, U.S. Army Engineer School, ATTN: ATSEESAL, Fort Leonard Wood, MO 65473-6630

ISSUE: Effects of lime slurry on 6000-gallon water distributors.

DISCUSSION: Prior to deployment, commercially available lime slurry distributors were planned for use in lime slurry operations. Several vendors were located and lease prices were obtained, but the costs submitted to the brigade S-4 were determined excessive. Also, some vendors did not want to bid on the lease of single distributors, they wanted to lease a package of equipment. The only other distributors available on short notice were organic 6000-gallon water distributors that belonged to another engineer battalion. The decision was made to use them.

RECOMMENDATION: Ensure funds for future projects that require lime stabilization are sufficient to include the lease of suitable commercially available distributors and that adequate lead time is provided for procurement.

ENGINEER SCHOOL COMMENTS: There is no on-going action to procure distributors made specifically for lime slurry operations. Several sizes of water distributors suitable for lime slurry operations are available in the supply system. However, users must clean the equipment thoroughly after use.

ISSUE: Mix of vehicles used for a task force support battalion's (TFSB) transportation fleet.

DISCUSSION: The TFSB deployed with ten M923 5-ton cargo trucks and six M931 tactical tractors that would be used as a line haul transportation fleet. The vehicles were required to travel on mountainous terrain with many hairpin curves. Portions of the route between San Lorenzo and Sato Cano, Honduras, are in disrepair and would be considered off-road conditions in the U.S. The M931 tactical tractors were selected because they can be driven off-road. It was difficult for the M923 5-ton cargo trucks to travel down steep grades at safe speeds. Because both vehicles have diesel engines and semi-automatic transmissions, drivers could not effectively use downshifting to slow their speed. The only way to keep vehicles within prescribed limits was to ride the brakes. This action caused the brakes to overheat and "glaze," requiring extensive maintenance after each convoy.

RECOMMENDATION: Deploy six M915 tractors in addition to the six M931 tractors. The M915s have a "retarder" that can slow the vehicle without riding the brakes. Use the M915s for line haul assets and the M931s for local off-road runs.

ISSUE: Construction of tent floors.

DISCUSSION: Original base camp construction plans called for using 4' X 8' prefabricated tent pads to construct tent floors. Only one-half of the required tent pads could be contracted out due to dollar ceilings. Construction of the rest was time consuming because it required cutting and nailing lumber.

RECOMMENDATION: Prefabricated tent pads are expensive and unnecessary. The following alternate method eliminates the need for cutting wood or nailing boards together, and it eliminates waste when teardown occurs. The method uses 2' X 4' lumber placed (wide side down) along the tent sides and down the center. Then 1' X 6' or 1' X 8' lumber is laid on top of the 2' X 4's to form a satisfactory floor.

ISSUE: Threat

DISCUSSION: The greatest threat to the task force was, as predicted, theft and population control. Local Hondurans, including children, vendors, thieves, and prostitutes, continually surrounded the

base camps, work sites, and equipment parks. Some of them looked for opportunities to steal or sell their wares to soldiers. The situation was complicated by friendly soldiers, who encouraged the sale of sodas, goods, fruit and sex. Because of this activity, safety became a major concern for both Hondurans and U.S. soldiers.

RECOMMENDATION: The key to population control is command involvement, soldier discipline, and physical barriers. Commanders and first-line supervisors must make soldiers aware of the threat and discipline them early in the deployment. Soldiers must not give handouts to local citizens because this practice encourages the problem. Use the chaplain's office or the public affairs office to operate any programs that donate items to the local populous.

ISSUE: Use of Honduran guards

DISCUSSION: It was necessary to use Hondurans as guards, and one task force employed between 10 and 43 guards at any time. Breakdown of security for the different phases of operations included port operations, base camp development/teardown, and construction. Guard requirements changed for each phase. Because the exercise encompassed a large area of operation, the requirement for Honduran guards was large. During ship on/off load, 10 Honduran guards were employed with an equal number of U.S. guards at the vehicle marshalling area. Ideally, the ratio of Honduran to U.S. guards should be 1:1 to ensure overlap and joint HO/US participation. Guard requirements for base camp development/teardown rose and fell, depending on the size of the U.S. force.

Most of the Honduran guards came from the 11th Infantry Battalion (HO), although a few came from the 101st Infantry Brigade. These soldiers were very young, 14 - 19 years old, inexperienced, and had little education. All Honduran guards had one NCO with them at all times. At night, they were alert and extremely sensitive to movements near the perimeter. They did not hesitate to fire warning shots or bodily apprehend intruders. Also, they did not adhere to JTF-B rules of engagement, but took instructions from their Honduran commander.

RECOMMENDATION: Use Honduran guards as much as possible, but be realistic in your requirements. Local Honduran units may not be able to meet the total guard requirement, so establish priorities and coordinate with the Honduran commander and S-3 prior to deployment. Honduran soldiers appreciate the opportunity to be with U.S. forces.

ISSUE: Delivery of construction materials.

DISCUSSION: Contractors delivering construction materials were directed to one of two base camps, depending on the project materials they had. Strict control of materials became difficult because there was confusion about which materials went where, and some deliveries contained material for projects at both base camps. The haste to off-load complicated the problem. In an attempt to correct the problem, the task force S-4 directed that all material be delivered to one location.

RECOMMENDATION: If the task force (TF) is composed of more than one battalion (i.e., controlled by a group or brigade), establish a central Class IV receipt and issue yard. Require subordinate units to augment the TF or brigade S-4 staff section with stock control personnel.

ISSUE: Poor quality of contractors and construction material.

DISCUSSION: Failure of contractors to meet required delivery dates and poor quality of construction materials created delays in project starts and completions. Delivery of construction materials such as base-camp lumber, gravel, culverts and sand was difficult. Most of the materials were ordered through the JTF-B contracting office well in advance. However, many of the Honduran contractors failed to meet their scheduled delivery date or provide the required quantity of materials.

RECOMMENDATION: Establish a list of reliable contractors for construction materials. The unit must request construction materials for projects early in the planning cycle to allow for receipt by the JTF-B Class IV yard (DCSENG) at least two months prior to STARTEX. In addition, each bill of materials must be identified by project number.

ISSUE: Number and type of vehicles deployed as line haul assets.

DISCUSSION: The TFSB deployed with ten M923 5-ton cargo trucks and six M931 tactical tractors, which would be used as the line haul transportation fleet. The TFSB was forced to augment them with unit organic vehicles at the rate of three 5-ton tractors per day for a 2-week period. The requirement to transport rations, lumber, concertina, and major assemblies far exceeded the TFSB's capability during this time. In the redeployment phase, the organic vehicles were not available to augment the transportation fleet because they had already passed customs inspection. The unit could not afford the loss of these vehicles during redeployment.

RECOMMENDATION: The transportation fleet for a battalion-plus sized TF should consist of six M931 tractors, six M915 tractors, ten M871 trailers, four M874 trailers, and ten M923 cargo trucks.

Directorate of Training and Doctrine (DOTD)

ARTEP 5-145-11-DRILL, "Engineer Battle and Crew Drills," scheduled. ARTEP 5-145-11-DRILL is scheduled for printing in the 4th quarter of FY 1990. This manual describes the most common engineer battle and crew drills for all types of engineer organizations. Battle drills, designed for platoons and smaller elements, are collective actions executed without a deliberate decision-making process. Crew drills are a form of battle drill designed for crews or specific items of equipment (AVLB or CEV). Each engineer organization will choose the battle and/or crew drills that support their METL. POC is CPT James Glass, (314) 563-7784.

Department of Military Engineering (DME)

Scatterable Mine Information Declassified. The self-destruct (SD) times and the safe separation and arming (S&A) times for U.S. scatterable mines have been declassified. For U.S. scatterable mines the self-destruct times are:

Scatterable System	Self-Destruct Times			
	4 Hours	48 Hours	5 Days	15 Days
ADAM/RAAMS (M731/M741)	X			
ADAM/RAAMS (M692/M718)		X		
GEMSS (M74/M75)			X	X
MOPMS (M76/M77)	X			
GATOR/VOLCANO (M89/M90)	X	X		X

Mines will start to self-destruct at 80 percent of their SD time. When the full SD period is reached, no mines will remain. Mines with a 4-hour SD time will start to self-destruct at 3 hours and 12 minutes. When the 4-hour self-destruct period is reached, no unexploded mines should exist. The probability of a live mine existing past its SD time is 1 in 1000.

Although most U.S. scatterable mines have an S&A time of 2 minutes, the S&A time is 45 minutes for GEMMS mines and 90 seconds for MOPMS. An on-going product improvement program will reduce the S&A time of ADAM/RAAMS mines from 2 minutes to 45 seconds. During the S&A time period, the mines conduct a self-test. If a mine fails the self-test, it will self-destruct at the arming time. VOLCANO mines self-destruct at the S&A time (2 minutes) at a rate of 13 per 1000. POC is CAPT Joe Jenkins, (314) 563-5595.

Medium Girder Bridge (MGB) Upgraded. The MGB has been approved for MLC 70 in the following configurations:

Bridge configuration	MLC	Bridge length meters (feet)	Max transverse slope unloaded
Single Story	60 70 (T) 100 (W)	9.8 (32) 9.8 (32) 9.8 (32)	1/10 1/20 0
Double Story	60 70 (T) 100 (W)	32.9 (108) 31.1 (102) 27.4 (90)	1/20 1/20 0
Double Story Link Reinforced	60 70 (T) 100 (W)	49.4 (162) 45.7 (150) (Note 2)	1/20 1/20 0

Note 1 - For MLC 70 tracked (T) and MLC 100 wheeled (W) configurations, the bridge width should be shown on a sign, as shown in STANAG 2010.

Note 2 - MLC 100(W) span has not yet been confirmed by tests. POC is Joe Cowgill, (314) 563-5835.

Information For Short-of-war Manual Requested. Your ideas and experiences are needed for a manual tentatively titled, "Engineers in Operations Short of War." Topics will include engineer support in deployments, military construction, peacekeeping operations, counterterrorism, mobile training teams, disaster relief, counterdrug operations, and nation assistance. A coordinating draft is planned for fielding in 4th quarter, FY 1990. POC is CPT Doug Houck, (314) 563-5671.

Team Leaders Sought for Engineer Officer Advanced Course (EOAC). Are you looking for a continuing challenge after a successful tour as company commander? Come to Fort Leonard Wood and be a team leader for the EOAC. As a team leader, you are responsible for the training, coaching, and total fitness programs for 12-15 EOAC students. They include Army (Active, National Guard, and Reserves), Marine Corps, and International officers. Your primary roles include small group instructor, facilitator, counselor, team leader, subject matter expert, and role model for the officer students. We want to make the Engineer School the best leader training facility in TRADOC. If interested, contact your captains' assignment officer at Headquarters, DA, and let your desires be known. POC is LTC Lloyd Evans, AV 676-5754 or (314) 563-5754.

Directorate of Combat Developments (DCD)

Reforger 90 Concept Evaluation Program (CEP). The TRADOC Test and Experimentation Command (TEXCOM) conducted a CEP during the REFORGER 90, Centurion Shield exercise to assess the division engineer (DIVENG, formerly E-FORCE) force structure. Results of the CEP demonstrated significant improvement in command and control, maneuver force combat effectiveness, and corps flexibility. A report describing results will be fielded in June 1990.

TRADOC Analysis Command (TRAC) Completes Engineer Structure Study. A study to compare three engineer force structure alternatives against current engineer force design was completed in June 1990. The study used several analytic tools, including spreadsheet performance analysis, command and control computer modeling, and force effectiveness computer modeling. Results show significant improvement in corps warfighting capability when using the DIVENG force structure. A report describing results is scheduled for distribution in July 1990. POC is Vern Lowrey, (314) 563-7885.

Automatic Integrated Survey Instrument (AISI) Update. The AISI is an electronic total station that integrates functions currently performed by theodolites and distance measuring equipment into a single, state-of-the-science device. Suitable for both office support and field work, it is rugged and man-portable, with speeds matching AirLand Battle requirements. The instrument will be used by construction (82B) and topographic surveyors (82D). Fielding is planned for 1992 and 1993. POC is Merrill Stevens, (314) 563-7209.

Department of Combined Arms (DCA)

Field Manual Update. The following field manuals (FM) are in the final stages of production. FM 90-13, *River Crossing,* and a coordinating draft of FM 5-X, *Combat Engineer Company Operations,* are scheduled for printing in the 4th quarter of FY 1990. FM 90-13-1, *Combined Arms Breaching Operations,* is scheduled for printing in the 1st quarter of FY 1991. These manuals will provide a common thread through all levels of training, from the Basic Noncommissioned Officer Course through the Pre-Command Course. POC is Herman Kufura, (314) 563-5449.

Department of Topographic Engineering (DTE)

Digital Terrain Analysis Programs Demonstrated. The Earth and Space Division recently demonstrated current and future digital terrain analysis capabilities at the Armor, Engineer, and Infantry Commanders' Conferences. Two Army-developed software packages were included: Terrabase provides warfighting commanders with quick response terrain-related decision aids, such as 3-dimensional views and line-of-sight products. The Condensed Army Mobility Model System (CAMMS) provides warfighting commanders with decision aids regarding tactical ground mobility, such as vehicle speed predictions and route planning products. Both packages operate in a PC DOS environment and are available to Army users. An upgraded composite of Terrabase and CAMMS will be incorporated in the future Digital Topographic Support System, to be fielded in FY 1993-94. POC is MAJ Pat Poulson, AV 676-5715.

Directorate of Engineer Branch Safety (DEBS)

Unreported Accidents. Commanders are requested to report near-miss or minor accidents involving engineer equipment. Such incidents frequently go unreported because there is little or no equipment damage or injury to personnel. However, the Safety

Office needs to be informed about them so that potential major accident producers can be identified. Such reports will also allow us to correct deficiencies in future materiel acquisitions. Examples include instances where equipment is unstable on hills or at corners and problems resulting from poorly designed control panels. POC is Paul Rusinko, (314) 563-5002, or Mark Totzke, 563-7346.

1st Brigade

Senior Warrant Officer Course Vacancies. Openings are available in the Senior Warrant Officer Training (MOS 213A) course at Fort Leonard Wood. The 11-week course is scheduled to begin 28 September 1990 and 18 January 1991. The course includes 2 weeks of common core subjects and 9 weeks of technical, MOS-specific subjects. Students must have completed the Warrant Officer Tactical and Technical Certification Course, be in grade CW3 or CW2(P), and have been accepted for voluntary indefinite status. For more information, call CW4 Harrel Rinehart, (314) 596-8223.

Fast Track Training Program Benefits Quality Soldiers. Selected soldiers in the engineer Advanced Individual Training (AIT) at Fort Leonard Wood can participate in a special studies program called Fast Track. The program is open to all Active, Reserve and National Guard soldiers in MOS 12F, 51B, 51G, 51K, 51R, 62B, 62E, 62F, 62G, 62H, 62J, 81B, and 82B. Students receive additional MOS-specific training, cross training in other selected MOS, and additional common soldier training above the standard Basic Training and AIT programs. To participate, soldiers must have exceeded the Army standards in performance, attitude, military bearing, and physical fitness, in addition to maintaining a 90 percent AIT and Fast Track program academic average.

Upon completion, a letter highlighting the soldier's accomplishments is sent to the battalion commander of their first unit of assignment, and a copy is added to his or her Training Records jacket. It identifies the graduate as a high quality soldier.

The battalion commander also receives a questionnaire to assess the Fast Track graduate's performance at the new unit. Completed questionnaires are a prime assessment tool for the program, and we request they be returned to us. Your information will help increase the benefits of the program to units and the soldiers. POC is SFC Gary Shriner, (314) 563-2453.

132d Brigade

Army-wide Sapper Stakes Competition Planned. The Engineer Center will host the first annual Sapper Stakes competition at Fort Leonard Wood on 10-14 September 1990. The purpose of the competition is to promote standard engineer battle drills and recognize the best engineer squad in the Army. Ten events are planned for both Active and Reserve Component personnel in divisional, corps combat, light, and combat heavy engineer battalions. A total of 14 seven-man squads representing USAEUR, FORSCOM, WESTCOM, SOUTHCOM, and USFK/EUSA will participate. POC is CPT Mark Miller, (314) 596-3141.

Bailey's Bridge

By Dr. Larry Roberts

In the early days of World War II, British engineers were faced with the problem of bridging that was inadequate for their new armored and mechanized equipment. Modifications of existing materiel met some bridging requirements, but new equipment was clearly needed.

Mr. Donald Coleman Bailey, chief engineer of the British Experimental Bridging Establishment, offered a solution to this problem by proposing a bridge design based on panel trusses. Bailey's design met the criteria in terms of manpower requirements, transportation needs, flexibility of design, and flexibility in load-bearing capacity (see photo on back cover).

Recognizing the advantages offered by Bailey's bridge, British engineers rushed the initial fabrication, test and, ultimately, production of the panel bridge. The normal design-to-production time of one year for military hardware was cut almost in half. In seven and one-half months, British engineers had produced the new "Bailey bridge." By the time the United States entered the war, British engineer units had employed the Bailey bridge in combat and had noted its remarkable versatility.

American military engineers faced similar problems—the increased vehicle weights exceeded the capacities of existing bridging material. Like the British, they initially tried to modify existing bridges to handle the loads. However, the success of the Bailey bridge soon prompted the Army to examine its adoption as a partial answer to the needs of the newly organized armored and mechanized forces. The fact that both armies could use the same bridge offered the possibility of interchangeability of components in tactical situations. If this was possible, it would simplify the production process.

Americans began to work with the Bailey bridge early in 1941, and for the next two years American engineers, civilian and military, tested and modified its design. The major problem with the bridge was the close production tolerances required for the panel sets to be truly interchangeable.

The British approach to production was for contractors to produce the components, with assembly at a central facility. The Americans chose to contract complete bridge sets to American steel and metal fabrication companies. In an attempt to ensure uniformity of production, American engineers acquired master gauges, duplicated those gauges, and provided them to contractors.

Field tests of the Bailey under various conditions confirmed the value of its design and its potential for use in many tactical situations. The Bailey could be used as a semi-permanent fixed bridge, spanning dry gaps or small streams, and it could be used with pneumatic floats or pontoons across wide water bodies.

Early use of the bridge by combat engineers in battle reconfirmed the results of field trials. Throughout the war, Baileys were used in many configurations, from floating bridges to suspension bridges. It could be altered in place, raising its load-bearing limits to accommodate heavier loads and greater volumes of traffic.

The one aspect of the Bailey which defied solution was the problem of manufacturing tolerances. Examination of factory production and reports from field units revealed that American-made sets were not interchangeable with British sets, and sometimes were not compatible with other American sets.

The problem was variation in the gauges used by the fabricators. It was not until the very end of the war that American gauges matched those of British instruments. Interoperability simply did not exist. This forced front-line units to segregate American- and British-produced sets, complicating the logistical support for engineer operations.

The operational value of the Bailey far outweighed the difficulties of production and interchangeability. In Sicily and Italy, the Bailey was often the bridge of choice. In northern Europe, the Bailey complemented the tactical float bridges and assault bridges, especially for armored forces. The Bailey was also used in the Pacific and in China. By the end of the war, tens of thousands of vehicles had crossed versions of the panel bridge that was born of military necessity, constructed by countless British and American engineers, and designed by Donald Bailey.

Dr. Larry Roberts is the historian for the U.S. Army Engineer School and Center, Fort Leonard Wood, Missouri.



PIN: 060535-000