Engineer

THE MAGAZINE FOR ARMY ENGINEERS

SPRING 1985

THE TRIAD OF SUCCESS

ALSO: GALLANT EAGLE '84 ☐ OBSTACLE BREACHING
18TH CENTURY ENGINEERING ☐ IEW FUSION

Total Force . . . Essayons

A Personal Viewpoint

by MSG John M. Hall

As General Wickham stated: "We face a more complex and diverse threat and must continue the forward-looking doctrine with an expanded role for the Reserve forces," the 464th Engineer Battalion headquartered in Schenectady, NY, continues to *train as we will be required to fight.*

When I was first assigned as a full time manning, active army operations sergeant to a reserve Engineer battalion, you might say I had several reservations ... long hair, poor uniforms, and week-end drills to train an Engineer battalion to fight in Europe and accomplish a CAPSTONE mission.

Well, after several months of evaluation and training, I found that these reserve force soldiers are as well-trained and capable of accomplishing their mission as active units, given the limited training time and limited amounts of funds, ammunition, equipment, and—most important—time to train. Needless to say, I had my work cut out for me and went to work using all the knowledge and experience that I have obtained over the years.

As the year went along, I found that these soldiers wanted the same things as the active force. They wanted to be challenged with training that was tough and demanding. This we have done and will continue to accomplish. Here is what this battalion, as a reserve unit, has accomplished and continues to accomplish:

- Built a timber-trestle bridge for the Vanhornsville, NY school system.
- Have crew-served weapons and demolition firing for the entire battalion at Fort Drum, NY.
- Have battalion-wide STX/CPX for the commanders and staff, under the CAPSTONE mission doctrine.
- Have a sustained 11-day annual training period at Fort Drum, NY, with company ARTEPs evaluated by the ARTEP Branch, Fort Belvoir, VA, and 1st Army with success and mission accomplishment.
- Have annual weapons-qualification and hand-grenade training at West Point, NY.
- Have regular joint training with the 3rd Field Engineer Regiment (Canadian Army).
- Have an overseas deployment for 10 days in the mission area with visits and reconnaissances to the actual mission areas.
- Have battalion quarterly training meetings, commanders conferences, and BTMS reviews.
- Participate in MAPEX '86 with the entire corps CAPSTONE units and active forces.
- Have smoke operations and decontamination operations for the AT-85 training period at Fort Drum, NY with company ARTEPs.
- Attend all Commander and CSM CAPSTONE conferences and keep the units current on doctrine and how to fight in the Combined Arms areas.

Finally, this unit, which is a part of the 1209th U.S. Army Garrison and the 98th Division (Training) in peacetime and the 329th Engineer Group for CAPSTONE will help rebuild the Engineer training area at Fort Drum, NY. A tall order for a reserve Engineer unit, however, *we will accomplish the mission.*

Yes, this battalion is capable of accomplishing its wartime CAPSTONE mission with limited resources and knows how to fight under the most current and up-to-date doctrine and CAPSTONE mission guidance. It truly is a pleasure, as well as hard work to be a part of the Total Force and to understand that the 70 percent reserve Engineer force is capable and willing to fight when and if called upon to do so. Our motto for this year is TOTAL FORCE . . . ESSAYONS.

MSG John M. Hall was the Engineer Office NCOIC to the British Army of the Rhine and Northern Army Group, 59th Ordnance Brigade Staff Element in Moenchengladbach, Germany. His other assignements in Germany were the 275th Engineer Company in Stuttgart, the 237th Engineer Battalion in Heilbronn, and the 78th Engineer Battalion in Ettlingen. MSG Hall was also assigned to the U.S. Army Engineer School and attended Virginia Tech and the Combat Engineer Advanced Course.

LTC John M. Paris III commands the 464th Engineer Battalion (CBT) (CORPS), 1SG Ogden Tuttle is the Command Sergeant Major.

Engineer

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Special thanks to 1LT Gayleen Brandenburg for all her help in coordinating and planning this issue.

On the Cover

SFC Stephen G. Strong ensures that EOBC students are technically competent by teaching them the proper construction of a double-story medium girder bridge (photo by 1LT L. J. Leto).

FEATURES

DEPARTMENTS

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Fuels and Lubricants

There is good news and bad news in the recent status report by Maurice LePera of the Belvoir R&D Center on the Army's efforts to improve management of packaged fluid, lubricant and grease products entering the military supply system.

The bad news is that a proliferation of proprietary products, now in excess of 25 percent, continues to plague logistical and supply personnel, impair readiness, and increase military costs.

The good news is that DARCOM/AMC Regulation 750-11, *Maintenance and Supplies–Use of Lubricants, Fluids and Associated Products,* can remedy the problem. All that Army equipment managers, specification writers, and program managers have to do is to adhere to it.

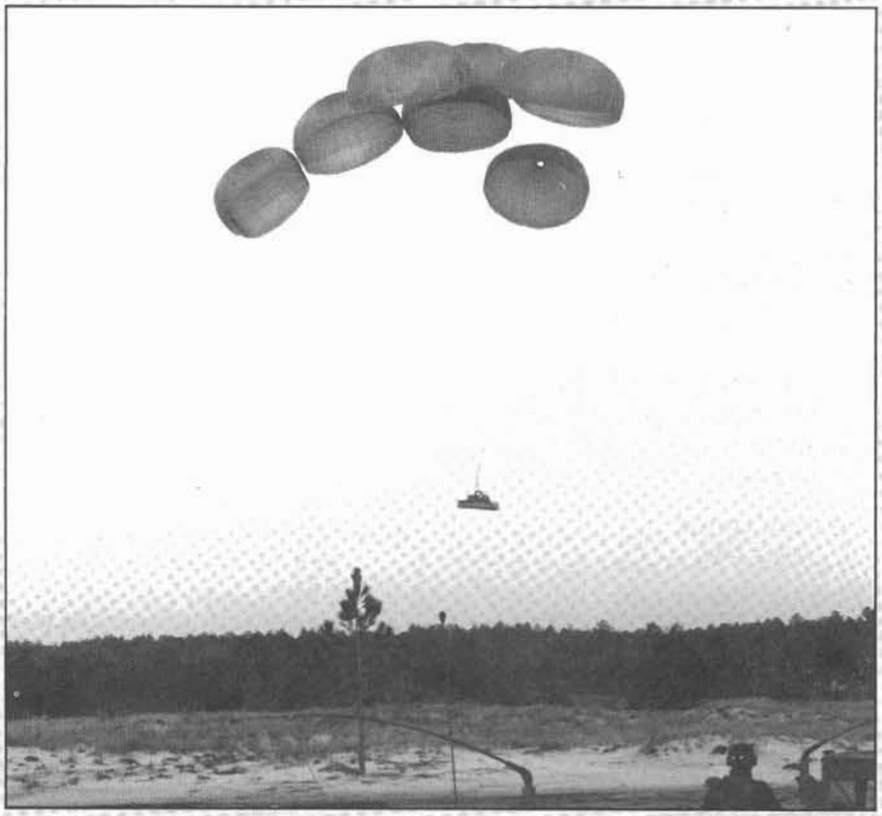
The regulation's biggest bonus is that it establishes the Belvoir R&D Center as the Army Material Command focal point on proper selection and use of the packaged products it governs. In this role, the Center's Fuels and Lubricants Division provides the coordination and approval necessary to ensure that lubricant orders and technical manuals contain only current standardized product specifications.

Guidance in the regulation prohibits random introduction of proprietary products. It curtails former procedures that have allowed contractors and developers to specify them.

The regulation accomplishes this by requiring justification for use of non-standard products as opposed to those qualified in accordance with military and federal specifications or purchase descriptions; imposing MIL-STD-836, *Lubrication of Military Equipment,* on all designs, developments, and acquisitions; and insisting that all procurement requests, solicitations, and contracts have lube-order/technical manual approval before first unit acceptance.

If DARCOM/AMC Regulation 750-11 is followed, according to Mr. LePera, the next news on long-term management of packaged lubricants and fluids will be all good.

D5B Dozer Parachuted



A 15-ton D5B dozer belonging to C Company, 27th Engineer Bn. (CBT) (ABN) 82nd Airborne Division, floats to the ground at Camp Blanding, FL. The airborne earthmover is the first D5B to have ever been dropped during actual operations (photo by CPT Peter Eschbach).

A claim for a "first time ever" was entered recently as a D5B bulldozer was parachuted during an exercise at Camp Blanding, FL.

Performing this "first" was the 27th Engineer Bn. (CBT) (ABN) of the XVIII Airborne Corps at Ft. Bragg, NC. While the D5B dozer, which weighs 15 tons, has been dropped in the past under test conditions, a spokesman said this was the first time it had been done during an actual training exercise.

The exercise, called Dragon Team 1-85, involved an emergency deployment readiness exercise (EDRE) which moved the Engineers from Ft. Bragg to Camp Blanding. There, the 27th, along with other elements of the Airborne Corps, parachuted personnel and equipment onto a small sand-covered drop zone.

After the landing, the D5B dozer was used to construct a field landing strip.

Engineers in the Combined Arms Team will be the theme of the Fall issue of ENGINEER. Readers are encouraged to submit manuscripts and photographs. Our copy deadline is May 17, 1985.

Engineers can build the ribbon bridge in shallow water because of the new boat's 22-inch draft (U.S. Army photo).

Bridge Erection Boats

The Army's Belvoir Research and Development Center has awarded a contract worth more than $12 million to the American Development Corporation of North Charleston, SC, for the production of 96 ribbon bridge erection boats. The award is the first installment of a multi-year purchase of 554 boats, with an option to buy 262 more.

Constructed of welded aluminum and powered by two diesel engine-driven water jets, the 25-foot boat features a 22-inch draft and a top speed of 31 mph. It can be transported to the crossing site and launched by the same vehicle that carries the ribbon bridge.

The ribbon bridge's modular design reduces the logistical problems associated with the old M4T6 bridge which took 260 men five hours to erect a 400-foot span. With the ribbon bridge, 50 men can build the same span in less than an hour. Delivery of the boats should begin next fall and be completed in 1989.

Engineers Clear Hurricane Debris

For most people, a trip to Wilmington, NC, means relaxing and basking in the sun at one of the area's numerous beaches.

However, for some soldiers of the 264th Engineer Co.; A Co., 27th Engineer Bn.; and A Co., 548th Engineer Bn. at Ft. Bragg, a trip to Wilmington meant 15 days of hard work clearing fallen trees and debris caused by Hurricane Diana.

The task force consisted of 39 soldiers and 22 pieces of equipment, including scoop loaders and five-ton dump trucks.

Working from sunrise to sunset six days a week, the soldiers found little time to indulge in activities offered by the resort area. However, they expressed no concern about the lack of recreational opportunities.

"It feels great to be operating my equipment," said SP4 Rob Leak, a scoop loader operator from the 27th Engineer Bn. He added that it was a good opportunity to practice with the clamshell attachment for the scoop loader, which is used for grasping trees and brush.

According to Felix Cooper, New Hanover County Manager, the assistance was greatly needed to reduce the county's financial burden. He explained that the county was not prepared to fund such a large clean-up operation.

Camouflaged vehicles rumbling through the streets were welcome sights to local residents who had debris to be removed. "This is fantastic," commented one happy resident. "I really appreciate all the work the Army is doing."

Some local elementary school students even approached the soldiers and asked them for autographs. "This made the troops feel like real heroes," said MAJ. Charles Simons, the officer in charge.

PFC Kenneth Hauer clears trees (photo by PFC Dennis McMahon).

CLEAR THE WAY

by MG Richard S. Kem, Commandant, U.S. Army Engineer School

Leadership . . . Tactical Proficiency . . . Technical Competency

The Triad of Engineer Success

As our Army better organizes itself to fight the AirLand Battle, the courses which train our Engineer leaders are being structured to provide the leadership, technical, and tactical skills needed to win. Our recently improved Advanced NCO Course (ANCOC) and the new Engineer Officer Advanced Course (EOAC) made the Engineer School the forerunner in providing high-quality training for company grade leaders. It is important that these courses do this, since few branches require such a wide range of abilities from their leaders as do Engineers.

Today our technical challenges stem primarily from automation and equipment modernization. The Army in general and the Corps of Engineers in particular are ever more dependent upon high-technology hardware such as computers to accomplish their missions in both peace and war. To do our jobs, Engineers must understand the benefits and the constraints of automation. Further, as new Engineer combat equipment is fielded, we must learn to effectively employ it and to properly maintain it.

Keep in mind that these are tasks above and beyond those we presently encounter. We must surely continue to maintain our capabilities in Combat Engineering and in designing and building the facilities necessary to support the Combined Arms Forces in the Theater of Operations, just as we have done in the past. But technical competence is only one of the traits we require.

We must also be adept at performing tactical tasks. AirLand Battle doctrine provides a demanding, dynamic operational framework in which Engineers have great responsibilities. The newly structured light and heavy divisional Engineer battalions create formidable challenges on that battlefield. Scarce Engineer resources dictate that we must be especially skillful in knowing when, where, and how to use our assets in supporting the maneuver commanders. Tactical proficiency is a vital trait, then. However, it is also insufficient by itself.

Competence in blending tactical precepts with technical skills may be the most important trait we can have. Our full understanding of how all this knowledge and many skills are woven together to form the fabric of our jobs is essential. Military leaders throughout history have been confronted with this problem. But never before have leaders been required to master so many diverse skills or so much technical knowledge. This is the crux of the problem for the Engineer School: how do we teach our leaders all that they need to know and train them to do all the tasks required of them, while keeping them out of the Army mainstream for a minimum of time? Our favorable experience with the revised EOAC makes us think that we might have the answer.

After two weeks of training in our leadership fundamentals, the 14-week core phase of the new EOAC devotes six weeks of instruction to tactics, followed by six weeks of technical engineering. Some peripheral topics are included in the training during the last 12 weeks, so the new course provides fewer hours for tactics and engineering than did the old. It is the quality of training—not the quantity—which is important, however. This is where the new course greatly outpaces the old.

The revised EOAC emphasizes small-group exercises where knowledge and skills must be successfully integrated by the students to complete their assigned tasks. It was not often that the prior course made our officers think and act with this broadened perspective. This simultaneous application of the students' leadership, technical, and tactical skills creates the energy that makes the new course a superior training vehicle. Those who are best trained to combine these skills will win the AirLand Battle.

Incorporated with other engineering topics in this issue of ENGINEER is an article about the revised EOAC. The article should be read especially by those officers who will return to Fort Belvoir within the next few years to attend the Advanced Course. Also, senior Engineer leaders will find it useful to know what training recent EOAC graduates in their units have received.

by CSM Charles T. Tucker, U.S. Army Engineer Center & School

Today's NCO: Leader, Student, Teacher

Only through strong leadership, technical competence, and tactical proficiency will soldiers follow NCOs onto the battlefield

Today's senior Engineer NCO plays a very important role in supporting the AirLand Battle. He must not only be able to provide the maneuver commander with mobility, countermobility, survivability, and general engineering; but he must also ensure that his men are properly trained and proficient in their jobs as well.

But with all of the roles which the Engineer NCO must play in today's Army, he must remember that the role of senior trainer is probably the most important. Regardless of his MOS, the NCO must be prepared to execute all of the technical Engineer tasks and still train his soldiers to the highest standards.

Coupled with tactical competence, technical proficiency is essential in a successful leader. Only if you, as NCOs, are technically proficient in your specialties and know how to survive on the battlefield will your soldiers follow you, fight for you, and perhaps even risk their lives for you. These main ingredients (technical proficiency and tactical competence) must be blended together to make effective leadership. And then all three must be interwoven to comprise the triad of success.

Soldiers must understand that it isn't enough, however, to be technically proficient in engineering tasks. They also must be able to apply these skills in various structured organizations. To have an NCO move from a combat heavy Engineer battalion to a corps Engineer unit and then to a mechanized divisional Engineer battalion, and to expect him to apply his skills to best improve the organization's effectiveness has always been one of our greatest challenges as Engineer NCOs.

With the Advanced Noncommissioned Officer Course at Fort Belvoir, the Field Engineering Branch of the Department of Military Engineering accepted the challenge of providing the technical skills which all NCOs need. The new instruction program adopted by the Engineer School enables our senior NCOs to receive training on common engineering tasks. This training teaches skill level four tasks and reinforces the skill level one, two, and three tasks by showing the NCOs how to organize and manage these skills. They are instructed on techniques which are used in performing these tasks. They are also provided with technical instruction on the equipment which they may encounter and how to properly employ this equipment.

Therefore, the Engineer common core teaches NCOs more than just standards. It provides ideas and alternatives in meeting these standards. As Engineers, the individual NCOs must add their own ingenuity and resourcefulness and make the finest product from the tools they have been given.

With an ever-changing environment and with new equipment constantly being introduced into the Army's inventory, it is no longer just a wise move for an NCO to learn about this new equipment. Now it is a necessity. For example, the article, "Beefing Up the MGB," which appears in this issue shows how this bridge has had to undergo changes to withstand the weight of new vehicles and equipment such as an M-1 Abrams tank. Our soldiers, especially 12Cs, will be trained and totally proficient with changes such as the new Link Reinforcement Set. There is simply no room for incompetence on the AirLand Battlefield.

Another article about a new obstacle breach course shows us other ways in which we can be more efficient in the Combined Arms Team. It is vital that our soldiers are fully trained in tasks such as this. CPT Harshbarger shows us how important time, speed, and agility are and that we, as Engineers, must make breaching obstacles another one of our specialities.

Success on the AirLand Battlefield is by no means an easy task. Engineer NCOs must not only ensure their soldiers can fight, but they must also make certain their soldiers are totally proficient in their MOSs. Leadership, technical proficiency, and tactical competency are the vital ingredients for that success.

Department of Combat Developments (DCD)

Counterobstacle Vehicle:

Contractor testing of two Counterobstacle Vehicle (COV) test beds began in March at Ft. Indiantown Gap, PA. The test bed design is based on the hull and chassis of the M88A1 recovery vehicle and is intended to provide a future replacement for the Combat Engineer Vehicle (CEV).

The COV will have excavating, bulldozing, lifting, hauling, and breaching capabilities to provide a rapid and effective means of completing both countermine and counterobstacle missions. Countermine tasks will be performed by a track-width mine roller or plow, a full-width mine plow with automatic depth control, or a towed projected line charge. A Vehicle Magnetic Signature Duplicator (VEMASID) can be used for magnetically fuzed mines.

For counterobstacle tasks, the COV will be equipped with one or two arms with digging, lifting, grappling, pavement breaking, tree cutting and auger attachments, and a heavy-duty winch and dozer blade converted from the full-width plow.

Test bed delivery to the government is scheduled for late May, to be followed by testing and evaluation ending in April 1986.

Department of Combined Arms (DCA)

Army Writing Program:

Because tomorrow's Army must have leaders who can read well, think critically, and express their thoughts with precision and clarity, the Army Chief of Staff recently approved an Army writing program. Its goal is to ensure that all officers, warrant officers, and NCOs possess effective communications skills.

The Directorate of Combined Arms has established a writing office to coordinate the Engineer School's writing program. This contains diagnostic testing, remedial training, and core curriculum instruction in communicative skills, which include not only oral and written abilities, but also the reading comprehension necessary for effective communication.

Beginning in March, EOBC will have 16 hours in this new program, EOAC will have 24 hours, and ENCOA will include self-paced instruction as part of its curriculum.

A staff of military and civilian educators has designed a writing program that blends the best education resources available in the local community with a series of reading, writing, and speaking requirements that use military situations to reinforce instruction.

The Engineer School POC for this program is MAJ McLaughlin, AV 354-2274, commercial (703) 664-2274.

EOBC Changes:

The EOBC Training Detachment has made significant changes in the five-day field training exercise (FTX) for its student officers.

The new ARTEP-based FTX stresses independent actions and decision making by a task force Engineer in a maneuver battalion.

EOBC students take part in weekend training with the 16th Bde. (SEP) Virginia Army National Guard, at Ft. A.P. Hill as one of these changes. The Brigade provides one AVLB and one CEV, with crews, to add realism to the FTX platoon missions.

Field Circular:

Field circular, "*The Task Force and Brigade Engineer*," has been scheduled for distribution at the end of the fourth quarter by the Tactics and Operations Division of the Department of Combined Arms (DCA). The new circular will define the duties and responsibilities of staff Engineers at task force and brigade levels.

Through this, the Engineer School hopes to better integrate Engineers into Combined Arms operations by discussing staff planning. In addition, both field Engineer and maneuver units have requested clarification of the Engineer staff officer's role.

Both active and reserve units provided information, and further comments can be given to CPT Milt Seekings at AV 354-3280, commercial (703) 664-3280.

The new circular will be distributed automatically to all active duty and reserve units.

New Branch Created:

The Tactics and Operations Division is organizing an Engineer Operations Branch, which will be responsible for developing and writing doctrinal literature pertaining to Engineer tactical operations. The new branch is being organized because of revisions to the School Model '83 realignment.

Directorate of Training and Doctrine (DOTD)

51T Basic Technical Course Selected:

An Air Force Career Development Course, CDC 55350, *Engineering Assistant*, has been selected as an interim technical engineering supervisor basic technical course for MOS 51T. This correspondence course is available to active Army and Reserve Component E6 soldiers in MOS 51T and to E5 soldiers in MOSs 51G, 81B, and 82B.

The course consists of eight subject-area volumes and will be used primarily as a merger training for 51T soldiers and cross-training for the soldiers in the feeder MOSs. Subject area volumes include: *Introduction to Civil Engineering*; *Applied Mathematics*; *Surveying*; *Soils Analysis*

Directorate of Training and Doctrine (continued)

51T Basic Technical Course Selected: (continued)

and Testing; *Pavements Analysis and Testing*; *Drafting*; *Engineering*; and *General Contingency Responsibilities*.

All volumes are to be completed in 12 months and require a satisfactory grade on an end-of-course examination in order for students to receive credit. An Army Correspondence Course Program catalog or any Army education office should be referred to for enrollment instructions.

Engineer Doctrine Update Planned:

Engineer doctrine is due for a major update starting in FY 85. FM 5-101, *Mobility*, has been forwarded to the DA printer with a release date to the field in early spring. Keystone manuals which will follow during the summer and fall are FM 5-102, *Countermobility*; FM 5-103, *Survivability*; and FM 5-104, *General Engineering*.

FY 86 will see continuing emphasis on getting doctrine to the field with scheduled publication of FM 5-205, *Engineer Topographic Operations*; FM 5-541, *Military Soils Engineering*; FM 5-25, *Explosives and Demolitions*; FM 5-34, *Engineer Field Data*; FM 5-210, *Military Float Bridges*; and FM 20-32, *Mine/Countermine Operations, Company Level*.

Supporting drills and field circulars for FY 85 publication are TC 5-101, *Mobility Drills*; TC 5-102, *Countermobility Drills*; and two new field circulars, *Brigade Engineer/Task Force Engineer* and *Airfield Damage Repair*. For FY 86, the schedule calls for publication of TC 5-103, *Survivability Drills; TC 5-104, General Engineering Drills*; and TC 5-105, *Topography Drills*.

Topographic Engineers Obtain New Training Products and Classes:

Many new training products and classes will be available to Topographic Engineers in FY 86 and FY 87, according to the Topographic Element of the Directorate of Training and Doctrine.

Both TM 21-33-1, *Vegetation Analysis*, and TM 21-33-2, *Surface Configuration*, will be fielded in FY 86. The coordinating draft of FM 5-10, *Topographic Operations*, will be ready in the third quarter of that year. Coordinating drafts of TM 5-240, *Compilation and Color Separation of Topographic Maps*; TM 5-245, *Photo Lithography*; and TM 5-232, *Elements of Survey*; are planned for FY 87.

The SQT 83F4, *Lithographer*, will be tested for the first time in FY 85. Three SQTs will be tested for the first time in FY 86. These are 81C4, *Cartographer*; 81Q, 2, 3, and 4, *Terrain Analyst*; and 82D4, *Topographic Surveyor*.

Many TEC and ACCP lessons will be fielded in the next two fiscal years in each of those MOSs, including TEC lessons on the operation and maintenance of the Heidelberg press and other new equipment in the topographic support system.

Many graphic training aids (GTAs) will be ready in FY 86, including a protractor that can be used with USGS maps, proportionate scales, *Azimuth-Bearing/Grid Magnetic Azimuth Conversion Charts*, and *Perform Maintenance on the Heidelberg Offset Press.*

Resident courses in advanced lithography (BTC) will be offered in FY 86, and Topographic common core ANCOC courses will be available in FY 87. The Topographic Engineering Branch is now under operational control of the Defense Mapping School and has been designated the U.S. Army Topographic Element, DOTD.

Either CPT Davis or CW4 Maxwell can be contacted for further information at AV 354-1831, commercial (703) 664-1831.

Boat Operators to be Awarded ASI:

Operators of the newly introduced Bridge Erection Boat—Shallow Draft (BEB-SD) will be awarded the 12C Additional Skill Identifier (ASI) according to recommendations made by the Engineer School.

Because training requirements for the new boat have proved more demanding than those for the boat it replaced, a three-week course will be given, open to selected 12C10 OSUT graduates, beginning in 1988. In the meantime, plans are being developed to award the ASI to presently qualified operators.

Since the BEB-SD was originally developed as the United Kingdom Combat Support Boat (UKCSB), two Engineer School NCOs have attended the six-week Royal Engineering School's Craft Operator Specialist Course in Great Britain, before developing the new course.

The newly introduced BEB-SD is a transportable hydrojet-propelled aluminum hull boat used to maneuver floating bridge components. Introduced into the system in 1981, it has replaced the 27-foot diesel-powered bridge erection boats in most Army units. While the old 27-footer is still used in reserve units, it is gradually being replaced by the new boats.

TRADOC has approved the recommendation for the ASI, and DA approval is expected in October 1985.

School Secretary Reorganized:

The Engineer School Secretary has been reorganized to form both a Central Resource Management Office and a Support Division. The consolidation between DOTD and the three training departments brings G-1 and G-4 functions under one contact point.

The School Secretary continues to manage the School library and the Academic Records Division. The new Central Office will handle budget and manpower programming and determine the number of instructors needed for each School course.

The School Secretary's Support Division will add the Text Distribution Warehouse. That division will also do maintenance coordination and coordinate between all School elements and Ft. Belvoir on major logistics actions.

All School directorates will remain the same, although there will be some reorganization with the Directorate of Training and Doctrine, the Department of Combined Arms, and the Department of Military Engineering. The directorates and the departments are listed below with their AUTOVON (354) numbers.

- Directorate of Training and Doctrine, COL D. Barber, 2188
- Directorate of Combat Development, COL T. Vander Els, 4177

Directorate of Training and Doctrine (continued)

School Secretary Reorganized: (continued)

- Directorate of Evaluation and Standardization, COL D. Karrer, 3668
- Department of Combined Arms, COL J. Fesmire, 2907
- Department of Military Engineering, COL P. Chinen, 2628
- Department of Military Logistics, LTC. R. Strom, 3144
- School Secretary, LTC M. Bowe, 2413
- POC for the Engineer School Secretary, CPT Woodward, 3771 or 3216.

These changes, which are being made to further meet School Model '83 guidance, should be completed by April.

Department of Military Engineering (DME)

PE and EIT Study Materials:

Study materials for the Professional Engineer (PE) and Engineer in Training (EIT) exams will be distributed by the U.S. Army Engineer School until current stocks are exhausted. A recent comparison to commercially available material showed that the Engineer School's material needs considerable revision. In the future, the Engineer School will continue to provide assistance to students with exam applications. The National Society of Professional Engineers has provided a select bibliography of study materials and home-study courses. This bibliography can be obtained by sending a written request to: The Commandant, USAES, ATTN: DME, Professional Engineer Program Coordinator, Ft. Belvoir, VA 22060-5331.

Concrete Mobile:

Several reports have come to the Engineer School of field units having trouble with the M-919 Concrete Mobile. While many difficulties are caused by incorrect operation or maintenance, some units have found unique problems in placing concrete.

If you have a problem that goes beyond the scope of normal operations, help is available from the Structure and Utilities Branch. You can contact them through the Engineer Hotline, AV 354-3646, commercial (703) 664-3646. Correspondence should be directed to the Department of Military Engineering, ATTN: ATZA-TE-SU, Ft. Belvoir, VA 22060-5331.

ADSPEC 23 Training:

CAPT Charles Wilkins (USMC), chief of the Structures and Utilities Branch, has been named coordinator of the Facilities/Contract Construction Management Course, which is designed to prepare officers for assignments with Corps of Engineer districts or installation Directorates of Engineering Housing.

Those interested in the course should call CAPT Wilkins at AV 354-2797/3806; commercial (703) 664-2797/3806. Requests to attend the course are made through channels to MILPERCEN Education Branch, ATTN: DAPC-DPA-E, 200 Stovall St., Alexandria, VA 22332-0400.

Letters to the Editor

The Division Engineer—Counterpoint

I must commend LTC Nahas on his article entitled "*The Division Engineer, A Personal Viewpoint*" which appeared in the ENGINEER Summer 1984 issue. It was an excellent attempt to outline the responsibilities for the Division Engineer on today's battlefield. However, there were several areas brought out in the article that deserve further discussion.

Contrary to LTC Nahas' stated viewpoint, the Division Engineer battalion commander's command responsibility will not be reduced during wartime. In fact, I would strongly argue that his command responsibilities will be far more demanding in wartime than in a peacetime environment. The Engineer battalion commander wears two hats both in wartime and peacetime. While he may have difficulty in exercising command and control (C2) in wartime due to the positioning of his battalion on extended battlefields, the requirement to maintain C2 remains an absolute if the Engineers are to contribute to influencing the battle.

While based on the Engineer Estimate, each brigade may receive a Direct Support (DS) Engineer company (the key word here being *may*), the Engineer battalion commander never relinquishes command or control of his subordinate DS Engineer companies. They remain his responsibility and can (if not fully committed) in fact receive missions directly from him in addition to receiving missions and priorities from the supported brigade.

The days of "fire and forget" Engineer support where Engineers are fragmented and piecemealed into ineffectiveness must be terminated given the fact that Engineer requirements will almost always exceed capabilities. Engineer personnel and equipment must be actively commanded by the Engineer battalion commander to ensure that Engineer support is always maximized. The maximum Engineer effort starts with the Division Engineer's Engineer Estimate prior to hostility and continues throughout the battle.

The Division Engineer has both the brigade and S-3 sections and in the heavy and motorized divisions a brigade Engineer section to assist him in planning for Engineer support activities. In addition, he may receive the assistance of an Engineer group or corps battalion to provide additional Engineer planning.

While the Division Engineer provides basic guidance on Engineer activities, to include the division commander's priorities of effort and other tactical considerations, it is the staff that produces the actual estimate and ensuing operation orders. This frees to a great extent the ability of the Division Engineer to don his other hat as commander, allowing him to exercise his command and control responsibilities. Point/Counterpoint.

MAJ Dana Robertson
Program Manager, Survivability
Army Development and Employment Agency
Fort Lewis, WA

Caption gets NO GO—Magazine gets GO

One of the many keys to becoming a successful leader is to "know your men and your equipment." It is with this in mind that I direct your attention to the caption in the lower right on page 17 of your Fall 1984 issue of ENGINEER. The soldiers pictured are carrying "normal balk." Long balk does not exist. The three types of M4T6 balk are tapered, short, and normal.

I'm not trying to be critical, but having spent two years on the trail at Fort Leonard Wood, I quickly learned that the best way to teach soldiers how to correctly perform a task is to show them first. Identifying M4T6 components is a task included in the C.E.T. at TA 204, and any soldier who identifies "normal balk" as long balk would receive a NO GO for that task.

I do, however, enjoy reading ENGINEER; and I find it extremely informative. Keep up the good work.

SSG David M. Barnes
U.S. Army, Engineer
HQ, 2nd Engineer Group

Engineer Command Update

ENGINEER will publish its annual Engineer Command Update in the Summer 1985 issue. Readers are encouraged to submit the names of commanders and command sergeants major of Engineer brigades, groups and battalions to:

ENGINEER Magazine
ATTN: ATZA-TD-P Stop 291D
Fort Belvoir, VA 22060-5291

Force Structure Management and Equipment

Change . . . but Not Engineer Standards

by LTG E. R. Heiberg III
Chief of Engineers, U.S. Army

Both because of my position and my personal concerns, I am especially interested in changes that affect Army Engineers. I review here some recent developments that are important for you to know about. I also will highlight a few areas that remain unchanged.

After extensive studies of its force structure over the past year, the Army has decided to keep most of its Engineers. The Army was seriously considering cutting Engineer forces by 22,000 before the Army Vice Chief of Staff hosted a force structure functional area assessment last November. However, after reviewing the Engineers' role and mission, the Army decided it could not afford to lose so much Combat Engineering support. As a result, the Engineers will lose significantly less than first considered, although there will be some painful cuts. The Engineer troop ratio of active component (AC) to reserve component (RC) will continue to be about 30 to 70.

Several changes resulted from the assessment. Some AC Engineer units —primarily utility detachments—will be inactivated to allow for high priority Army initiatives. Other AC companies from corps combat battalions and combat heavy battalions will be moved to the RC as roundout units. In addition, there will be some conversion of selected RC Engineer units as a result of revised allocation rules. For example, some dump truck companies will convert to panel bridge units.

The AC Engineer strength is unlikely to grow under the Army's imposed AC strength of 781,000. Where there is a shortage of Engineer forces, one of our future challenges is to offset this through host nation support or contracting. This involves finalizing host nation agreements and ensuring that contracts are in place. This is a difficult challenge, but it has to be met if we are to ensure adequate Engineering support.

Another area of change is in the way the Army manages its officers. In an effort to meet the future needs of the Army, the Officer Personnel Management System (OPMS) will be fine-tuned to emphasize branch—a return to pre-1974 policy. The recent OPMS study will mean a number of changes to Engineer officers over the next three to five years.

Engineer officers will be managed and developed only by the Engineer branch. Engineers, therefore, will not serve in areas such as maintenance management and material services management which become areas of concentration within the Ordnance branch and the Quartermaster branch. By the same token, officers from other branches will not be developed in Engineer areas of concentration.

In order to meet Army field grade requirements in each branch, some officers will branch transfer at the third and eighth years of service. Officers from overstrength branches will transfer to the Engineer branch and the Combat Support Arms and Combat Service Support branches. Among the combat arms, only the Engineers require more field grade officers as the officers are promoted. All the other combat arms decrease their requirements as the officers in those branches gain seniority. For the Engineers, this is highlighted by the large command opportunities for lieutenant colonels and particularly colonels. And this need is further emphasized by the Engineers' challenge to produce qualified Directors of Engineering and Housing at field grade levels.

Officers will no longer be required to have two specialties. The OPMS study found that the current system takes qualified officers away from Combat Support and Combat Service Support assignments just when the need for these officers is increasing. Under the new system, branches with multiple specialties will have those specialties consolidated. Our current Engineer specialties will become four areas of concentration within the Engineer branch.

The current specialty code 21, Combat Engineer, will become areas of concentration 21A (General Engineer) and 21J (Combat Engineer). Specialty code 22 (Topographic Engineer) will become

21C, while specialty code 23 (Facilities/Combat Construction Management) will become 21D (Construction Engineer). Multiple career patterns will be permitted so that some officers may single track in Engineer areas of concentration while others may dual track, switching between assignments in Engineering and in functional areas such as comptroller or research and development.

What remains unchanged are the Engineer soldiers' high standards of excellence, professionalism, and integrity. As we get new doctrine and equipment, we are especially challenged to maintain our professional standings and capabilities. Reserve components, who make up 70 percent of the Engineers, have a special challenge to maintain readiness with only limited training time. New training initiatives are going to stretch the RC soldier even further. For example, in the future, RC officers will be attending certain parts of the officers advanced course instead of completing the course through correspondence.

Because you in the RC have so many demands on your time, I encourage you to use your time well and to use your military duty and civilian work to enhance each other. Civilian experiences are an opportunity to learn, grow and perform at your best; they can be part of preparedness and readiness training. And use your military training and experience to enhance your leadership potential in civilian life. I encourage you particularly to help those of us on career active duty. We need the input, insight, and breadth you can offer. We welcome your wisdom and experience.

During these changing times, we in the U.S. Army Corps of Engineers continue to do all we can to support the Engineer soldier. In fact, everything the Corps does in one way or another supports the Engineer soldier—both on and off the battlefield.

My work with the Army staff and other Army commands ensures Army Engineer units are properly equipped, organized, and manned. The Corps' military construction program creates the environment in which the Army operates, from training ranges to housing. And our civil works program, together with our military design/construct mission, keeps a strategic reserve of Engineers, both uniformed and civilians, trained in managing large construction projects should the nation ever have to mobilize in a national emergency. That strategic reserve cadre across the United States and overseas also provides a "bank" of Engineer-related skills we would need in an emergency: real estate and procurement specialists, lawyers, fiscal and administrative experts, and a host of others.

Engineer equipment is an area that is changing for the better, although sometimes progress is slow. We are seeing new equipment, both tactical and construction, entering our Engineer units, both AC and RC. Some of our forward battalions are receiving the M-113 Armored Personnel Carriers made available as the infantry and cavalry receive the new M-2/M-3 series of Bradley Fighting Vehicles. Testing of the M-9 Armored Combat Earthmover is underway. A small emplacement excavator (SEE) is in production. And new mine/countermine equipment continues to be supported by Army dollar decisions. I expect the Army's need for modernized Engineer forces to continue to be recognized in the years ahead.

I challenge all Engineers to continue to bring your best to the job. Continue to maintain our high standards of excellence, professionalism, and integrity. I also ask that you support each other. Share your enthusiasm and energy with other Engineers as well as with your staffs and co-workers. We need to nurture a sense of responsibility for the Engineer Family and the whole Army Family. To have an Army that works, each of us must be committed to each other's success.

LTG E. R. Heiberg III challenges Engineers to maintain standards of excellence, professionalism, and integrity (photo by Donald R. Jones).

Announcing the 118th Annual Engineer Dinner and Castle Celebration

118th Annual Engineer Dinner	*The 1st Castle Celebration*
Friday, May 17, 1985	*Thursday, May 16, 1985*
MacKenzie Hall, Fort Belvoir, VA	*MacKenzie Hall, Fort Belvoir, VA*
Officers Only	*Active, Reserve Component, and Retired*
Mess Dress Blues, Whites	*Engineer Officers and their Spouses*
or Tuxedo with Black Bow Tie	*Informal Civilian Attire*
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Airfield and Base Camp Construction in Honduras

by CPT Don C. Young

Over 300 aircraft used the parking aprons and taxiway of the San Lorenzo airstrip constructed for Big Pine II. A major problem during construction was the basic soils equation of DIRT + WATER = MUD (photo by 1LT Samuel Burkett).

Central America has become a major news-breaking area in the past several years. Millions of U.S. dollars are budgeted for this area annually. The rise of Cuban activities in Nicaragua and Grenada has certainly opened many Americans' eyes to the security threat from Soviet intervention into Central America. Honduras, approximately the size of Tennessee, has become an important ally in Central America due to its location and political status.

The 46th Engineer Battalion (CBT) (HVY) from Fort Rucker, AL, constructed two C-130 medium-lift dirt airstrips and three base camps during the 179-day Joint Service Exercise AHUAS TARA II (Big Pine II) in Honduras. Three Engineer task forces were formed to accomplish these five missions at San Lorenzo, Comayagua, and Aguacate. Each site encountered a variety of construction problems, and the task forces developed interesting techniques to overcome these problems throughout the exercise.

- Non-standard mill lumber.
- Excess water during the wet season.
- Limited availability of civilian construction equipment repair parts.
- Mountainous terrain and substandard road conditions.
- Limited availability of standard U.S. Code electrical and plumbing materials.
- Lack of specific plans from the host nation.
- Lack of topographic maps and information.
- Long acclimatization period required for soldiers.

Airfield Construction

The San Lorenzo airstrip project was located two miles north of the San Lorenzo base camp. Construction began Sept. 15, 1983 during the heavy rain season. Daily rainfall caused mucky soil conditions that cut equipment utilization time to less than half a day.

The airstrip design criteria was taken from TM 5-330, *Roads, Airbases and Heliports in the Theater of Opera-*

tions. All transverse and longitudinal grades were set at maximum values achievable to ensure effective drainage from the heavy rainfall. Parallel V-type drainage ditches carried the runoff to trapezoidal open-channel ditches at each end of the airfield. These open-channel ditches carried the runoff to existing stream beds.

Clearing, grubbing, and stripping operations were done with bulldozers and scrapers. Approximately 30,000 cubic yards of organics were moved before hauling fill for the runway, and 15,000 compacted cubic yards of CH-SC type soil fill were cut from the drainage areas and used to build the runway.

The runway supported its first C-130 landing on Nov. 10, 1983. Over 300 sorties of C-130 and C-7 aircraft used the airstrip before the end of the exercise (ENDEX). The runway sustained minimal landing and takeoff damage. An access road, taxiway, and parking apron were completed by Dec. 20, 1983. Their dimensions were modified slightly to fit onto the available land space.

Major problems encountered during the San Lorenzo airstrip project included working with the basic soils equation of DIRT + WATER = MUD and keeping critical pieces of Engineer equipment operational. Late afternoon rainstorms (daily at 1600–1800 hours) caused extremely mucky soil conditions even with site drainage established daily. The sun would dry out the top layer by midday, allowing the crews to work until the next rainstorm.

Bulldozers were primarily required to strip the organics because of the lack of traction with the scrapers. The bulldozer push-method was used whenever scraper traction was satisfactory. Soil stabilizing additives such as lime, to dry out the mucky soil, were not available in-country. The large quantity of lime required for this airstrip project would not have been cost-effective if sent from the United States.

Lack of repair parts for Engineer construction equipment caused problems throughout the exercise. Turn-around time using normal exercise maintenance channels was too long, and in-country construction equipment dealerships could not provide parts. Besides cannibalizing repair parts, the only other requisition system was to telephone Fort Rucker, AL, and order the required parts. The rear-detachment maintenance element would immediately acquire the parts and send them on the next available supply plane to Central America.

The most critical piece of Engineer construction equipment was the high-speed compactor/motorized sheepsfoot roller which is essential for compacting each layer of fill. Because there are only three compactors organic to a combat heavy Engineer battalion, a major construction problem occurs when the battalion is working on more than one airfield or earthmoving project simultaneously.

A high-speed compactor/motorized sheepsfoot roller was the most critical piece of Engineer construction equipment at the two airstrips in Honduras (photo by 1LT Samuel Burkett).

Equipment breakdown and lack of spare parts caused construction delays by having to shuttle compactors from one site to the other. As a result, a change of the Modified Table of Organization and Equipment (MTOE) was submitted at the end of exercise to add a minimum of three additional high-speed compactors with transport-hauling capabilities (tractor-trailers).

The Aguacate airstrip project was located in the mid-northeastern sector of Honduras, approximately 70 kilometers west of the Nicaraguan border. No prior planning had been done by the Honduran civil engineers for this airstrip. Therefore, the S-3 construction section researched, designed, coordinated, and laid out the airstrip design according to TM 5-330.

The major missions for the Aguacate task force were to build the runway through subbase, establish a base camp, and install a 10,000-foot PVC-pipe waterline. The short time of the exercise prevented the completion of the runway as it was originally designed. However, a clay cap was installed to render the subbase runway C-130-capable as built.

Again, all transverse and longitudinal grades were set at the maximum values allowed to assure effective drainage from the heavy rainfall. Construction began Oct. 6, 1983 with the stripping of organics through swamps, farm fields, streams, and rice paddies along the designated airstrip centerline. Approximately 200,000 cubic yards of cut (organics) and fill (GP-type soil) were hauled to finish the subbase of the airstrip by the end of the exercise.

The mountainous terrain surrounding the Aguacate airstrip made drainage construction extensive. The drainage plan included four culverts that were installed underneath the airstrip to carry runoff and stream water away from the project. Two 36-inch diameter, single barrel, reinforced concrete culverts and two 36-inch diameter, triple barrel, reinforced concrete culverts were placed underneath the airstrip. Upstream and downstream soil-cement sandbag headwalls were built at each culvert site.

An efficient, field-expedient method of installing 4-foot concrete culvert sections was brainstormed by SGT David Coleman of C Company, 46th Engineer

Engineers from the 46th Engineer Battalion install culvert sections at a triple-barrel site to carry runoff and stream water. To save time, materials, and money, the Engineers also constructed a trapezoidal channel to carry water from the runway (photo by 1LT Samuel Burkett).

Battalion (CBT) (HVY). Instead of using the traditional method of lifting each section with a crane and pushing the section into place with manpower, a 2½-cubic-yard bucket loader with a multi-purpose (four-in-one) bucket was modified by securing a 4 x 8-inch post in the bucket with a chain and binder.

In essence, a field-expedient forklift was created that increased the installation rate of 36-inch diameter concrete culverts from 2.5 sections per hour (crane method) to over 6 sections per hour. Therefore, with each culvert length averaging between 220 and 280 feet, a significant amount of construction time was saved during the culvert-installation activities.

An extensive open-channel ditch was cut around the northeastern end of the airstrip to carry a large wet-season stream away from the runway. A trapezoidal channel was designed according to TM 5-330 standards with the deepest cut about 21 feet into the hillside. Construction of this open-channel ditch saved construction time, materials, and cost that would have been expended to install another triple-barrel culvert site underneath the airstrip to carry stream runoff.

Base Camp Construction

The vertical construction platoons were tasked to build a number of base camps at San Lorenzo, Aguacate, and Comayagua. The facilities included clearing hospitals, AAFES post exchanges, road culverts, ammunition storage points, mess halls, bunkers, obstacles, helipads, observation towers, latrines, shower facilities, orderly rooms, and offices.

Each base camp development plan centered around the construction of tropical buildings, nicknamed CAT-HUTs or C-HUTs for Central American Tropical Huts. Approximately the size of a G.P. medium tent, each building cost about $1,500 in materials to build in Honduras and will certainly outlast any canvas tent in tropical climates. The battalion aid station conducted a series of inside temperature tests comparing a G.P. medium tent and a C-HUT. In almost every case, the inside temperature of a C-HUT was 20 to 25 degrees cooler during tests in the heat of the day.

The basic C-HUT unit (16 x 32 feet) was considered a squad level construction mission. It normally took a vertical construction squad six to seven days to complete one C-HUT from footers to the tin roof. However, prefabrication yards were set up to build doors, steps, stud walls, and roof trusses that were hauled to the building sites as needed.

With a prefabrication yard in operation, it normally took a vertical construction squad two to four days to complete one entire C-HUT. However, one vertical construction squad from B Company completed an entire C-HUT in one day at Comayagua base camp. On several days, the vertical squads were broken down into technical advisor teams to assist in self-help construction of C-HUTs by other supporting units.

The overall design of the C-HUTs

proved very effective for a tropical climate. The design improved living conditions immensely and allowed for easy expansion. However, several modifications were made to ease construction and improve living conditions. Recommended modifications included lowering the wall height from 8 to 7 feet, placing roof trusses every 8 feet on-center instead of 4 feet on-center, and installing canvas rolls above screens for use during rain and dust storms. During the entire six-month deployment, less than 30 percent of the battalion personnel lived in C-HUTs. The G.P. medium tents were home for the soldiers located at Aguacate and Comayagua.

AHUAS TARA II provided a unique opportunity for the battalion to train, survive, and build in the austere conditions of Honduras. A remarkable improvement in leadership skills, operator skills, maintenance, and MOS qualification at all levels was realized.

Training Summary

- Movement from CONUS.
- Equipment operator skills.
- Maintenance operations.
- Convoy procedures.
- Secure communications equipment.
- Water purification.
- Construction and topographic survey.
- Soils analysis.
- Vertical construction skills.
- Reconnaissance of roads, airfields, and bridges.
- Survivability.
- Command and control operations.

Despite internal and external problems, the battalion accomplished all assigned missions and provided a smooth transition for the follow-on Engineer unit, the 864th Engineer Battalion (CBT) (HVY) from Fort Lewis, WA.

CPT Don C. Young is the commander of the 586th Engineer Company (AFB) at Fort Benning, GA. He led the Quality Control Team attached to the Mobile District and 1st/7th Special Forces Group during the construction of the Regional Military Training Center near Trujillo, Honduras. He redeployed to Honduras with the 46th Engineer Battalion (CBT) (HVY). CPT Young completed the Engineer Officer Advanced Course and has a degree in civil engineering from Vanderbilt University.

CPT Young wishes to thank the following people for their assistance in gathering information: CPT Michael Flanagan, 1LT Samuel Burkett, 1LT John Gunter, 1LT Michael Rorex, 1LT James Balocki, SFC Lewis Hamilton, and Blake Peck.

Top, soldiers align girders on C-HUT footers. A squad from B Company completed an entire 16 x 32-foot building in a record time of one day. Bottom, completed C-HUTs at one of the base camps provide effective shelter in tropical climates (photos by 1LT Samuel Burkett).

Leadership Development in *EOAC*

by MAJ Don Riley
CPT Mark Buck
CPT Richard Crocker
CPT Jerome Rosperich
CPT Joseph Schroedel

Captains Mike Candelaria, Jay Parker, and Billy Fortner give a student briefing on their scheme of maneuvers to their team and Team Leader (U.S. Army photo).

At his periodic counseling session, CPT J's Team Leader encouraged him to work on his ability to think on his feet and act quickly. This need became evident in CPT J's last briefing when he relied heavily on his briefing charts.

When CPT J's next chance to brief came, he was sure that he would impress the team with his well-prepared overhead slides. His briefing went well until his Team Leader turned off the overhead projector and asked him to proceed.

CPT J was surprised, stumbling for a few moments. But he pressed on, knowing why he was confronted with this situation and realizing that his teammates' expectations of him were high since he was one of the few with company command experience.

The open critique which followed helped to reassure all on the team that they were there to help each other and that open, honest feedback is one of the best aids to learning a skill. This was a meaningful learning experience for both CPT J and all of his teammates. An opportunity was provided for a team member to practice his leader skills, for team members to reflect more on their own capabilities and limitations, and to promote team cohesion through candid evaluations.

In the Winter 1983 issue of ENGINEER, CPT Ralph Graves described the development strategy for the new Engineer Officer Advanced Course (EOAC). Driving this strategy was the Engineer School's need to better develop professional officers and leaders as described in the key manuals, FMs 100-1, 100-5, and 22-100. The mission—train leaders to fight and win.

It's tough to do this training in the classroom, but many positive steps can be taken to develop the skills and attributes needed in our leaders. The small-group instruction and exercises, total fitness, team building, and Team Leaders are all integral parts of our leadership development program. These efforts build upon the leadership instruction presented by the Leadership Branch in the first weeks of the course.

The key to the program is the *reinforcement, application,* and *appraisal* of leader skills and attributes within the small-group environment.

Course Design

The design of a leadership development program began with a study of the most current standards, doctrine, and research to determine the *leader skills* (what we must ***do***) most critical to our training objective—to fight and win. The number of skills was limited to allow for efficient management of the program and to give adequate feedback to the student (Figure 1). These skills were integrated through training, application, assessment, and individual plans for improvement; and feedback is given at each step.

Figure 1. Leader Skills

- **Take risks**
- **Act quickly**
- **Make decisions**
- **Write effectively**
- **Contribute to teamwork**
- **Use initiative**
- **Motivate subordinates**
- **Manage time**
- **Communicate effectively**
- **Think on feet**
- **Solve problems**
- **Manage stress**
- **Conduct briefings**

The design of the program to develop *leadership attributes* (what we must ***be***) was tougher—how do you reinforce qualities like honesty, creativity, and flexibility? The keys are honest feedback from both the Team Leader and team members, Team Leaders and instructors who set the example, and a classroom environment which promotes these qualities. Attributes were selected in much the same way as leader skills. A worksheet with attribute definition and appraisal criteria was then developed to appraise team members.

However, the real impact is made in the *small-group exercises* designed to integrate leader, tactical, and technical skills. These exercises were examined to determine which situations best presented the student with an opportunity for application and practice. A plan was then developed detailing in which lessons the skills would be trained, applied, and appraised.

Also, *team building* is reinforced throughout the program. This both improves the potential for the team members to learn and places them in a very realistic team environment. To promote team building, careful consideration was given to all course requirements, lesson sequence, composition of work and briefing teams, and physical and competitive activities.

To support leadership development, the *total fitness* program was designed around basic instruction in personal and unit conditioning, lifestyle improvement, physical training, and personal programs for improvement based on a battery of assessments, all oriented to developing leaders to fight and win.

Leader Skills

Besides ensuring understanding of the course subject material, the Team Leaders assess student development of leader skills during small-group exercises, leadership and fitness lessons, and physical training activities.

The strategy to develop these skills follows a competency model developed by the Army Organizational Effectiveness School. Students are initially informed of the criteria, shown examples of good and poor skill application, and instructed (formally or informally) in each skill. Following an initial assessment, students practice the skills within the context of the course curriculum. Additional opportunities to practice and reevaluate the skills precede the final step—applying the skills in future assignments.

For example, one element of "thinking on your feet" is recognizing a change in the situation. This "change" may be prompted by the Team Leader as in the example of CPT J. Individual student weaknesses form the basis for this prompting. Standard appraisal criteria are then used to provide students with immediate feedback as one focus for periodic counseling and eventually as input to the ***Academic Evaluation Report.***

Leadership Attributes

The leadership-attributes assessment is closely related to the leader-skills appraisal. Attributes are qualities which make us what we are, and good leadership depends both on the development of leader skills and the internalization of leadership attributes. We develop the skills through practice and feedback; improvement in leadership attributes is fully the student's responsibility. His observed weaknesses are identified by both his Team Leader and peers and remain his responsibility.

An assessment considers 23 leadership attributes, each with five descriptors which characterize a particular level of behavior. A carefully worded definition explains each attribute and its accompanying descriptors, for example, "judgment" (Figure 2).

The assessment is used both by the Team Leaders and peers. Usually there is a close correlation between assessments made by several students of the same individual. In any case, the information is provided to the student for his personal use. Further advice is provided to those who are interested.

The students are very receptive to the feedback. They usually agree with the assessments made, although they may have not previously recognized that aspect of their behavior. Also, they have shown a desire to improve both their leader skills and attributes as leaders.

Small-Group Exercises

After receiving initial instruction in a given subject (such as tactics and

Figure 2.
Judgment

The ability to see the essential elements of a problem, logically weigh facts and possible solutions, assess priorities, and base sound decisions upon these considerations.

5. Sound	Shows consistently sound, well-founded, logical judgment even in difficult situations.
4. Reliable	Can generally be relied upon to produce sound judgment in most circumstances.
3. Measured	Sometimes unsound. Apt to overlook some aspects.
2. Hazy	Has difficulty in marshalling facts, determining possible solutions, and making logical decisions.
1. Unreliable	Inclined to rush into hasty, illogical conclusions without full consideration of all the facts.

(This format was suggested by MAJ Rod McKinnon, Australian Exchange Officer to the Engineer School, who worked on a similar project at the Australian Command and Staff School.)

engineering) in the more traditional fashion of a lecture, the students move to their team rooms for practical application. Often the team is broken down into smaller work groups. Role-playing as a commander, an S-3, or a brigade Engineer allows for realistic application. The primary instructor (the author of the exercise) provides technical expertise. The Team Leader functions in two roles, that of facilitator of the exercise and instructor.

In most exercises, the students develop two products—a written assignment and a military briefing. The students also brief and critique each other.

Our experiences with the small-group instruction show that greater learning takes place in small groups. The students prefer to work and learn in the team environment. They learn to rely on each other's experiences, and they exhibit greater enthusiasm and effort (including those students who already have a good grasp of the material and who often participate less in other methods of instruction). Some of the best learning occurs as a result of the peer interaction within the team.

Team Building

In EOAC, we build team cohesion through efforts to develop bonds of mutual trust, respect, confidence, and understanding. This begins by selectively composing teams of officers who represent a cross section of typical Engineer assignments and education. The varied background of a team presents a challenge in group dynamics, but greatly increases the potential for learning through the sharing of experiences. Additionally, the students have responsibility for team administrative matters providing a structure to promote team cohesion.

The Team Leader guides and coaches the team. He *guides* the team through the successive stages of team development. He provides the initial structure for the team, assists in establishing initial norms, sets standards of performance, and establishes systems for feedback. As a *coach*, he meets with each team member periodically; and he uses a combination of his observations, the student's academic performance, and peer evaluations to provide meaningful feedback to the student. Familiarity with the course content and the student's values and goals allows the Team Leader to place the student in situations which reinforce strengths and overcome weaknesses.

Also, the small-group exercises are designed to facilitate team building. Different team members are placed in charge of subgroups for graded and ungraded exercises. The added component of a group grade requires the student leader and team members to work together and reflects how well the student leader organizes and motivates the team members. The student leader gains an appreciation of group dynamics and how it contributes to team building. Every opportunity is taken to translate this experience to teamwork in units and how to build a team spirit in units.

Competitive athletic events and social activities during the course help to speed the development of team cohesion. After these activities, team members are friendlier, less inhibited in the classroom, and more candid in their comments.

This deliberate effort to build teams is evident in the improvement in student learning of both the subject matter and the benefits and constraints of working together as a team.

Total Fitness

The abilities to lead, think clearly, and act decisively are enhanced by the leader's total fitness. In EOAC, the

Teammates work together to solve an engineering design problem (left to right) CPT Ken Collier (AR), CPT Ron Young, CAPT Lee Moran (USMC), CPT Rich Jennings, and MAJ Ibraham Hassan (Jordan) (U.S. Army photo).

rudiments of total fitness (mind, body, and spirit) are presented cognitively (lectures, readings, and class discussions) and experientially (practical exercises, physical exercises). The basic framework of the instruction uses simple equipment; standard facilities; and current Army manuals, pamphlets, and training guidance.

The students receive instruction for improvement at a personal level and guidance for applying the same techniques to soldiers in their future commands. All the instruction is practical and simple. The honest assessments, plans for improvement, and final results are easy for students to use in their future units.

Physical fitness is assessed in the first week of instruction. Each student takes the Army Physical Readiness Test (APRT), measures his flexibility, and determines his blood pressure and pulse rate. With this data, he assesses his current level of physical fitness. He then develops an exercise plan which incorporates mandatory EOAC physical activities with the team and additional individual activities emphasizing a balanced program of endurance, strength, and flexibility.

Goals for improvement are set, student progress is monitored, and an evaluation is made at the end of the course. Students must score at least 50 aerobic points during each of the final twelve weeks of the course and are strongly encouraged to set high goals for the final APRT.

Instruction is presented on the basics of exercise, flexibility, exercise considerations, and unit fitness. Organized physical training includes relay races, water polo, exercise circuits, parcourses, basketball, soccer, guerilla drills, team runs, and volleyball.

Health is also emphasized during the first weeks of the course. Students have their body fat content measured; analyze the composition and caloric content of their diets; have their blood tested for cholesterol, uric acid, glucose, and tryglyceride levels; take a total life stress assessment; and evaluate their risks of heart attack in relation to their lifestyles. With his Team Leader, each student assesses and evaluates his state of health, plans any needed improvements, sets goals, and monitors his progress.

Instruction is presented on nutrition, weight control, cardiovascular fitness, and stress management. Students are given practical guidance on diet and stress reduction techniques. At the end of the course, a subsequent blood test helps to measure any effect of lifestyle changes.

The physical fitness plan and lifestyle improvement begin progress towards *lifetime* total fitness for each student, thereby developing more effective leaders for the Army.

Results of the new course will take time to measure, and the Engineer School's Directorate of Evaluation and Standardization has begun an extensive program to evaluate the course and its graduates.

However, we are confident that by presenting opportunities for the students to apply leader skills; to form and work together as teams; to improve their total fitness; to receive feedback on their performance and observed attributes; and to make assessments, set goals, and measure progress, the new EOAC provides a great opportunity for leadership development.

MAJ Don Riley is a graduate of the U.S. Military Academy and has a master's degree in engineering from the University of California, Berkeley. He served with the 7th Division at Fort Ord, CA; the U.S. Army Engineer District, Far East; and the General Staff, U.S. Army Engineer School.

CPT Mark Buck is a graduate of the U.S. Military Academy. He served with the 54th Engineer Battalion in Germany and the 3rd Battalion at Fort Belvoir, VA.

CPT Richard Crocker is a graduate of Penn State University. He served with the 19th Engineer Battalion in Germany, was a Facilities Engineer in Kitzigen, Germany, and served with the 30th Engineer Battalion at Fort Belvoir, VA.

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CPT Joseph Schroedel is a graduate of the U.S. Military Academy and has a master's degree in civil engineering from the University of Illinois. He served with the 20th Engineer Brigade at Fort Bragg, NC, and the 82nd Engineer Battalion in Germany.

(The authors were Team Leaders for EOAC Class 1-85, Department of Military Engineering, U.S. Army Engineer School.)

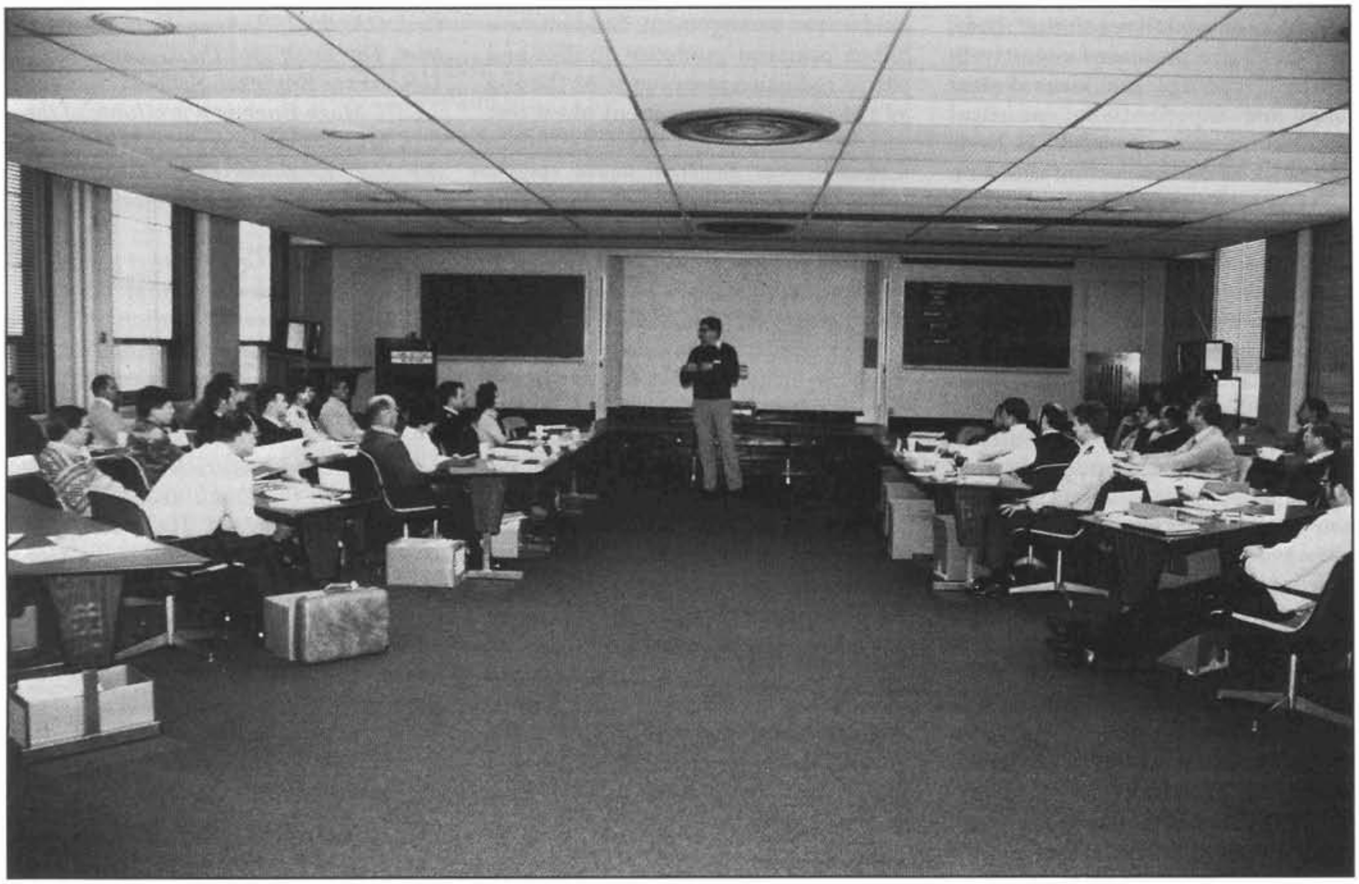
ENGINEER HOTLINE

Problems, questions, and comments relating to Engineer doctrine, training, organization, and equipment can be addressed by telephone to the U.S. Army Engineer School's "Engineer Hotline." The Hotline's auto-answer recorder operates 24 hours a day, seven days a week. You should give your name, address and telephone number, followed by a concise question or comment. You'll receive a reply within three to 15 days. **The Hotline is not a receiving agency for formal requests.**

Call commercial (703) 664-3646; WATTS 800-336-3095, extension 3646; or AV 354-3646.

Correction

The article, "Developing Our Junior Officers," by COL Samuel J. Ady incorrectly stated " . . . the 4th and 1st Engineer Battalions at Fort Riley," and " . . . the 4th and 5th Engineer Battalions at Fort Knox" (Fall 1984, page 24). This should have read " . . . the 4th Armored Battalion of the 37th Armored Regiment and the 1st Battalion of the 63rd Armor," and " . . the 4th Battalion of the 5th Infantry and the 5th Battalion of the 41st Field Artillery."



Tim Ketchum discusses productivity and efficiency with students attending the Facilities Engineering Management Course at the Engineer School (U.S. Army photo).

Preparing for Your DEH Assignment

by Tim Ketchum

Is there a DEH assignment in your future? Are you prepared to move into one of the most challenging jobs in the Army today?

You say you are. You've had the right assignments along the way. You've had the normal schooling—EOBC, EOAC, possibly graduate school. You've gotten your company command under your belt and have served at various positions in several Engineer units. All these previous assignments have developed your leadership abilities and have given you confidence in dealing with soldiers in a military environment.

But has your previous experience prepared you for the challenges of being a director of engineering and housing or an operations officer with the DEH? Chances are, if your career has followed the normal progression, the answer to that question is no.

Why aren't you ready? What's so different about the DEH business than the other assignments you have had?

To begin with, in today's monetary terms, the DEH is big business. Looking at a standard size CONUS installation, the DEH controls an average yearly budget of $45 million. This accounts for about 50 percent of the base operations money spent on that installation. The DEH work force comprises about 30 percent of base operations personnel.

Aside from the sheer magnitude of the job and the responsibilities, there are several other new problems you will encounter. One of the most frustrating of these, especially when coming from a military environment, is dealing with a predominantly civilian work force. In a typical DEH organization of 300 to 400 people, there may only be two or three people wearing the green suit.

Now you are confronted with the civil service system. Your first reaction would be to treat the organization like any military one and assume you have great flexibility in dealing with personnel matters. But soon you are bogged down in the rules and regulations on hiring and firing, rewards and discipline, promotion, merit pay, hiring freezes, grievances, and all the other factors which affect your ability as a manager to get the job done.

Associated with the challenges of a civilian work force is another organization you have not had to deal with in the past, and that is the employees' union.

When you look at how the DEH accomplishes its mission, you will find that over half the work is performed by civilian contractors. You have now moved into a new dimension of time and space, the twilight zone of procurement rules and regulations. You are challenged by trying to get the lowest bidder on a job to give you a quality product on time. You are introduced to new players in the game: contracting officer, legal counsel, and small business administration. You are able to increase your vocabulary with new terms such as *termination for default, cure notice, cost-plus award fee,* and *change order.*

Just when you thought there could be no more challenges left, you face another problem unique to the DEH—customer satisfaction.

For every project you get, every work order that comes across your desk, there is someone out there—the customer, the user—who wants that job done yesterday. You have to be a good juggler, balancing your limited resources of money and people against the unlimited requirements of your customers and the desires of your commander.

The most highly visible part of the DEH is the H . . . Housing. Under the previous facilities engineering organization, the FE was responsible for the maintenance and repair of family housing. Under the DEH organization, the management of the housing function has been added. Providing adequate housing is essential to the quality of life for the soldiers and their families.

These are just some of the challenges awaiting a new DEH. It is obvious that the more preparation you can make before assuming your new job, the faster you can take control and the less on-the-job training you will require. If one of your previous assignments was in a Corps of Engineer District, you are probably better prepared than individuals who have spent all their time in troop units.

What training is available? The U.S. Army Engineer School offers a three-week Facilities Engineering Management Course (FEMC), a DEH Executive Course, and seven different housing management courses. You should attend FEMC before starting your assignment. This course will provide you with the latest guidance in the DEH business and valuable contacts with the various functional experts. Other training available at your own installation includes supervisor courses which familiarize you with the civil service system and contracting courses which will give you the basics in government procurement.

For additional information on the DEH courses available at the USAES, call AV 354-4195, FTS 544-4195, or commercial (703) 664-4195.

Mr. Tim Ketchum is the Chief, Engineering and Housing Management Division, Department of Military Engineering, at Fort Belvoir, VA. He has worked in the Directorate of Engineering and Housing, Military District of Washington and for the Office of the Chief of Engineers, Housing Division, and the Facility Engineer Support Agency. A former Engineer officer, Mr. Ketchum has associate degrees in data processing and business management from Northern Virginia Community College, a bachelor's degree in civil engineering from Virginia Tech, and a master's degree in engineering administration from George Washington University. He is a registered professional engineer in Virginia.

Hotline Q & A

Q. My question deals with the triangular tank ditch. We have information from an Engineer pamphlet which states that the spoil is placed on the enemy side of the tank ditch. Does it go on the friendly or enemy side?

A. The spoil is placed on the enemy side of the tank ditch and not on the friendly side because of the factor of work effort required in construction. If the spoil were to be placed on the friendly side of the ditch, it would require the digging team to lift the spoil over the 1.5 meter high wall of the friendly side. In addition, the spoil reduces the traction of approaching enemy tanks and affords good soil cover for antitank mines. This information can be found in FM 5-15, *Field Fortifications;* FM 5-34, *Engineer Field Data;* and the Engineer pamphlet, *Tank Ditches,* dated May 1982.

Q. I would like to know when ARTEP 5-35, *Engineer Combat Battalion, Corps,* will be available.

A. ARTEP 5-35 was fielded February 1985. It can be ordered from the U.S. Army AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220.

Q. I am trying to find the NSN for the overhead foxhole covers. How can I order them?

A. The NSN is: 4200-00-444-7118. The covers can be obtained through normal supply channels.

Q. We have received the link reinforcement set for our MGB. However, we have not received any guidance as to how to employ it, nor can we find any information in any DA pamphlets about this kit.

A. TM 5-5420-212-12-1, *Link Reinforcement Set for the Medium Girder Bridge (LRS),* is available through normal channels. An additional chapter covering the LRS will be included soon in TM 5-5420-212-12, *Medium Girder Bridge.* A mobile training team from Ft. Belvoir, the office of Non-Resident Training, can also be requested for Army Reserve or National Guard units. The AUTOVON number is 354-3008, commercial (703) 664-3008.

Engineer Platoon Leader at NTC

by CPT David R. Frick

You graduated from EOBC three months ago in the top 20 percent of your class. You took a quick 30-day leave to *relax* and then reported to your unit ready to start work with the "Real Army."

After a hasty introduction, your new company commander briefed you on all your additional duties, told you that you would be taking over second platoon, and said that the company would be leaving for Fort Irwin, CA, to provide support to 3rd Brigade at the National Training Center.

It's now the fourth day of a 14-day rotation through the training center. Since the exercise kicked off, the task force that your platoon is supporting has conducted a night attack, a deliberate daylight attack, and is currently preparing to defend to retain a battle position. So far, your platoon has not been actively involved in any of the operations.

The S-3 has approached you several times for information he needed to write the Engineer annex to the task force operations order; but for the most part, you just attend the briefings, try to understand where your platoon fits into the order of movement, and then follow the vehicles in front of you to the objective. You are beginning to wonder when you will get a "real mission" so you can show these tread-heads what the Engineers can really do.

At 0330 you receive word to attend a warning order briefing at the task force TOC in 30 minutes. As you arrive, the S-3 is going over the general situation: The task force has received a reflex mission and will conduct a hasty attack NLT 0800. The various members of the staff go through their portions of the briefing as you settle back and mentally wonder how you're going to get all your vehicles topped off with fuel before 0800.

After the artillery finishes their portion of the briefing, you expect the S-3 to stand up and tell everyone what the Engineer mission is. Normally in an offensive operation like the one just received, the S-3 will say something about the priority of Engineer effort as being to "provide mobility support as required" and then move on to coordinating instructions.

However, this time it's different. Instead of the S-3, the task force commander gets up and explains that for the last two operations, the task force has been criticized in after-action critiques concerning its utilization of Engineers. The ADC will be observing the attack in the morning, and the task force WILL function as a cohesive and coordinated Combined Arms unit. The TF commander proceeds to outline the type and size of threat-force obstacles to be expected and then turns to you and says, "What do the Engineers say about how we should breach obstacles in a situation like this?"

You stumble to your feet as your mind races for an answer to his question. Your momentary silence provides an opportunity for others in the TOC to bring up their own questions.

"Shouldn't we be attaching a squad of you guys out to each of the company teams?"

"Who actually controls you anyway?"

"What exactly can you do that the grunts can't do?"

"What kind of special breaching assets do you have?"

The commander calls for silence and waits for your response. You mention that most of your mine detectors were working before you left for NTC. Also, your platoon sergeant brought some fiberglass probes and enough demolitions to blow the mines in place once you detect them.

The S-3 then asks how you plan to solicit volunteer detector operators for the upcoming assault under direct fire . . . Silence . . . Anxious to get yourself out of the line of direct fire, you fall back on the old cop-out you learned at the basic course and mutter, "Sir, I'll look into it and get back with you ASAP."

The S-3 shakes his head, and the sergeant major gives you a look that would freeze tequilla. You sit back down and for the first time since graduation seriously consider your Uncle Eddie's offer to join his insurance firm after you get out.

Sadly enough, the situation described here has occurred more often than we as Engineers would care to admit. The reasons it occurs are many, and the solutions are neither simple nor easy to implement. The purpose of this article is to focus some attention on key areas and identify some actions that will assist the platoon leader in overcoming or at least minimizing some of the problems.

To begin, the role of the Engineer platoon leader must be clearly understood. Unlike his infantry or armor counterpart, the Engineer platoon leader has two separate roles that he must fill:

- **Platoon Leader**—That of leader, manager, and supervisor of a small unit.
- **Staff Officer**—That of Engineer advisor and "expert" on the task force staff.

Understandably, this is a tremendous responsibility for anyone with the experience and knowledge of a second lieutenant to be expected to fulfill. The task is made even more difficult because most maneuver commanders and S-3s are not proficient in planning for the use of Engineers.

The result is that many times at NTC, Engineer support is relatively ineffective. Obstacles are not placed to support the tactical plan and are easily bypassed. Obstacle breaching and fighting position construction is conducted by maneuver forces alone when the bulk of the effort should be performed by Engineers.

So, how can a lieutenant with six months time in service have any impact on task-force operations in a realistic combat environment? Several points outlined below can contribute to Engineer performance at the task-force level and are within the power of the lieutenant to implement.

Be technically and tactically proficient. Know what your platoon's capabilities are in providing mobility, countermobility, and survivability support in a Combined-Arms operation. You're not expected to be a walking field or technical manual, but you should have a firm grasp on what your platoon's mission is and what its capabilities and limitations are. You also need to be aware of how the maneuver force plans to fight.

Engineers must coordinate with their supported maneuver units. The minefield emplaced by Engineers is being closed by the withdrawing Cavalry unit (U.S. Army photo).

Here again, you are not expected to be an expert tactician, but you should be able to intelligently assess the effects of Engineer effort in the overall tactical plan. Characteristics and capabilities of U.S. weapon systems should come as second nature. Becoming proficient in this area requires a lot of individual effort on your part. EOBC gave you a basis to serve in a wide variety of Engineer assignments. Once you find yourself attached to a combat unit, the responsibility falls to you to ensure that you are professionally competent.

Seek out and insist upon joint train-

ing with your supported maneuver unit. Engineers cannot expect to train in a vacuum and then function effectively when thrown together with a combat arms unit at the last minute. Get to know the commanders that you will be working for. Understand how they operate and what they expect of you. Let them know who you are and what you can and cannot do for them.

Practice drills with your supported units and within your platoon for certain actions that are expected to occur on the battlefield. For example, your platoon may want to have breaching teams established with individual roles and actions defined and equipment identified. This ensures that everyone knows what is expected and eliminates a lot of planning and preparation time when actually in the field.

Take an active part in the task force planning and briefing sessions. Don't hold back and wait to be tasked with something to do. Seek out the S-3 and offer to write or assist in writing the Engineer annex and obstacle plan for the task force operations order. You are the Engineer expert and have much to contribute to how the commander plans his operations.

Use your subordinates effectively. Your platoon sergeant has a tremendous amount of experience that is there for the asking. Use him and your squad leaders effectively and don't try to do everything yourself. While you're involved with the planning process (which will occupy a large part of your time), let the platoon sergeant run the platoon. Provide guidance and follow-up supervision as appropriate.

Develop a "leader's book." Compile a list of commonly referred to data and checklists that will assist you in the performance of your mission. You can't carry all your FMs and TMs to the field, so just include the information that you feel will be critical. The idea is to have something readily available that will jog your memory and keep you from forgetting important responsibilities.

As the senior Engineer in a battalion-size unit, you have a tremendous responsibility to fulfill. You must make the effort to become proficient in your profession as quickly as possible. Most commanders will understand your situation and will assist you as much as possible. However, there is no excuse for incompetence. Remember, what you lack in experience must be made up in motivation.

CPT David R. Frick is an instructor assigned to the Field Engineering Branch, Department of Military Engineering, at the Engineer School, Fort Belvoir, VA. He has served in Engineer troop and staff assignments in Germany and CONUS. CPT Frick has a bachelor's degree in chemistry from The Citadel and a master's degree in business administration from Boston University.

The siting and construction of fighting positions is another example of the close coordination required between Engineers and their supported maneuver units. The tactical commander knows where to position his weapon systems while the Engineer knows how to construct the positions (U.S. Army photo).

The
Subject Matter Expert
Program

by MAJ David T. White

The Subject Matter Expert Program, which may not be understood outside of the TRADOC command, is an effort by the TRADOC schools to improve the quality of the doctrinal manuals and other training products exported to the field. The U.S. Army Engineer School wholeheartedly supports this program.

The Subject Matter Expert Program is designed to simplify, standardize, and institutionalize the responsibilities for writing and staffing doctrinal and training publications, answering questions from the field, and accomplishing other tasks related to particular Engineer subject areas.

A Subject Matter Area (SMA) is an area or topic that is considered so important by the Engineer School that it has made a concerted effort to institutionalize the expertise. The School has identified various departments and directorates to maintain the required expertise. The training departments are responsible for the majority of the subject matter areas.

Within the three training departments, the SMAs have been assigned primarily to the instructional divisions or branches. In most cases, the SMAs are closely related to the subjects in which the branch provides instruction in one or more of the resident courses. The SMAs for the three training departments are shown in Figures 1, 2, and 3.

A Subject Matter Expert (SME) is an instructor within the branch who has responsibility for a particular SMA. The SME could be an officer, an NCO, or a civilian. The SME has been assigned by the branch chief as the point of contact or action officer for all tasks related to the SMA. The SME is expected to continually update and build on his expertise in the subject area.

This program is of tremendous benefit to the Engineer in the field. He now has an identified point of contact within the Engineer School for all the subjects that might concern him. The areas cover the spectrum of leadership, tactical, and technical subjects.

The instructors/SMEs in the branches divide their time appropriately to handle both teaching the subject and authoring doctrinal literature or training products related to the subject. The project could be an FM, ARTEP, SQT, POI, or some other training product. The number of soldiers in the training departments at the Engi-

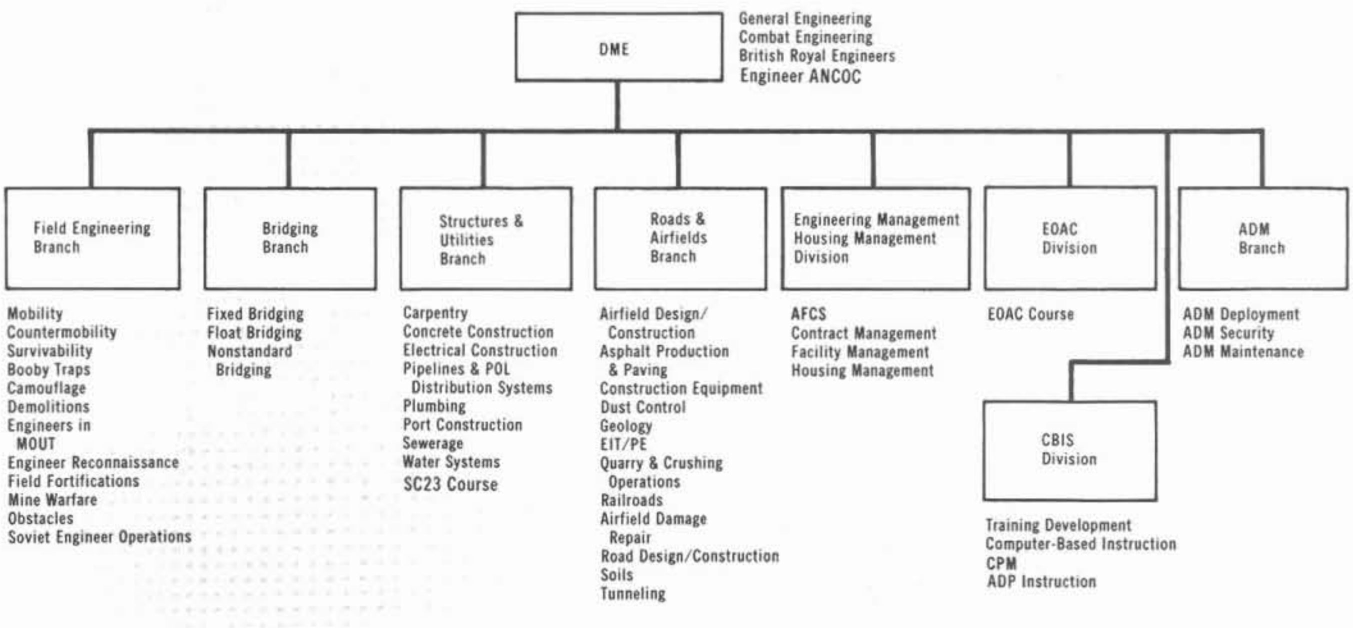


FIGURE 1. Department of Military Engineering Subject Matter Areas.

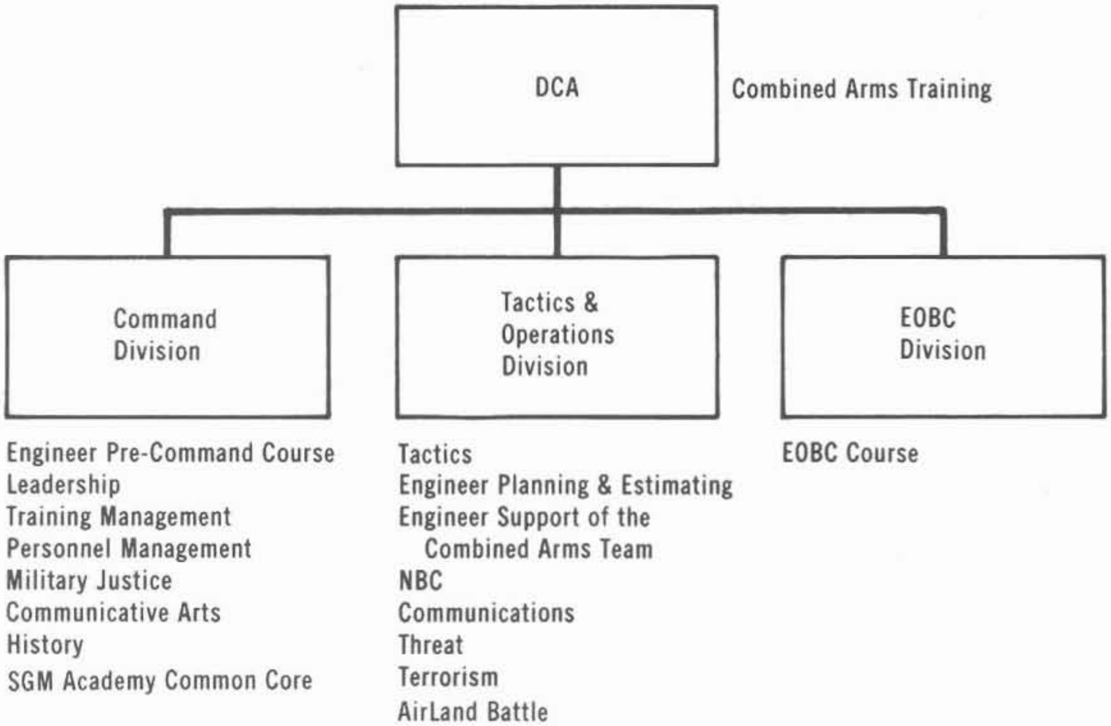
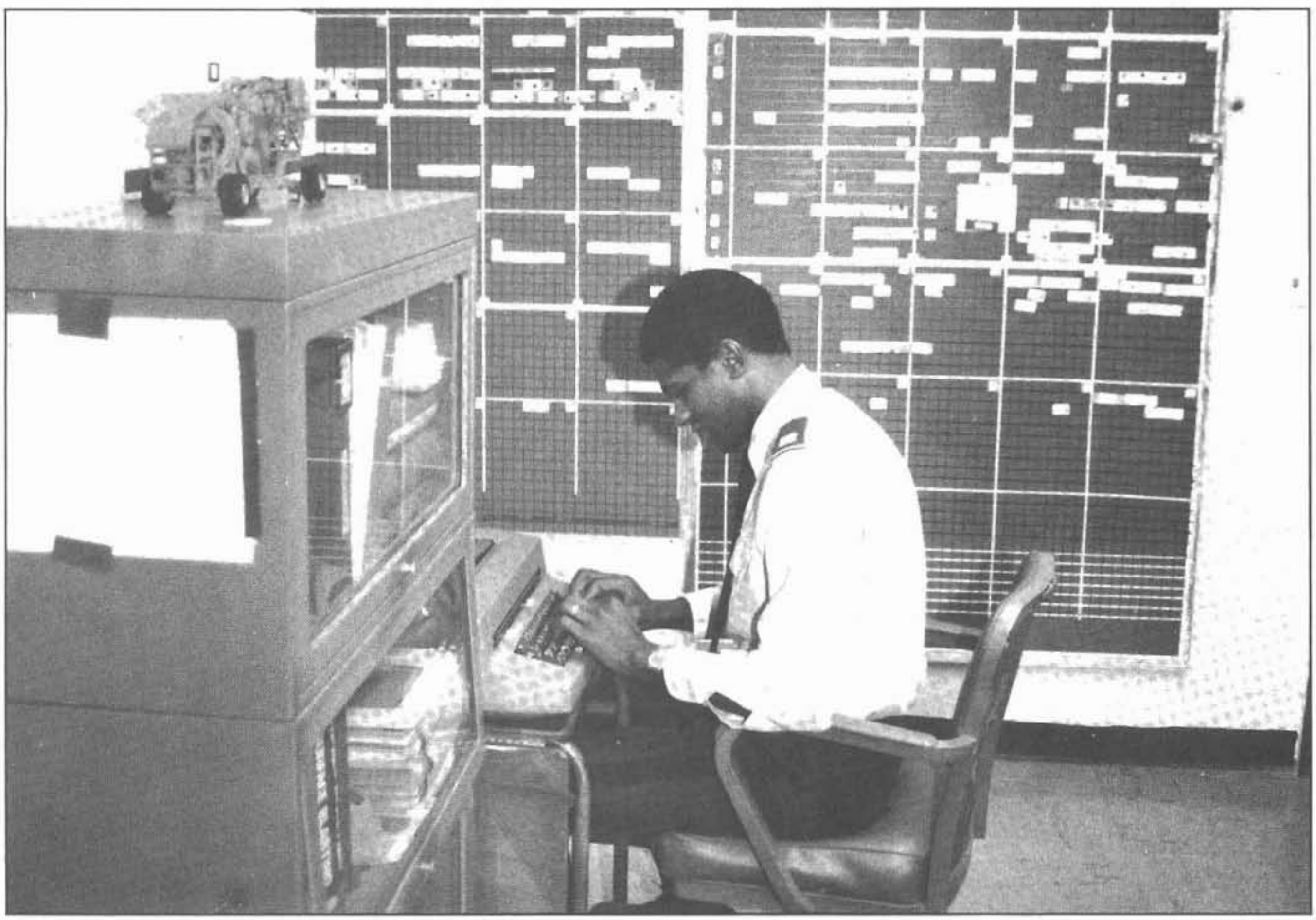


FIGURE 2. Department of Combined Arms Subject Matter Areas.



CPT Aaron Bush, a subject matter expert in both drainage and equipment utilization, prepares lesson plans. He is assigned to the Roads and Airfields Branch, DME, at the Engineer School (U.S. Army photo).

neer School that exclusively instruct has been dramatically reduced through this program.

Since all of this work is related, quality is improved in all areas. The key to the concept is the continuous interaction with the field in the classroom. The instructor/SME is constantly getting feedback from the students enroute from Engineer assignments all over the world. The feedback—plus the reference effort made by the instructor/SME—improves both the instruction at the School and the doctrine and training products the School produces.

The U.S. Army Engineer School has published Fort Belvoir Regulation 10-1 to publicize this program to the Engineer community. It details all of the Engineer SMAs and the responsible agencies. Requests for this regulation should be sent to the Directorate of Evaluation and Standardization, ATZA-ES, Fort Belvoir, VA 22060-5271 or call (702) 664-3668 (AV 354-3668).

Questions, comments, or concerns on any of the SMAs can be directed to the appropriate department.

- Department of Military Engineering responsibility can be sent directly to the department, ATTN: ATZA-TE, Fort Belvoir, VA 22060-5331 or call (703) 663-2628/3998 (AV 354-2628/3998).
- Department of Combined Arms responsibility can be sent directly to the department, ATTN: ATZA-TC, Fort Belvoir, VA 22060-5341 or call (703) 664-2907/2093 (AV 354-2907/2093).
- Department of Military Logistics responsibility can be sent directly to the department, ATTN: ATZA-TM, Fort Belvoir, VA 22060-5351 or call (703) 664-3144/3303 (AV 354-3144/3303).

MAJ David T. White is the Assistant Director, Department of Military Engineering, at the Engineer School, Fort Belvoir. He is an Armor officer who graduated from the Armor Officer Advanced Course in 1978 and the Facility/Contract Construction Management Course in 1983. He has been selected to attend the Command and General Staff College. MAJ White has served in Engineer assignments at Fort Bragg and in Armor assignments in Europe and at Fort Hood. He has a bachelor of science degree in Civil Engineering from West Virginia University.

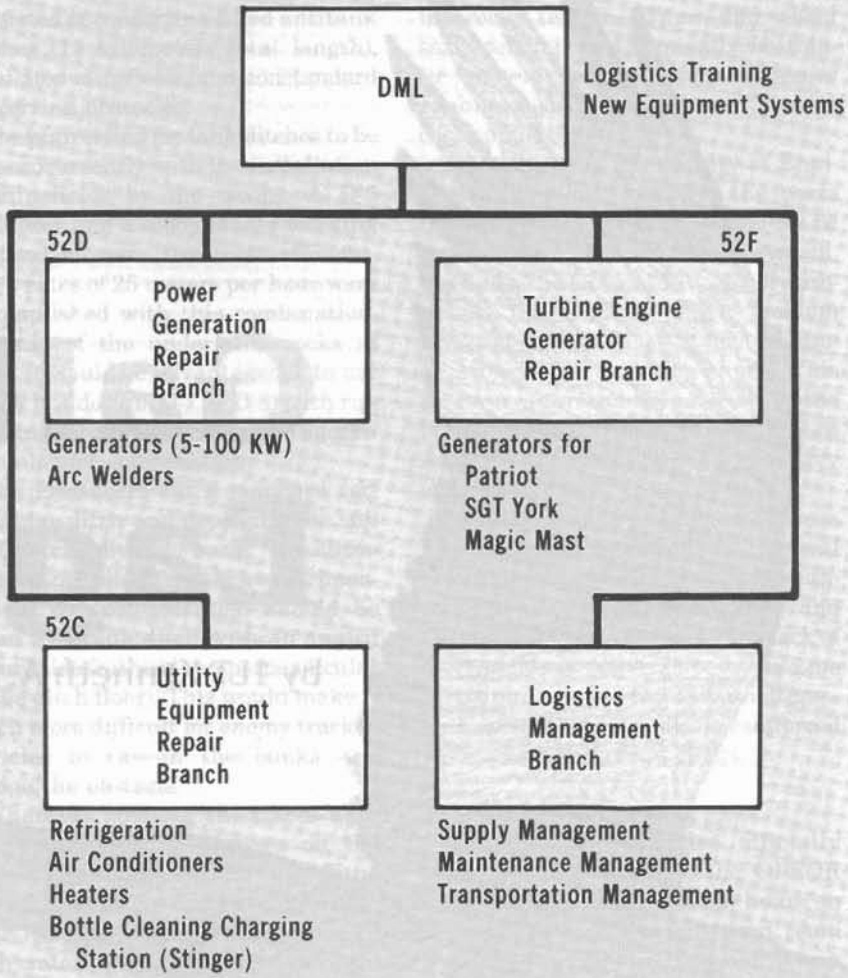
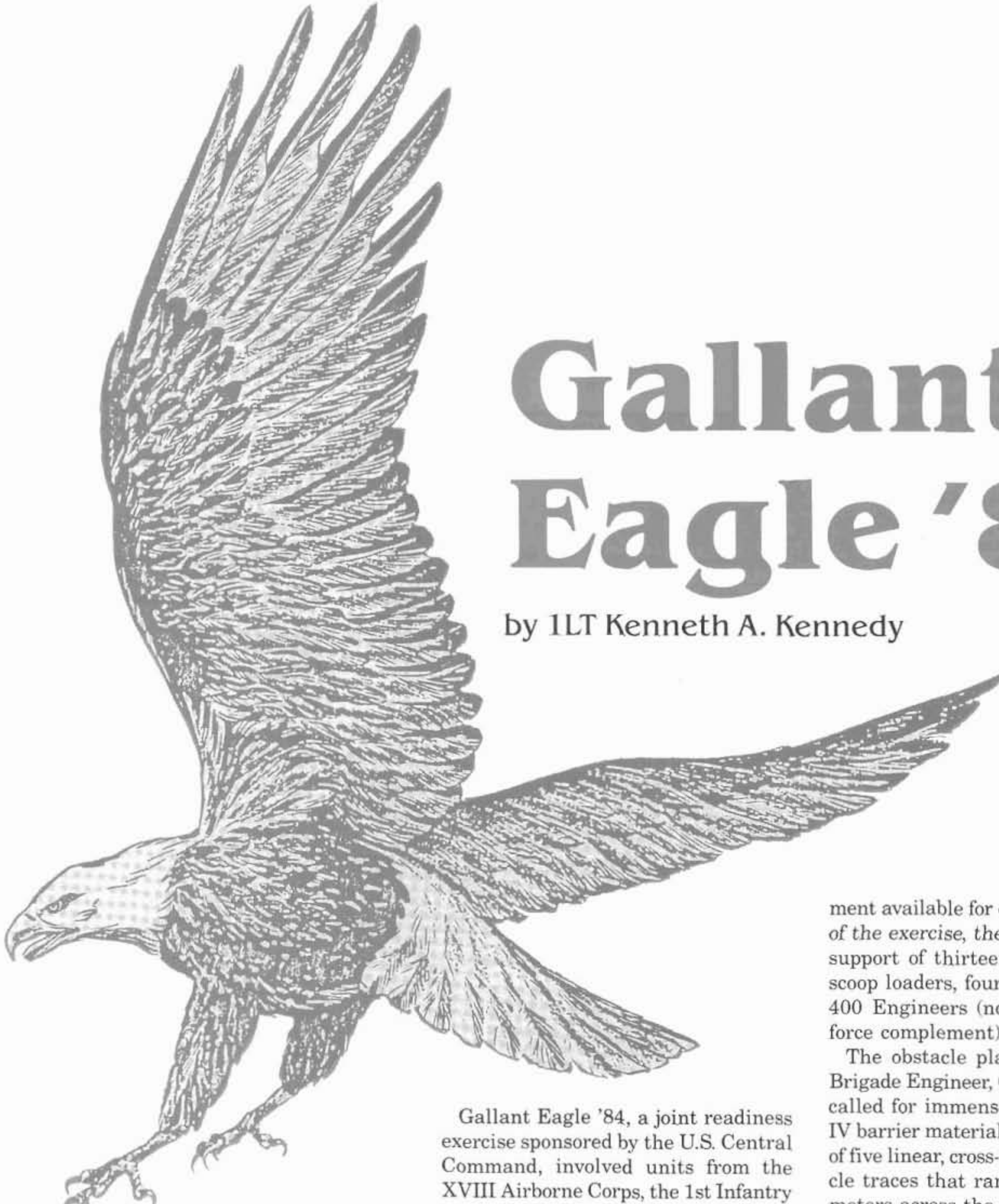


FIGURE 3. Department of Military Logistics Subject Matter Areas.

Past in Review

Starting with the Summer 1985 issue, ENGINEER will feature "Past in Review." This new department will focus on significant people and events in the Corps of Engineers throughout American history. Readers are encouraged to send manuscripts and photographs to ENGINEER. Please include author's biographical sketch, address, and telephone number. Photos and manuscripts can be returned upon request.



Gallant Eagle '84

by 1LT Kenneth A. Kennedy

Units from the 1st Infantry Division got a taste of Engineer handiwork at 0400 hours on Sept. 8, 1984. Facing them was a desert Maginot Line that stretched from one side of the Valley of Death to the other.

As Gallant Eagle '84 continued, the value of solidly constructed, well-placed obstacles became apparent. While the infantry and field artillery chalked up estimated casualties caused by "notional firepower," the Combat Engineers of the 101st Airborne Division (Air Assault) demonstrated the effectiveness of *real* combat multipliers.

Gallant Eagle '84, a joint readiness exercise sponsored by the U.S. Central Command, involved units from the XVIII Airborne Corps, the 1st Infantry Division, and elements of the Air Force. The battle was fought in several training areas throughout the Mojave Desert in southern California, each command playing off a similar OPFOR scenario.

Planning

The 101st received the Corps OPLAN on July 31, 1984, but planning had begun long before. A brigade task force with all its supporting elements was deployed from Ft Campbell, KY. The brigade's supporting Engineers were supplemented at NTC by units from the 20th Engineer Brigade to increase the amount of "heavy" equipment available for operations. For most of the exercise, the task force had the support of thirteen bulldozers, seven scoop loaders, four scrapers, and over 400 Engineers (not the normal task force complement).

The obstacle plan designed by the Brigade Engineer, CPT Roy Hightower, called for immense amounts of Class IV barrier material. The plan consisted of five linear, cross-compartment obstacle traces that ran two to three kilometers across the valley. An in-depth terrain analysis, CPX, and on-the-ground reconnaissance (TEWT) beforehand confirmed the feasibility of the plan.

Time would be a major factor. What work rates could the bulldozers maintain in desert soil? How long could man and machine operate efficiently in a very hot, dry and dusty environment? As final preparations were completed, the Brigade Engineer made a final tabulation of the necessary Class IV amounts: 4,000 rolls of concertina, 212 rolls of barbed wire, 5,000 pickets, and 10,000 simulated mines.

Transporting the barrier material

over 2,000 miles would be a problem in itself. The 2½-ton dump trucks organic to an air assault Engineer battalion would have to be loaded with Class IV material instead of the normal complement of squad tools and personal gear. If the mines had been actual training mines instead of sandbags, transportation planning would have been even more constrained. This illustrates the fact that the Engineer obstacle plan is likely to be limited by transportation of barrier material, rather than by available manpower.

Deployment

Heavy Engineer equipment was deployed by rail in mid-August from Fort Campbell to Georgia, then transported by ship 3,000 miles to California. The bulk of the task force equipment, including the Engineer tactical vehicles, was sent directly to California. The remainder of the Engineer tools and equipment was loaded into MILVANS and convoyed to the NTC. The medium-lift helicopters of the task force self-deployed, while others used MAC for support.

Finally, the troops of the task force were transported by military and civilian aircraft with the final flights arriving on September 3. Logistic support teams at key points coordinated billeting and made medical and dining arrangements for soldiers involved in the loading and unloading operations.

Obstacle Construction

The task force commander, COL Harding, gave the release to begin obstacle preparation on September 3. Four days later, five linear traces lay across the Valley of Death. Each trace consisted of concertina-filled antitank ditches (11 kilometers total length), simulated minefields, and nonstandard concertina obstacles.

The plan called for tank ditches to be dug concurrently with the installation of minefields by the troops. A D-5 bulldozer and a scoop loader working in tandem were the most efficient. Work rates of 25 meters per hour were accomplished with this combination. Because of the underlying rocks at NTC, it would be advantageous to use heavy bulldozers (D-7 or D-8) with rippers to precede the smaller bulldozer/scoop loader combination.

The Engineers cut a standard rectangular ditch and deposited the soil on the friendly side bank. The situation did not allow for much experimentation, but consideration should be given to a tank ditch with an angled enemy side (rather than perpendicular to the ditch floor). This would make it much more difficult for enemy tracked vehicles to cave-in the banks and bridge the obstacle.

Whenever possible, the traces were tied into small hill masses on the valley floor and wadiis running off the Tiefort Mountains and Furlong Ridge. Gaps left in the traces were later closed with cratering charges once all forward ground units had withdrawn to the rear. The closed gaps had to be reinforced with additional material later due to the energy-absorbing characteristic of the loose, desert soil.

Maintenance problems that did arise during construction seemed more related to extended use and vehicle age than environmental factors. However, tires did receive excessive wear traversing rocky terrain. Filters and wheel seals were replaced frequently. Hydraulic system failures were a major problem—bursting hoses were commonplace.

Because of the low density of Engineer equipment, many of the parts needed during the exercise could not be procurred through the supply system, but had to be fabricated or locally procurred. One solution to the problem involved using a Class A agent to procure repair parts commercially. This solution is particularly effective at the NTC where the nearby city of Los Angeles has many vendors of heavy equipment parts.

Once the countermobility operations had been nearly completed, several survivability positions were constructed for the task force TOW and DRAGON weapon systems. The lack of overhead-cover materials was overcome by using portable fighting shelters—preformed fiberglass shells reinforced with a covering of sandbags.

The Exercise

Although the exercise officially began on September 5, the OPFOR main attack started at 0400 hours on September 8 as a mechanized team from the 1st Infantry Division began probing the 101st sector. After several smoke-filled minutes, they withdrew east. The defenses were as formidable as the 1st Infantry Division commander had suspected. A full-scale attack the next day eventually breached all of the obstacle traces. The 101st Infantry, in conducting an Air Assault delay, slowly withdrew to the rear of the battle area.

An M-88 tank recovery vehicle tows two threat force vehicles which have been "destroyed" by friendly fire during exercises at the NTC, Fort Irwin, CA (photo by MAJ Robert Somers).

At MOPP Level 4, this soldier looks for enemy mines with a mine detector (photo by MAJ Robert Somers).

According to one Engineer platoon leader, "We sat on top of one of the hills overlooking the valley and watched the smoke pop (simulating the explosion of the mines), but the OPFOR tanks kept coming." It is reasonable to assume that any obstacle requiring 35 minutes to breach would be highly successful when covered by *real-life* direct and indirect fire.

At this point, the task force established an air assault defense in preparation for air assault deep attack against two objectives in the enemy rear. This was especially challenging because the air assault was conducted under the cover of darkness. Once the objectives were taken, friendly forces in the south linked-up with the air assault forces, concluding the exercise.

Engineers from the 20th Engineer Brigade performed several successful missions during the exercise, including an airstrip-denial mission and an airstrip-construction mission.

Endex was called at 1000 hours on September 10. Following a number of "hot washes" and after action reviews, redeployment began. Previous arrangements and prior experience made planning for the redeployment much easier.

Lessons Learned

The Engineers came back from NTC with much information about operations in the desert. Many of the points stressed by LTC John Mennig (*"Getting Up To Speed,"* ENGINEER, Fall 1983) were confirmed. Some of the comments made by the Engineer units in their after-action review include:

- The logistics burden was eased through the use of containerized deployment system drops and helicopter slingloading.
- Mines should be surface-laid in nonstandard patterns. Using simulated mines, however, does not adequately give realistic installation time or manpower requirements.
- Antitank ditches where rock is lying three feet below the surface of the ground require the use of bulldozers with rippers.
- Concertina must be solidly anchored to the ground, thereby preventing easy removal with rope and grappling hook.
- Prefabricated position shelters are necessary when no natural cover materials are available.
- Obstacle gaps should be turned over to the infantry immediately. This frees Engineers to continue work on Engineer tasks.
- Maintenance units deploying with the task force must be able to service heavy Engineer equipment. Also, they should have the capability to fabricate hoses and fittings for hydraulic systems.
- Aircraft-lifting capability is greatly diminished in the desert—especially at midday.

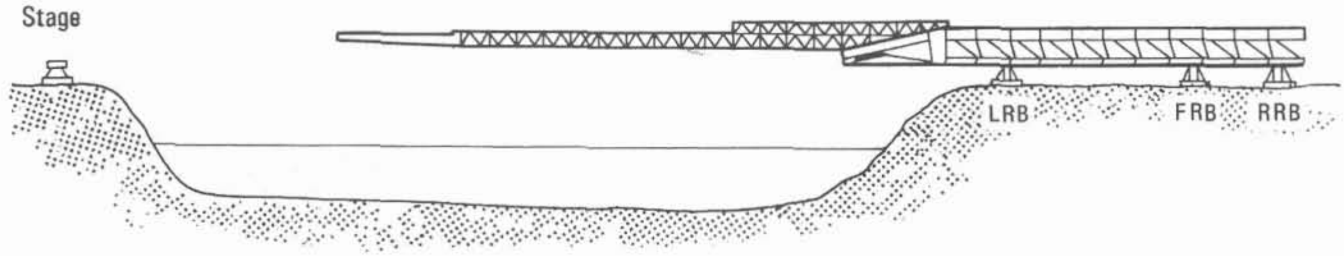
The principle lesson learned during Gallant Eagle '84 was that light, air assault infantry, when supported by a detailed and well-executed obstacle plan, can be effective against mechanized forces in a desert environment.

1LT Kenneth A. Kennedy is the liaison officer for the Assistant Division Engineer of the 101st Airborne Division (Air Assault) at Fort Campbell, KY. He is a graduate of the United States Military Academy.

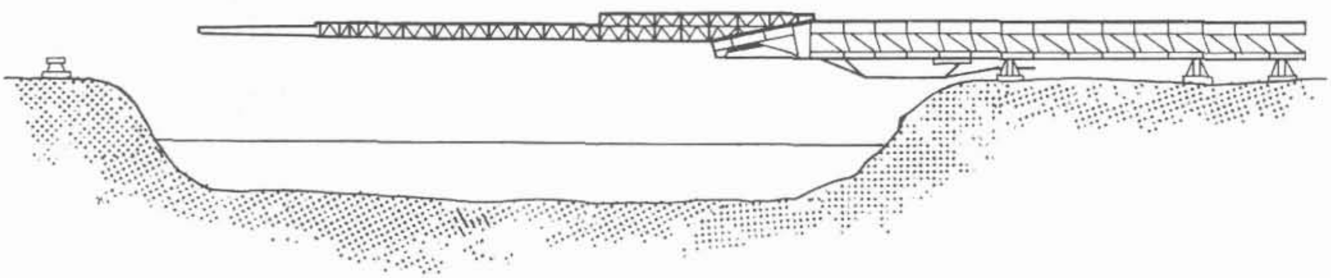
Although the D-7 dozer clears obstacles and digs tank ditches, the M-9 ACE would greatly improve Engineer capability which is vital on the AirLand Battlefield (photo by MAJ Robert Somers).

Beefing Up the MGB

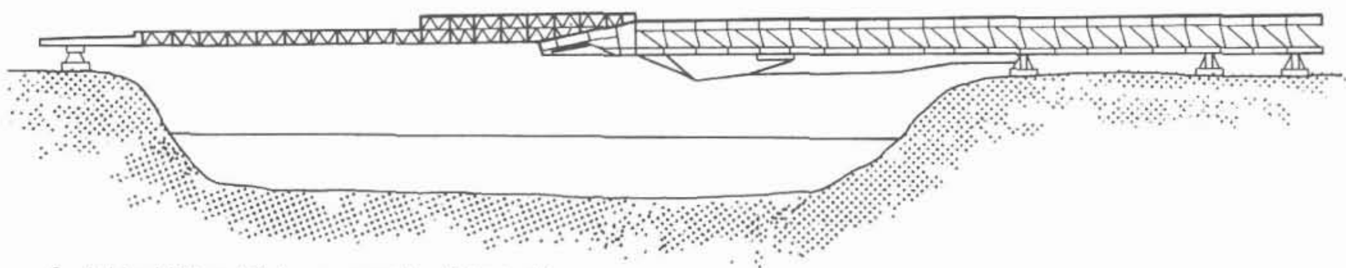
by 1LT Steven W. Chandler and SGT David J. Mohan



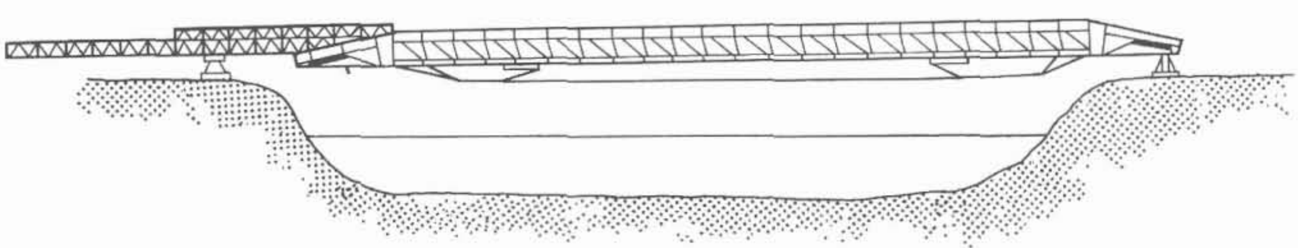
1. Add far reinforcement anchorage



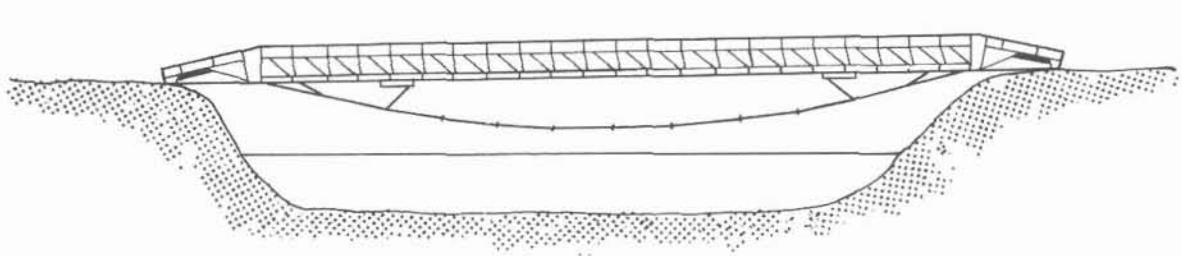
2. Add first links and far reinforcement post



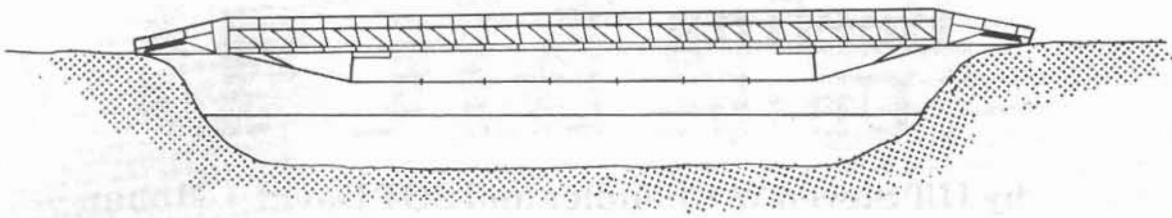
3. Add additional links, support by light tackle



4. Continue booming, add links, near reinforcement post and anchorage

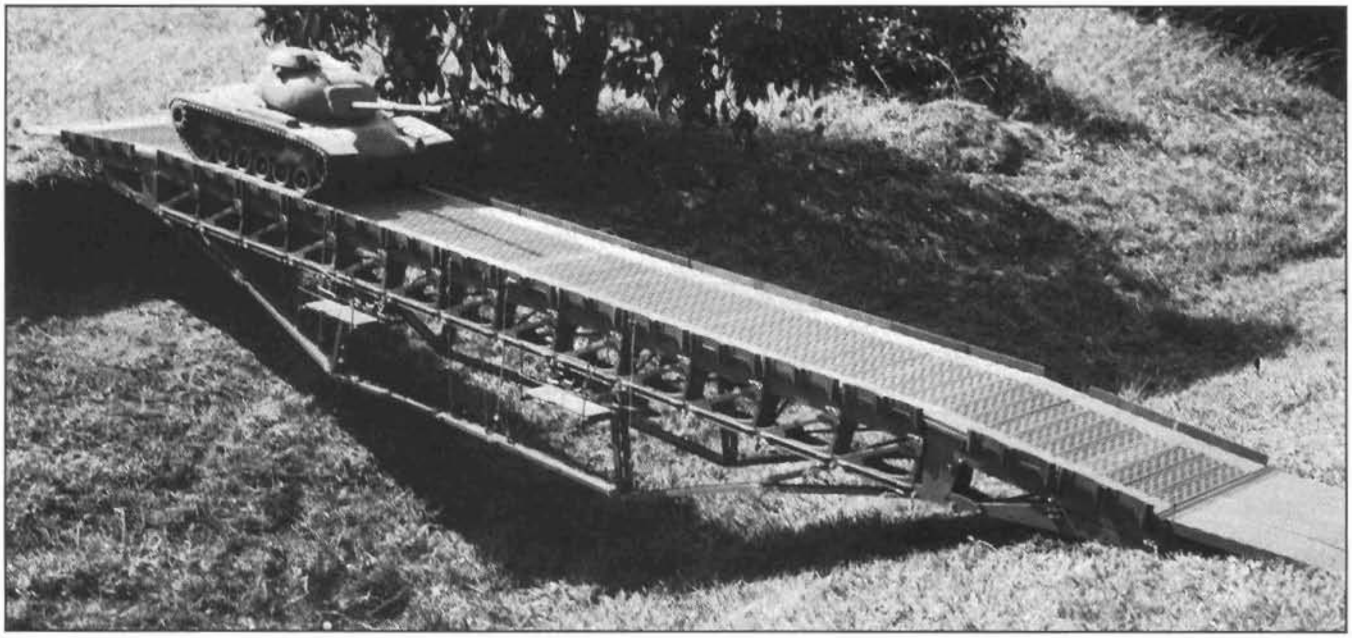


5. Complete launch and jack down, release light tackle



6. Reinforcement posts pulled towards vertical and pinned

Illustrations courtesy of Fairey Engineering LTD



The Link Reinforcement Set provides a good shared-load distribution, unlike the Cable Reinforcment Set (U.S. Army photo).

Since its introduction more than a decade ago, the Medium Girder Bridge (MGB) has gained rapid acceptance throughout NATO as a tactical fixed-bridging asset of unequalled simplicity, reliability, and speed of construction. As a complement to the proven Bailey M-2 panel bridge, the MGB rounds out our inventory of standard fixed bridges and will undoubtedly see extensive service for years to come.

Developed by Fairey Engineering of Great Britain, the MGB permits the rapid construction of Class 60 spans as long as 103 feet (31.4 meters) without the need for intermediate supports. In recent years, however, the U.S. Army and its NATO allies have produced new families of armored vehicles with military load classifications nearing Class 70 (the M-1 Abrams tank, for example). This fact, coupled with the desire to increase the maximum unsupported gap-crossing capability of the MGB, prompted efforts to provide a means of quickly and easily reinforcing the bridge.

To this end, the U.S. developed and type-classified the Cable Reinforcing Set (CRS) in September 1978. It never went into production, however, because the system proved unwieldy. The CRS was difficult to construct, and funds for procurement were not available. Additionally, the cables themselves supported a major portion of the load, thereby preventing a good shared-load distribution.

Further efforts on the CRS were dropped when Fairey Engineering developed the Link Reinforcement Set (LRS). The set alleviates the problems observed with the CRS and extends the single span Class 60 capability of the MGB to 163 feet (49.7 meters). It also provides a Class 70 capability up to 145 feet (44.2 meters).

Construction Process

As the far end of the bridge passes over the launching roller beam (LRB), the far reinforcement anchorage is pinned to the first bottom panels (Figure 1).

As construction proceeds, the assembly crew adds the remaining links and reinforcement posts and anchorage. Light tackle is used to temporarily suspend the links until tension is applied.

Upon completion of the launch, the bridge is jacked down and the tackle released. During the decking and ramping drill, the reinforcement is tensioned using Tirfor jacks attached to the reinforcement post mechanisms. The reinforcement posts are then pulled nearly vertical and pinned. The effect is a slight upward bowing of the center of the bridge, with a portion of the load being transmitted through the links.

Construction Time

Fairey Engineering contends that installation of the LRS will not appreciably increase building times of a comparable unreinforced bridge. However, practical experience shows that construction times should be increased approximately 10 percent for trained troops.

Fielding Plan

The LRS worked well during the test phase after a slight modification of the rollers. A contract was let in February 1983 for seven sets, with an additional 18 sets scheduled for procurement by FY 86.

Each MGB company will be authorized two Link Reinforcement Sets. The first seven sets have been issued to the 264th Engineer Company (MGB), at Fort Bragg, NC; 516th Engineer Company (MGB), Hanau, Germany; 38th Engineer Company (MGB), Kornwestheim, Germany; and the U.S. Army Training Center, Engineer, Fort Leonard Wood, MO.

1LT Steven W. Chandler is a fixed bridge instructor at the U.S. Army Engineer School. He was a platoon leader and company executive officer with the 902nd Engineer and HHC companies of the 11th Engineer Battalion (CBT) (HVY) at Fort Belvoir, VA. He is a graduate of EOBC and has a master's degree in systems management from the University of Southern California.

SGT David J. Mohan, reassigned to Germany, was a fixed and float bridge instuctor at the U.S. Army Engineer School. He was previously assigned to the 10th Engineer Battalion, Kitzingen, Germany, and is a graduate of PNCOC, BPTC, and ITC.

Engineer Problem

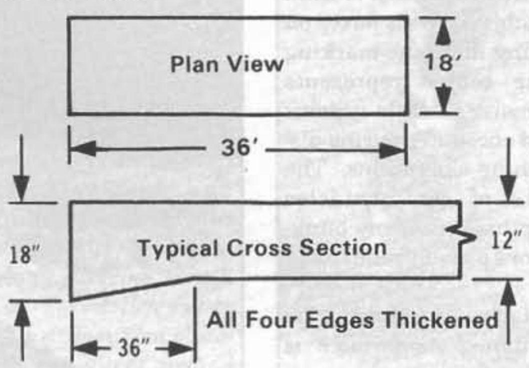
Your unit has to construct five tank turning pads that are to be 18 x 36 feet each (see illustration below). The concrete mix proportions for a one cubic yard batch are:

Cement	**786 lbs or 8.4 sacks**
Water	**275 lbs or 33 gallons**
Fine aggregate	**893 lbs or 8.1 cubic feet**
Coarse aggregate	**1,971 lbs or 20.8 cubic feet**

1. Determine the amounts of materials required for this task.

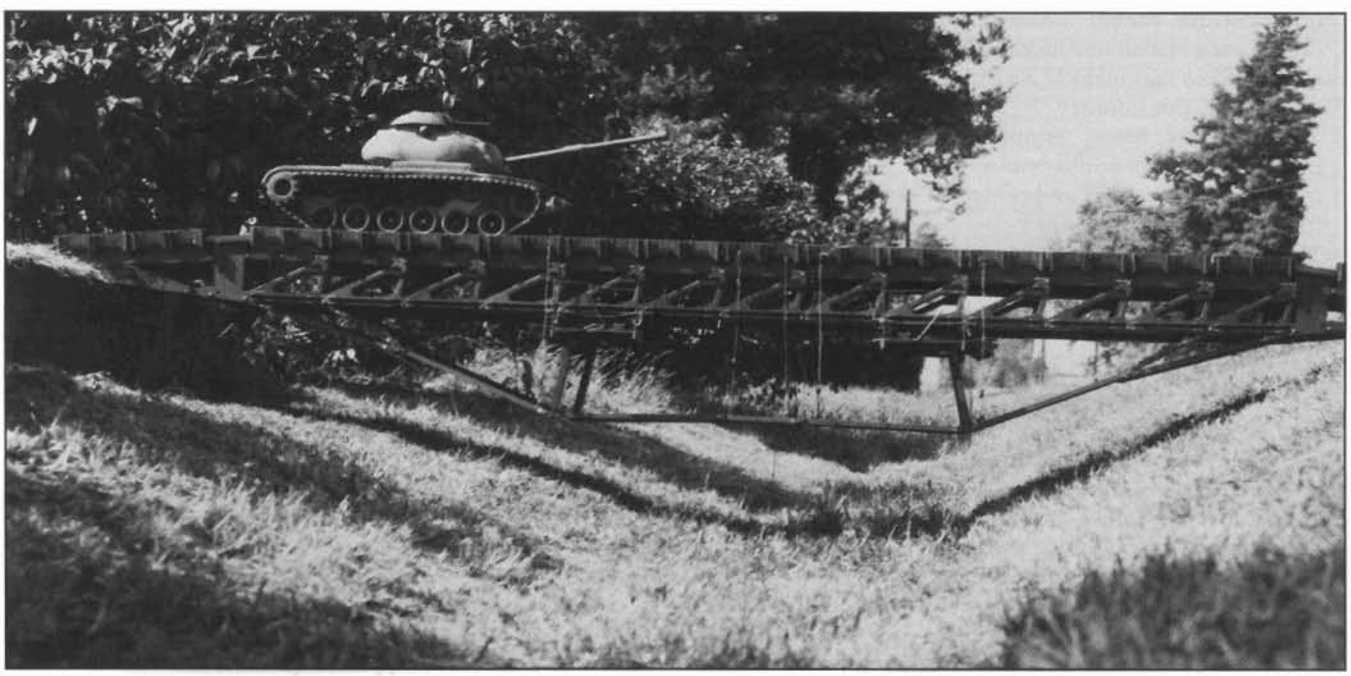
2. The fine aggregate has 4.5 percent free surface moisture. The coarse aggregate has one percent free surface moisture. Adjust the mix proportions for the moisture on the aggregates.

3. You are to mix the concrete using 16-S mixers. Adjust the mix proportions accordingly.



REFERENCES: FM 5-35; TM 5-742

(Problem/Solution submitted by CPT Robert J. Irby, Department of Military Engineering).



The U.S. Army and its NATO allies have produced new families of armored vehicles precipitating the need for a good bridge reinforcement system (U.S. Army photo).

Dismounted Complex Obstacle Breach Course

by CPT Kenneth A. Harshbarger

AirLand Battle doctrine has changed the priority of battle tasks and focused training on mobility operations. These operations require well-trained, coordinated and integrated Combined Arms teams. The teams are physically and mentally trained to use the element of surprise and initiative in breaching the depth of defensive obstacle systems. Time, speed, and agility are essential to synchronize combat firepower and mobility of forces through barriers.

Although bypassing an obstacle is still the desired course of action, breaching an obstacle will sometimes yield preferred results by avoiding threat kill zones and friendly force channelization.

Concealed by smoke, the breaching force marks a lane through the minefield (photo by CPT Kenneth A. Harshbarger).

The Dismounted Complex Obstacle Breach Course was constructed by the 2nd Engineer Battalion to train dismounted Combined Arms forces on obstacle-breaching and lane-marking operations. The course represents anticipated defensive obstacle systems that troops could encounter during dismounted breaching operations. The course consists of ten obstacles emplaced in depth, four enemy bunkers, six demolitions pits, and one safety bunker.

After an obstacle is detected, the advancing Combined Arms force is organized into four separate elements:

- The ***breaching force*** which breaches and marks a foot path through the course. This force is composed of Engineers.
- The ***assault force*** which neutralizes and destroys enemy forces in the breach area and on the objective. The assault force can include Engineers along with the infantry.
- The ***support force,*** composed of infantry, which provides over-watching fire and command and control of the operation.
- The ***Engineer deliberate breaching force*** which widens and remarks the initial breach to allow vehicle traffic.

The course is divided into six obstacle system zones. Each zone must be breached and secured before a force continues to the next zone. The course provides realistic battlefield conditions that include both smoke and opposing forces. Soldiers are required to wear an armor vest and MILES equipment.

As the breaching and assault forces breach and secure a zone, the support force maneuvers through the course providing direct and indirect fires for the breaching operation. The Engineer deliberate breaching force then follows, widening the lanes.

The breaching and assault forces enter the *Initial Obstacle System Zone* and breach a footpath through an enemy minefield consisting of antitank and antipersonnel mines 50 meters in depth. The breaching force must breach and mark a lane through the minefield while concealed from enemy observation and fire by darkness or a smoke screen. As the breaching force marks a lane through the obstacle, the assault force maneuvers through the zone.

The *Forward Obstacle System Zone* consists of a triple standard concertina fence and a seven-foot electric cattle fence. Still concealed by night or under a smoke screen, forces breach and mark both obstacles.

Next, the *Main Obstacle System Zone* presents a series of dragon's teeth and rock obstacles distributed 75 meters in depth. The breaching force breaches and marks a dismounted lane through the obstacles, while the support force maneuvers to provide cover. Meanwhile, at the start of the course, the deliberate breaching force begins to widen the lane for vehicles to pass through the enemy minefield.

The *Rear Obstacle System Zone* consists of a seven-foot electric cattle fence, a triple standard concertina fence, an antitank ditch, and two enemy emplacements. The support force provides direct and indirect fire to clear the enemy bunkers. Afterwards, the breaching force breaches and marks a dismounted lane through the wire entanglements and negotiates the antitank ditch which is mined and booby-trapped to prevent the assault force from using the ditch as a fighting position. At this point, the deliberate breaching force widens the forward zone for vehicle traffic.

The *Defensive Obstacle System Zone* consists of an enemy minefield 50 meters in depth and a 10-foot antitank wall with two enemy emplacements. The support force and assault force neutralize the enemy bunkers before the breaching force breaches the minefield and negotiates the antitank wall. A lane through the minefield is breached and the antitank wall negotiated to allow the assault force to continue forward.

The *Final Obstacle System Zone* consists of a triple standard concertina fence. A dismounted lane through the wire entanglements is breached and marked. Then, the breaching force, the assault force, and the support force maneuver through the lane and set up a perimeter securing the far side of the obstacle system.

At this time, the deliberate breaching force breaches one of the dragon's teeth and one rock obstacle using reinforced-concrete breaching charges. They then mark a vehicle lane through the Main Obstacle System Zone. The training exercise ends with the destruction of the dragon's teeth and rock obstacle.

Well-coordinated and integrated Combined Arms mobility operations are necessary for successful AirLand Battle operations. Success requires detailed planning and rehearsals in assembly areas before such an operation begins. The 2nd Infantry Division identified the need for a dismounted Combined Arms force obstacle-breathing and lane-marking course. It was constructed by Company C, 2nd Engineer Battalion in Korea. The Army now has a Dismounted Complex Obstacle Breach Course for soldiers and leaders to use for training.

CPT Kenneth A. Harshbarger is a graduate of the Engineer Officer Advance Course and commands Company C, 2nd Engineer Battalion, in the Republic of Korea. CPT Harshbarger has served as a platoon leader, company executive officer, and S-4 staff officer in the 326th Engineer Battalion, Fort Campbell, KY.

Note: Complex obstacle breaching doctrine for heavy divisions is outlined in FM 71-2J (Draft), **The Tank and Mechanized Infantry Battalion Task Force,** and FM 5-101, **Mobility.** *Light unit breaching doctrine is still under development. This article is one way a unit trains for dismounted obstacle breaching as an expedient method to meet training needs.*

The 10-foot antitank wall is no problem to the breaching force in the Defensive Obstacle System Zone (photo by CPT Kenneth A. Harshbarger).

Soldiers breach and mark triple standard concertina and an electric cattle fence in the Forward Obstacle System Zone (photo by CPT Kenneth A. Harshbarger).

Reserve Engineers

The Total Army Team is alive and well, as exemplified by the 416th Engineer Command's increasing Engineer support of the Eighth U.S. Army (EUSA) in the Republic of Korea. Through the CAPSTONE program, the 416th Engineer Command (ENCOM)—the largest Engineer organization in the force structure with over 8,000 Engineers—has acquired global responsibilities. The area of operations ranges from the Persian Gulf to Korea and the Western Pacific. If hostilities were initiated, ENCOM's commander, MG Max Baratz, would become the EUSA Engineer.

Engineer Needs

The Eighth U.S. Army and its Republic of Korea allies have a common goal, the maintenance of peace in Northeast Asia. General Robert W. Sennewald, former Commander of U.S. Forces Korea (USFK), has stated that these forces must be able to take the fight to the enemy in depth should South Korea be attacked by North Korean forces.

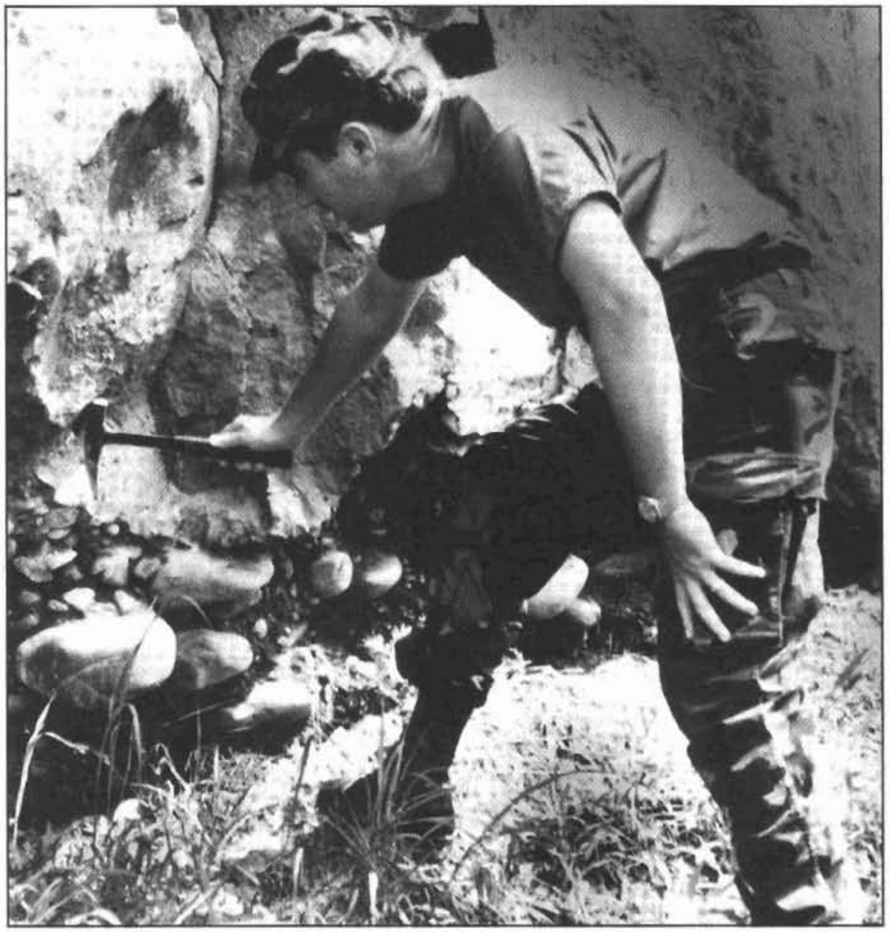
The small, tough EUSA force combined with other U.S. armed forces and Republic of Korea forces provides an effective deterrent to aggression with a high state of combat readiness. However, because of its economy-of-force profile, EUSA relies on the availability of other active and reserve forces should the growing North Korean military threat break into open hostilities.

The ability to swiftly reinforce EUSA with combat, service support, and logistical units is an essential part of the total deterrence. The lean EUSA force is reflected in its limited availability of Engineering support, both unit and non-unit.

In early 1983, after discussions with the USFK/EUSA Engineer on how the ENCOM's broad range of Engineering skills and depth in personnel could assist in their missions, the Third U.S. Army approved the involvement of the 416th in Korea. Discussions culminated later that year in a formal agreement to provide continuing ENCOM support for USFK/EUSA Engineer activities.

Initial efforts focused on several areas including:

- Reinforcing USFK/EUSA Engineer personnel.
- Taking the lead in the preparation of the Civil Engineering Support Planning components.
- Providing Engineering support for the USFK POL system.
- Establishing a USFK program for the continuation of peacetime maintenance support during hostilities.
- Preparing the 416th ENCOM for deployment to the Republic of Korea.
- Establishing and maintaining close communications/liaison with the USFK/EUSA.



MAJ Keith Wedge examines an igneous basalt rock outcrop during a geologic evaluation of a suspected North Korean infiltration tunnel site (U.S. Army photo).

Since that formal agreement, 416th ENCOM support has increased at a steady rate. One indicator of this growth is the number of Reserve Engineer person trips to the Republic of Korea. Starting with zero person trips in FY 82, the rate has grown to 65 person trips in FY 85.

Engineer Tasks

Although the 416th has become

involved in a variety of Engineer tasks, it may be useful to focus on how Reserve Engineers are contributing to the front-line efforts of the EUSA. Three such tasks are the ENCOM's Civil Engineering Support Planning (CESP); Reception, Staging, and Deployment (RS&D) Master Planning; and Geologic Support Team efforts.

CESP Components

Civil Engineering Support Planning (CESP) is primarily a planning tool used to test the feasibility of proposed operations plans in terms of required facilities construction. It also identifies specific actions required to improve the feasibility of a specific operational concept.

The results of the CESP analysis became an appendix to the logistics annex of that operations plan. CESP compiles and extracts Engineering information that allows Western Pacific Command (WESTCOM), Pacific Area Command (PACOM), USFK, and EUSA to coordinate the efforts of subordinate units in base development.

Using the CESP-G computer program to manage the data, 416th ENCOM planners identify the Engineering support required to provide mission-essential facilities to support specified operation plans. Such facilities include seaports, airports, roads, railroads, supply depots, maintenance installations, administrative facilities, and troop installations. CESP also identifies the Engineering effort required to repair essential facilities in a theater of operations.

ENCOM planners are involved in CESP activities from planning and programming to the execution of the annex documents. To ensure effective CESP planning, each product must involve coordination with all levels of senior command—the Secretary of Defense, all military departments, the Joint Chiefs of Staff, WESTCOM, USFK, and EUSA. Besides providing the CESP planning support for EUSA, the 416th performs similar services for PACOM, U.S. Central Command, and WESTCOM.

RS&D Planning

The 416th ENCOM has established a facility master planning team to identify and plan the RS&D sites and facilities to receive and process designated EUSA reinforcements essential to EUSA's wartime operations. ENCOM planners are identifying alternative facility sites and developing required facility lists, by type and quantity, for a variety of potential troop populations.

The RS&D master planning efforts cover a wide range of Engineering disciplines necessary for programming an installation for today's Army and tomorrow's needs. The final product of this effort will be detailed master-planning documents that will guide construction of required facilities.

Geologic Support

A team of 416th ENCOM geologists and geotechnical experts directly supports EUSA's Tunnel Neutralization Team (TNT) whose job is detecting North Korean Peoples Army efforts to tunnel beneath the Demilitarized Zone. The 416th continually works on specialized geologic evaluations of suspected infiltration sites. The analysis is aimed at characterizing each site geologically before site testing by a geophysical work crew.

These crews bore holes and insert subterranean geophones and cameras to listen and look for signs of tunnel construction. ENCOM team geologic analysis is designed to establish the required number of holes and their locations and to recommend optimal depths for geophone and camera monitoring.

In these days of economy of active forces, expanding global responsibilities, and need to maximize the combat arms deterrence, it is essential to mobilize our Total Engineer Force to defense objectives.

MAJ Kurt Carlson and SP4 Tatia Payne examine a microwave/signal facility at Camp Long, Korea (U.S. Army photo).

As the 416th ENCOM's direct support of "front line" comands grows, its title "Reserve" has increasingly become simply a payroll designation. With hundreds of professional engineers, architects, and other specialists at their disposal, the 416th ENCOM and other Reserve Engineers stand ready to make major contributions to the Total Army efforts.

MAJ Gary L. Groat is a staff officer with Headquarters, 416th Engineer Command (USAR), Chicago, IL. He was an advisor in the Construction Directorate, Military Assistance Command Vietnam (MACV) and a company commander with the 24th Engineer Battalion in Germany. As a project manager with the Washington, D.C. office of De Leuw, Cather, and Company (a part of the Ralph M. Parsons Corporation), he specializes in transportation planning. MAJ Groat has a bachelor's degree in architecture from the University of Illinois, a master's degree in science from the University of Wisconsin, a postgraduate diploma from Edinburgh University (Scotland), and graduated from the Command and General Staff College.

in Korea

by MAJ Gary L. Groat

History and Military Engineering Design:

An 18th Century Example

by MAJ Steven H. Myer and MAJ Jefferson J. Irvin

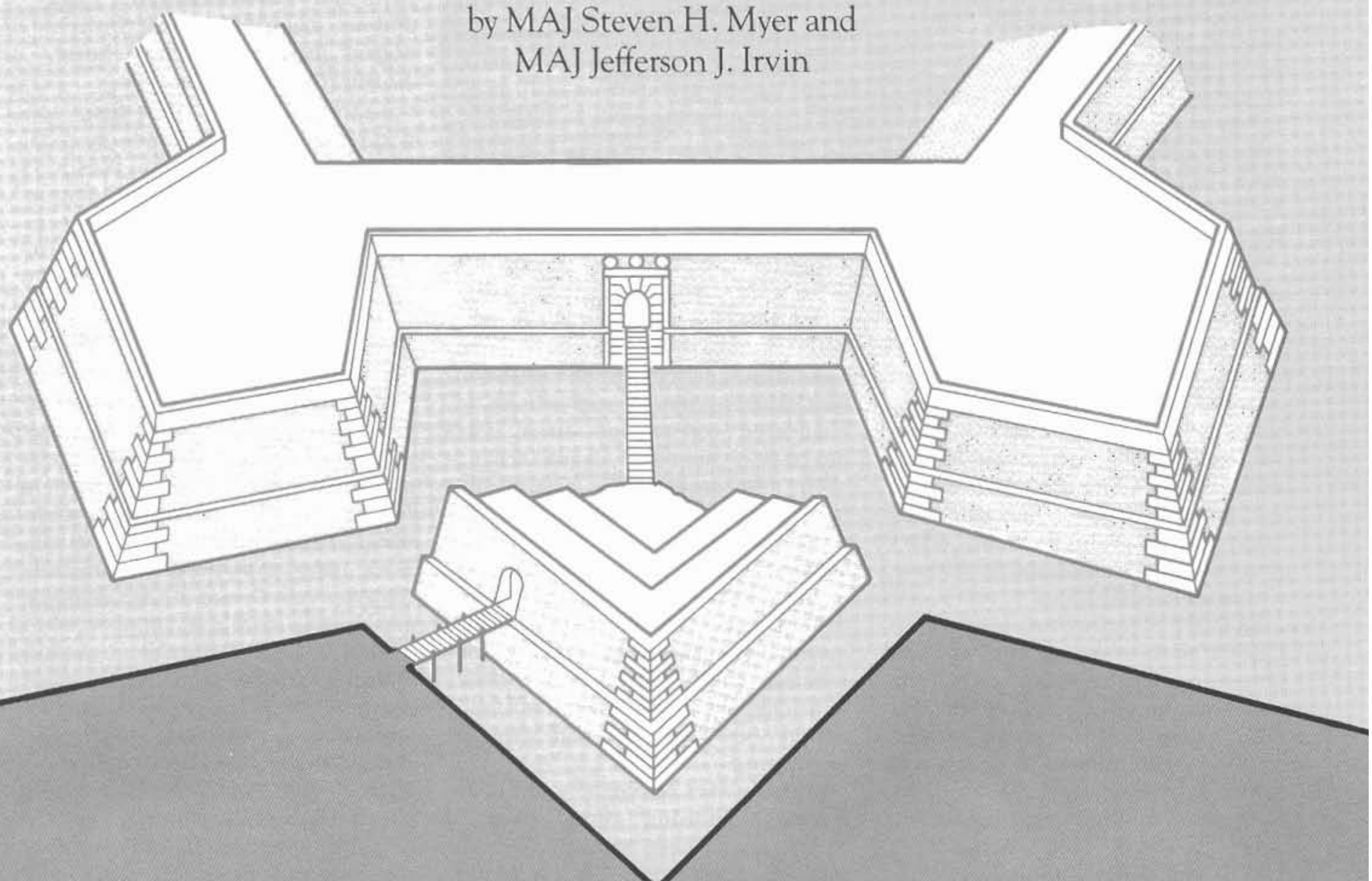
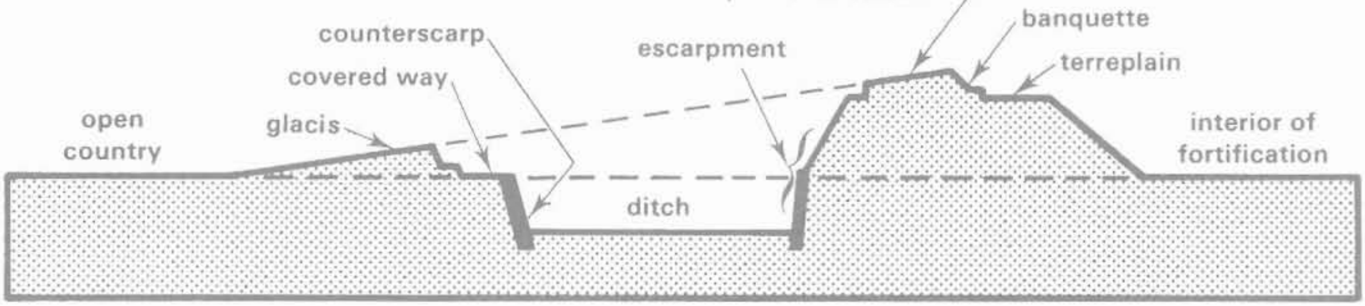


Figure 1
Cross Section of Simple Fortification



This article applies the principles of design of French 18th century fortification to modern field fortification and obstacle design, but it has the broader purpose of advocating history as a fertile source of design ideas. The first example provides a short ilustration of using history to discover principles useful in design and sets the stage for the more involved 18th century example.

The Belgian fortifications near Liege did not perform well during the German onslaught of August 1914, despite having been designed by one of the 19th century's leading fortification theorists, General Brialmont. The forts, built in the late 1880s, gave inadequate protection against 1914 artillery; the concrete walls were too thin, were not reinforced with steel, and were made from a weak concrete mix. The forts were sited poorly, so that German siege artillery could bombard from positions out of sight of the defenders. Ventilation within the forts was so poor that men asphyxiated during the smoke and dust of battle.

In addition, when the German shells began dropping around the forts, the garrison was cut off from access to its food supply and latrines. Noting the latrine problem, the Belgian General Leman said: "Brialmont's military genius had an academic bent, and he forgot that his works were made for human beings. He left out of account a natural function of mankind which does not cease during bombardment: quite the reverse" (*The Architecture of War* by Keith Mallory and Arvid Ottar).

This tale of disaster taught soldiers in 1914 that fortresses required strong concrete walls, inner battlement latrines, and inner battlement storehouses. The tale provides today's soldier with more enduring principles of design. Defense must remain current with enemy technology. The human needs of the defending soldier must be met under battle conditions. A study of 18th century fortification highlights some similarly derived universal principles.

The 18th century fortification radically differs from the more familiar, earlier castle. The high towers and masonry walls of the castle became obsolete when accurate cannon were developed. The lower profile and thick, earth-filled walls of the 18th century fortress have interesting modern implications.

Attacker's Viewpoint

Assume you are an attacker attempting a frontal assault against a fortress (Figure 1). You charge across 80 yards of bare ground (the glacis) subjected to grazing fire from infantry on the covered way and artillery fire from the ramparts. If you successfully storm the covered way, the jagged fortress outline ensures that infantry and artillery on the ramparts can now hit you with enfilading fire along your attacking lines.

Your men have to either jump down 12 feet into the ditch or jam through narrow staircases, covered by defensive fire, into the ditch. The ditch is also enfiladed by fires from walls on the jagged fortress outline. At the opposite end of the ditch, you have to climb a 30-foot wall to the ramparts on 40-foot ladders you somehow transported to the ditch. The defenders have prepared covered routes for counterattack forces, which can assault you any time along the hazardous path from covered way to rampart.

Dimensioning

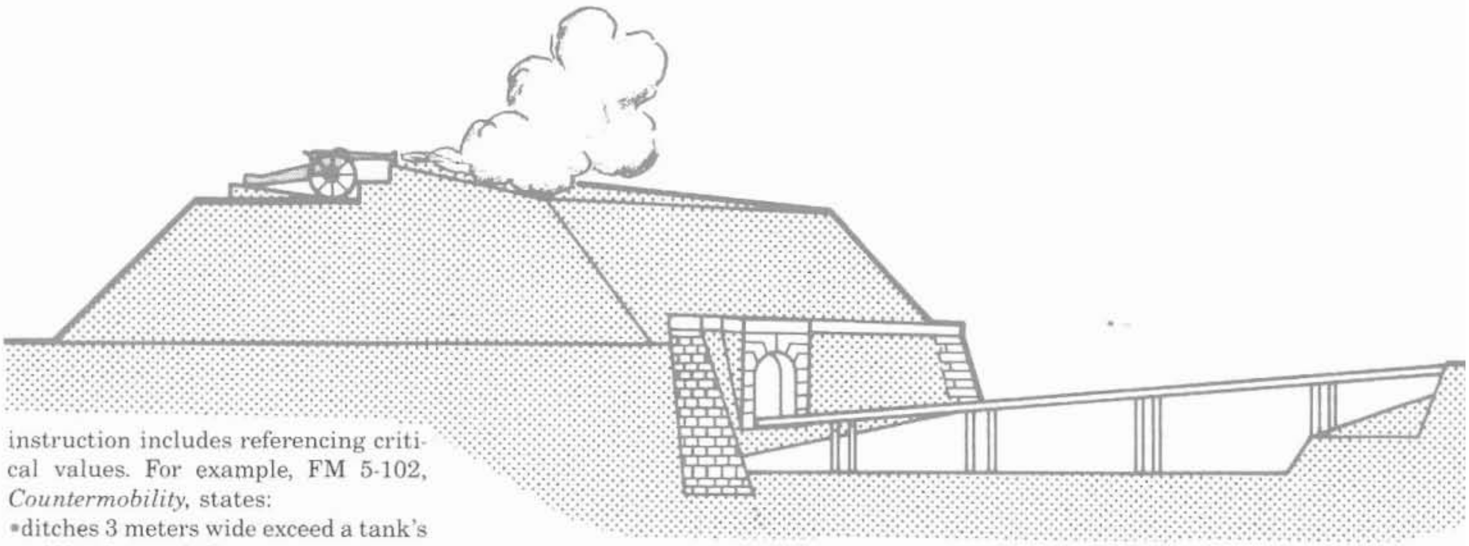
Let's look first at what determined the thickness of protective berms and the dimensions of the obstacles: the ditch and parapet. The thickness of the parapet was set at 18 feet because a 24-pound shot from enemy cannon penetrated 15 feet into a berm. Berm protection from direct fire and overhead protection from indirect fire must exceed in thickness the penetrability of enemy shells.

In 1700, the fortifications were designed and built by persons other than the individual soldiers manning the ramparts. This is not true today. The contemporary soldier designs and constructs his own individual position. He needs to know that the required thickness of the berm in front of the individual foxhole is equal to the length of an M-16 for the purpose of stopping the enemy equivalent of a .50 caliber shell.

Soldiers need to understand the difference in safety between compacted and loose berms and between piled rocks, loose sand, and tight clay. Foxholes must be taught as fairly complex structures designed for maximum protection and utility, not as camouflaged pits. The same type of information and emphasis must be applied to design and construction of hull-down positions for APCs and tanks.

The development of 18th century ditch and escarpment dimensions were also set by enemy breaching capability. Escarpment heights exceeded practical ladder dimensions. Ditch dimensions were set by balancing two factors: making the ditch deep enough to protect the base of the escarpment from plunging fire and making the ditch wide enough to exceed enemy expedient bridging.

Modern obstacles should also be explicitly tailored to enemy breaching capability, and recent obstacle design



instruction includes referencing critical values. For example, FM 5-102, *Countermobility*, states:

- ditches 3 meters wide exceed a tank's self-bridging ability;
- cross-country slopes of 45 percent reach the upper limits for tanks;
- vertical steps 1.5 meters high stop tanks;
- trees with diameters of 20 to 25 centimeters and spaced 3 to 5 meters apart stop tanks.

Such data are vital obstacle design aids, but may be seductively oversimplified. Simplicity was acceptable in the 18th century fortress where the terrain constituting the field of battle was largely unvarying and man-made. The fields of fire (glacis) were graded and cleared by hand. Also, the opposing weapons system did not change for two centuries. The terrain of our battlefields changes radically, and our primary adversary changes weapons systems at least each decade.

First, consider how the variability of local conditions affects design. Trees 20 to 25 centimeters wide and less than 5 meters apart will stop a tank. Logically, if you reduce the diameter and increase tree density, you might still have a viable obstacle. Similarly, if your enemy had to make a run uphill into your stand of trees, lesser diameters and spacing might be adequate. Enemy vehicle approach speed may be important.

A computer fed such data should be able to provide estimates that could be transformed into design charts and consolidated on a card like the demolitions card. The charts would force consideration of important factors that might otherwise be ignored. How many Combat Engineers would bother to place charges at a breaching distance up from the ground, if that factor did not appear in the calculations? That simple improvement in placement halves the required explosives.

Likewise, if a tank attacking at high speed can breach your obstacle by bulldozing, leaping, or shearing, that is useful information. You then have a strong incentive to precede your obstacle by something which will slow a tank down. Charts that illustrate the reinforcing action of slope, soil, and tree density will greatly aid obstacle siting, particularly for deliberate barriers in long-range planning.

Second, consider how changes in technology affect design. The prime threat to the 18th century fortress was the muzzle-loaded 24-pound cannon. The cannon was inaccurate at ranges exceeding 200 yards. The length of the glacis, the maximum exposed fortress wall length, the lengths of ditch segments, and so on were all set at less than 200 yards. These dimensions did not change in design for 200 years because for 200 years, no new cannon substantially improved on the existing 24-pound cannon.

The Russians produce a new tank every 10 years, and therefore critical obstacle dimensions must be adjusted for each new generation. The T-62, for instance, is configured so that its leading edge precedes the tread. Its step-climbing ability is limited by the slope of the forward edge of the chassis to 55 degrees. The leading edge of the T-72 is the tread, and it can climb vertical steps much easier. The T-72 is heavier and can generate more force at its leading edge and thus should be able to shear trees and bulldoze obstacles easier than the T-62.

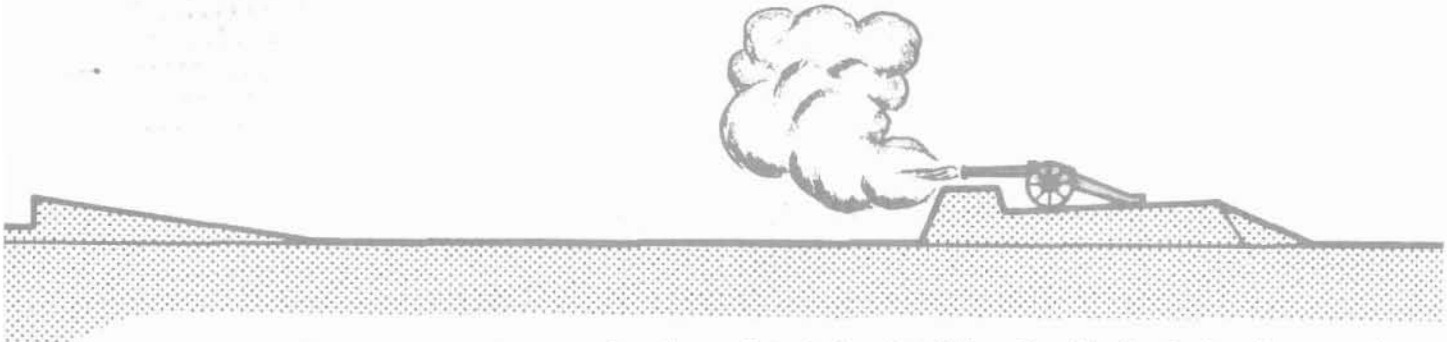
It would be interesting to know how tank type affects data like those given in FM 5-102, which are unlabeled by tank type. The differences may or may not be significant. In any case, tagging such data to a specific generation of weapons system automatically would provide flags when the data are outdated.

Sequencing

Sequencing of obstacles was as important as dimensioning in the 18th century example. The reason the 30-foot escarpments of the 18th century fortification were difficult to assault is not that 30 feet exceeds the maximum ladder length. The attacker's problem was that a 40-foot ladder could not be transported safely across the open areas to the ditch and escarpment. In other words, the rearward obstacle (the vertical escarpment wall) was shielded from breach by the forward obstacle (the long, cleared fields of fire of the glacis). This principle has interesting implications. The sequencing of obstacles should be set to progressively inhibit the enemy's capability to breach rearward obstacles.

Imagine a tank ditch preceded and followed by minefields. The enemy's main breaching capability for minefields consists of vehicle-mounted mine rollers and plows. The enemy assaults through the lead minefield behind the rollers and plows. The lead vehicles are stopped by a properly designed ditch because their rollers and plows substantially hamper the bulldozing and rocking action needed to breach a ditch.

Following tanks are forced to fan out



to cross the ditch. When these tanks do bulldoze their way across the ditch, the rollers and plows are no longer leading, and the assaulting force takes many more mine-induced casualties in the minefield after the ditch. Logically, the highest concentration of mines should be placed along the forward edge of the ditch, far enough back so the ditch is not partially filled or breached when the mines are exploded. This protects the ditch from breach and catches tanks forced to leave the protective trails of the rollers and plows.

Cleared fields of fire preceding the ditch serve the same purpose as the 18th century glacis. The cleared area greatly inhibits the transport of breaching equipment to the tank ditch. Priorities of fire set to eliminate AVLBs first (as was done by the Israelis on the Golan Heights in 1973) protect the integrity of the ditch as an obstacle.

The main point here is that intelligent sequencing of obstacles can create a barrier much more difficult to breach than the simple sum of the barrier components. Design hinges on thorough knowledge of enemy breaching tactics and technology and the application of this knowledge in the creative siting and sequencing of obstacles.

Masking

Finally, 18th century obstacle masking techniques can be used to postulate improvements to an obstacle. Imagine that you were standing on the leading edge of the glacis in the open country (Figure 1). You could see nothing of the ditching that protects the fortification; you could only see the gun embrasures on the main ramparts. The progressive rise of the glacis masked the location and geometry of the obstacle system: the ditches. The attacking commander was forced to perform daring, detailed reconnaissances before initiating siege maneuvers.

In this day of satellites and aerial reconnaissance, hiding a tank ditch from an enemy division commander is probably not possible. Hiding the ditch from an individual tank driver is possible. Assume the tank ditch spoil is piled on the enemy side of the ditch and graded towards the enemy, in the manner of the glacis, and made to look like surrounding land (or vice-versa). If you do not have time to seed the spoil, tear up the area ahead of the spoil.

The attacking tank column, under fire, not being able to see the far edge of the ditch, will not be able to judge where the ditch is cut. The column hits the ditch. The lead tanks cannot cross with their roller attachments; and the following tanks, having been drawn in, must run diagonally instead of straight through the high-density mine zone near the ditch. The increased length of the diagonal path increases the chance of a mine casualty. Additionally, a tank commander who cannot see a ditch is also less likely to approach at speeds necessary to bulldoze or leap the ditch.

Low berms graded towards the enemy and preceding point obstacles can be employed in the same way. The spoil from a crater, or destroyed bridge abutment, can be shaped to hide from an approaching attacker the far edge of the gap created. However, just like the glacis in 18th century fortification, the berms must be covered by commanding fires. Otherwise, the berms provide cover to the attackers.

A few important points should be reiterated. In the 18th century, the fortress was static, and the individual soldier had no design responsibilities. The king's chief military engineer derived the fortress layout and dimensioning from a coldly rational analysis of the explosive power, breaching ability, and assault tactics of the enemy forces.

Today, the same knowledge is needed to design our own field fortifications and obstacles, but now squad leaders are frequently designers. Engineer squad leaders must be experts on enemy attack formations, breaching technology, the penetrability of enemy munitions into protective shelters, and the reinforcing effects of combined obstacle structure and terrain. Forcing consideration of these additional factors in obstacle design prevents possibly disastrous over-simplification and aids creativity.

As a final note, this discussion is meant to encourage the search through history for ideas applicable to current design.

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IEW Fusion for the AirLand Battle

Engineer Echelons, Corps and Below

by MAJ Michael A. Lytle and 1LT Mark T. Banigan

The Army is undergoing rapid and revolutionary change in both force structure and doctrine. FM 100-5, *Operations*, August 1982, provides the authoritative statement of the U.S. Army's combat doctrine in the form of AirLand Battle.

This doctrine seeks to exploit the full potential of U.S. forces by blending two concepts—attacking the entire enemy force to its full depth and synchronizing all available combat means. To ensure unity of effort and success in combat, all three areas of engagement (deep, close-in, and rear) must be considered part of one battle.

AirLand Battle doctrine provides the foundation for the U.S. Army to examine future concepts. These ideas and notions permit the Army to move forward deliberately—developing doctrine, designing forces, and obtaining resources from which to field these forces.

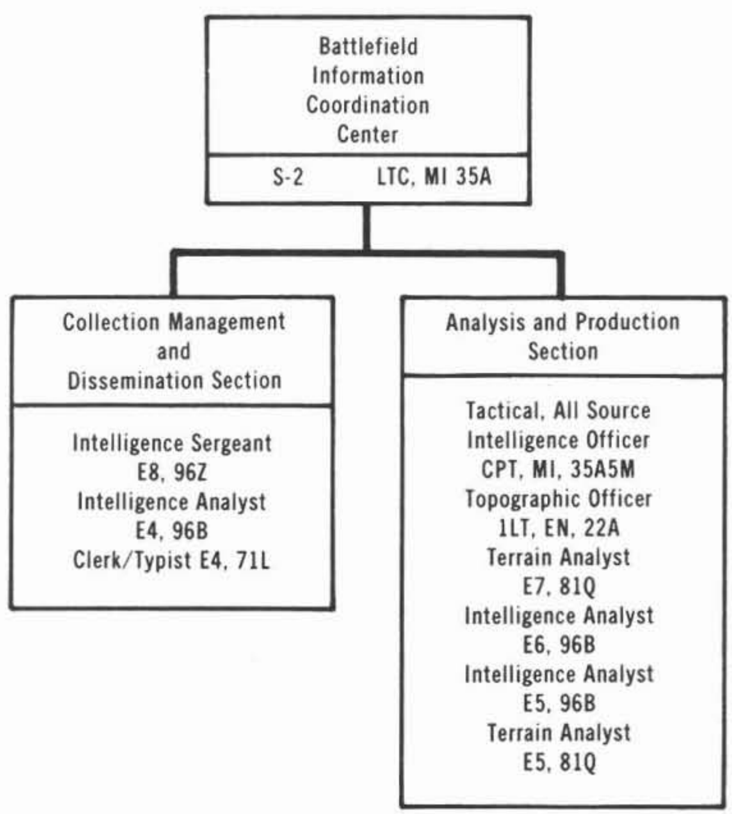
Much rethinking and retooling is already evident within the Corps of Engineers, as doctrine and combat developers anticipate present needs and future fighting capabilities. Frequently in the dynamics of organizational change, as evolutionary concepts and new dimensions become accelerated, certain subcomponents are overshadowed. The realm of intelligence and electronic warfare (IEW), as a component of the Combat Engineer package, may be receiving little or no attention.

Recent opportunities for the Engineer community to comment on the merit of branch coding the Engineer battalion S-2 position, either as Engineer or Military Intelligence, were only an inkling. Larger, unanswered questions loom! That is to say, where is the clear and coherent refinement of the perceived inadequacies in Engineer-Intelligence and Electronic Warfare (E-IEW) support, doctrine, organization, operation, and procedures at echelons, corps and below (EAB)?

Intense concern for these matters at the 420th Engineer Brigade (CORPS) led to the creation of a self-directed, experimental test-bed, which over the past two years has been studying and attempting to define and remedy this doctrinal void. Engineer and IEW rela-

Figure 1

Brigade BICC



tionships have been examined at various Engineer organizational levels in the EAB, while anticipating factors such as battlefield realities, information requirements, and the mission tasking expected of Engineer units by the AirLand Battle doctrine.

The 420th studies placed heavy reliance on simulation. Extensive literature reviews, staff conferences, internal CPX play, corps-level FTX play, and the preparation of an interim concept paper, have all tried to clarify the unknown and to create a contemporary and prototypic E-IEW system.

A major research hypothesis of these studies recognizes the inadequacy of the S-2 role and staff section manning for IEW in Engineer units EAB. Simply stated, the brigade tables of organization and equipment (TOE) for the S-2 staff section were viewed as an artifact, seemingly designed for supporting construction and general engineering in the communications zone, but failing to keep pace with the demands of either Engineer or IEW operations, concepts, or tactical assumptions for a likely engagement scenario.

The Engineer brigade, in a fully developed and committed corps, is likely to be one of the largest major subordinate commands. It should be stipulated that a fusion of Engineer and IEW systems is necessary to ensure timely and integrated efforts in concert with combat operations.

This fusion aids rapid, responsive, and reliable dissemination in time to affect the battle. The Engineer brigade as a fusion center and Engineer groups as subfusion centers, in coordination with supporting IEW organizations, must be prepared to operate in a setting which has been variously described as a 24-hour, all-weather, target-rich environment characterized by shifting axes of attack and high levels of mobility and lethality.

Deliberate, yet unfinished findings of the 420th analysis are as follows.

First, the intelligence staff sections in Engineer organizations at brigade, group, and battalion require extensive modification to deal with the threat, battlefield C^3ICM realities (command and control communication intelligence countermeasures), and new tactical doctrine.

Second, the Engineer brigade must develop a Battlefield Information Coordination Center (BICC) and organic Battlefield Information Centers (BIC) at the Engineer groups, absent a brigade support element from the MI group (CEWI) as is now assigned to certain other combat, combat support, and combat service support units in the corps and to provide the S-2 with the IEW assets required.

Located at the tactical operation centers of these Engineer units and staffed by assigned MI-trained personnel of modified S-2 staff sections, these

Figure 2

Group BIC

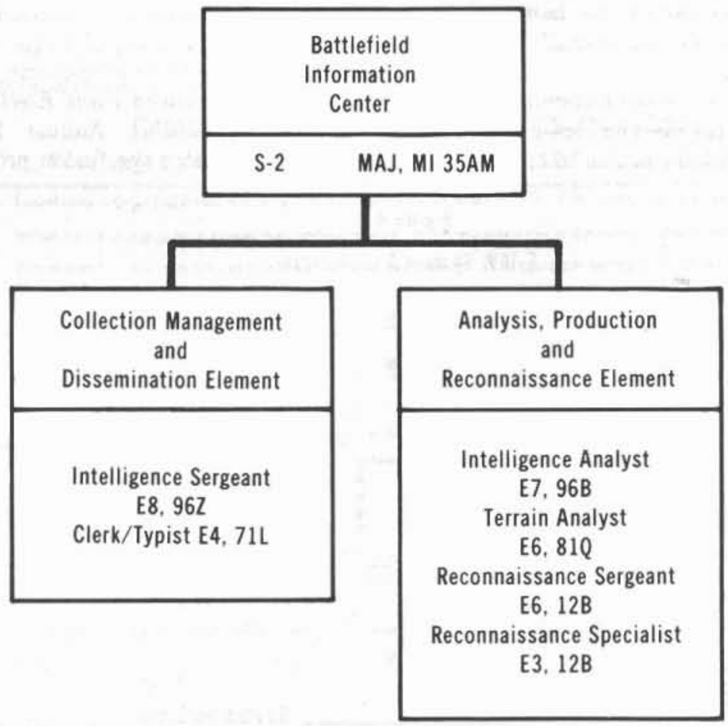
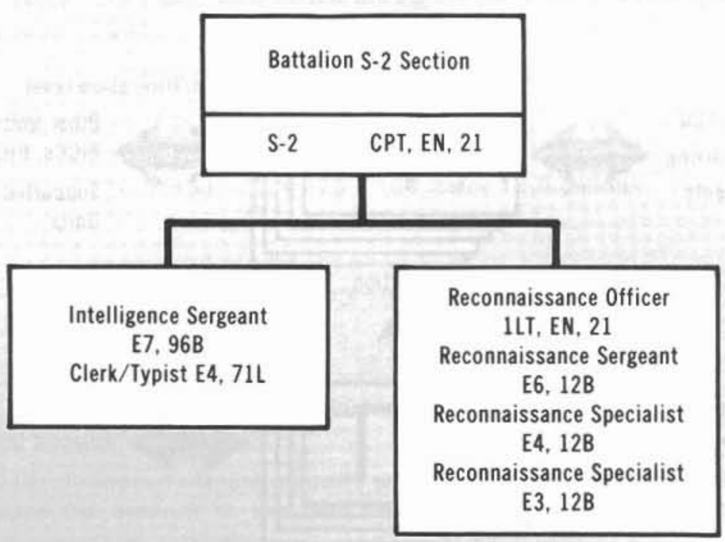


Figure 3

Battalion S-2 Section



Centers would give the S-2s the capability to fully realize their role in the IEW system. In actual practice, Army-wide, BICCs and BICs provided the detailed control and coordination of intelligence collection, production, and dissemination. They have been suitably described as "management enhancers" which actually extend the capabilities of the S-2 sections, while liberating the S-2 from extensive routine and detail, to better develop and manage the overall intelligence activities.

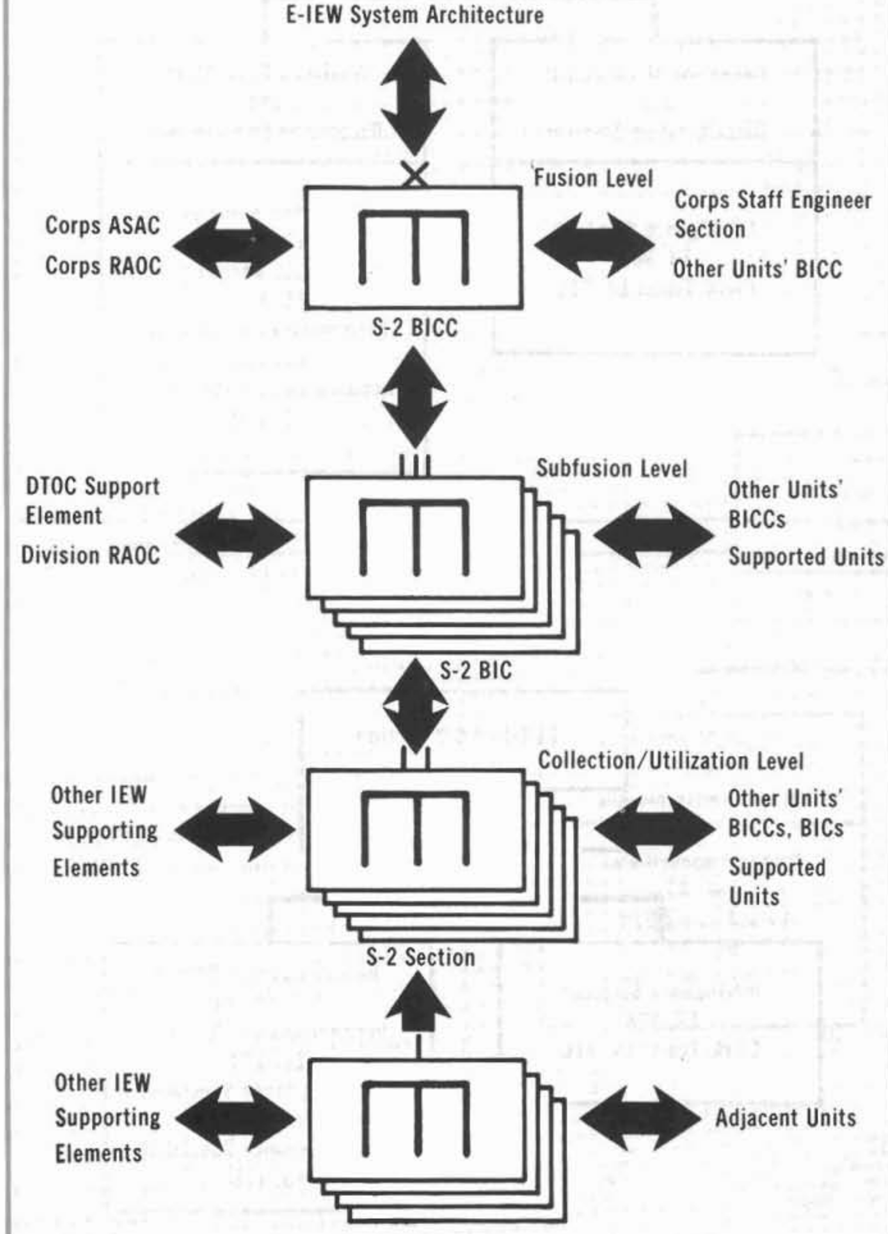
Third, increased recognition must be given to the need for closer E-IEW linkages and information interdependency with the Corps' All-Source Analysis Center and Division TOC Support Element. The magnitude of collection, analysis, and production requirements generated from Intelligence Preparation of the Battlefield (IPB) at Engineer echelons, corps and below, for instance, is integral to such a linkage.

Finally, serious study is required to clearly define and articulate vertical and horizontal E-IEW system architecture, communications requirements, and dynamic flow at EAB for the eventual adoption of sound doctrine.

FM 34-1, *Intelligence and Electronic Warfare Operations,* August 1984, clearly illustrates the fusion process.

Figure 4

E-IEW System Architecture



For our purposes, the most attention must be placed in IEW at the Engineer brigade level, as the greatest fusion of tactical and strategic intelligence occurs at echelons above corps (EAC) or at corps. Here, strategic intelligence received from EAC integrates with the tactical intelligence for use by the corps commander and for dissemination to other tactical levels. At the same time, tactical intelligence for use at strategic levels is integrated, formulated, and transmitted by the corps.

Engineer-derived or dependent tactical intelligence, IPB products, and other source data centrally place the Engineer brigade in the information/intelligence flow at EAB, and a major contributor as a corps major subordinate command.

The Engineer brigade's role in IEW outweighs in volume, time dimension, and area of interest that of the groups or battalions and calls for a greater density of specialist talent for its BICC. The brigade BICC and groups BICs generally vary only in size, scope, and depth of functions, with the exception of a reconnaissance-collection capability retained at the group BIC.

Their peacetime mission is IEW support, contingency planning, and training directed to the brigade or group's mission within the corps. During tension phases, these centers begin increased collection and analysis missions to satisfy the commander's Priority Intelligence Requirements (PIR). During hostilities, the centers interface with the doctrinal EAB-IEW system architecture, supporting the battle coordination—deep, close-in, rear, or in combination.

As described in FM 34-1, whether in static, tension, or hostility phases, the brigade BICC or groups BICs serve to:

- Develop and coordinate collection planning.
- Prepare and transmit tasking messages and requests for information to satisfy collection management.
- Develop and maintain various data bases for S-2 formal intelligence estimates.
- Process intelligence.
- Disseminate combat information and intelligence.
- Provide intelligence support to EW, operations security (OPSEC), and tactical cover and deception (TC&D).

As mentioned, the evolution and eventual refinement of E-IEW system architecture requires radical modification of existing S-2 staff section TOEs to create the necessary brigade BICC, group BICs, and vertical dimension to the system.

The 420th studies support the adoption of the organization schemes at Engineer brigade, group, and battalion (Figures 1, 2, 3).

Modified TOEs for Engineer units EAB are mediating factors in the development of the larger E-IEW picture. The 420th studies of corps operations, viewing the requirements for situation development, target development, the intelligence cycle, and the existing corps IEW functional resources which are linked into an interlocking organization at each level of command to provide IEW/OPSEC/TC&D support, give rise to a type E-IEW functional structure.

The 420th studies synthesized the E-IEW design which allows the Engineer unit S-2s to support their commanders; see deep; reduce battlefield uncertainty; develop targets and situations; identify vulnerabilities; provide support to command EW, OPSEC, and TC&D; and provide that Engineer units are prepared for the next battle (Figure 4).

"Hip pocket" or "shoe string" doctrinal developments in the field, at the Engineer brigade, may be incomplete and certainly contain many limitations. Diligent study and deliberate action is needed to fill the E-IEW doctrinal void in the AirLand Battle force and what lies beyond in merging fighting capabilities. Yet, the initiative and experimentation on those problems provide a prototype, a foundation for further steps by those carrying the standard for Engineer proponency.

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Engineer Solution

1. Materials required:

a. Determine project volume for one turning pad.

V = (18')(36')(1') + ½(3')(.5')(96') = 720 cubic feet
= 26.7 cubic yards

b. Add waste factor: WF = 10 percent for projects requiring 200 cubic yards or less of concrete.

Adj. V = (26.7)(1.1) - 29.3 cubic yards

c. Materials required:

Cement: (786 lb/cy)(29.3 cy) = 23,030 lbs or 245 sacks

Fine aggregate: (893 lb/cy)(29.3 cy) = 26,165 lbs or 13 tons

Coarse aggregate: (1,971 lb/cy)(29.3 cy) = 57,750 lbs or 29 tons

Water is used for mixing, cleaning, and preparing forms. As a rule, 8 gallons per sack of cement will provide adequate water for these operations.

2. Mix proportion adjustments for free surface moisture.

a. Determine the weight of water on the aggregates.

Fine aggregate: (893 lbs)(0.045) = 40 lbs

Coarse aggregate: (1,971 lbs)(0.01) = 19.7 lbs

Total weight: 40 lbs + 19.7 lbs = 59.7 lbs

b. Reduce the mixing water.

275 lbs - 59.7 lb = 215.3 lbs/cy of concrete or 25.8 gallons

c. Adjust aggregate quantities.

Fine aggregate: 893 lbs + 40 lbs = 933 lbs/cy of concrete

Coarse aggregate: 1,971 lbs + 19.7 lbs = 1,990.7 lbs/cy of concrete

d. Adjusted mix proportions (for one cy of concrete):

Cement: 786 lbs or 8.4 sacks

Water: 215.3 lbs or 25.8 gallons

Fine aggregate: 933 lbs

Coarse aggregate: 1,991 lbs

3. Adjust the cubic yard mix proportions for a 16-S mixer (batch capacity = 16 cf).

Cement: $\frac{16}{27} \times 8.4 = 5$ **sacks or 468 lbs**

Water: $\frac{16}{27} \times 275 = 163$ **lbs or 19.6 gallons**

Fine aggregate: $\frac{16}{27} \times 993 = 588$ **lbs**

Coarse aggregate: $\frac{16}{27} \times 1{,}991 = 1{,}180$ **lbs**

NOTE: If reduced cement quantity was not a whole number of sacks, reduce the amount to the next whole sack and adjust the other components accordingly.

Career Notes

Commissioned Officers' Branch

Post-Advanced Course Assignments:

A recent policy change in post-advanced course assignments will mean that officers attending advanced courses in 1985 will know not only where they are going, but what their next job will be. The change, announced by Army personnel planners, will make this information available during the 10th week of the course the officer is attending. Currently, officers learn of their projected assignment locations before arriving at school.

The new policy will also identify their duty positions or types of unit to which they will be assigned halfway through the course, officials of the Military Personnel Center's Officer Distribution Management and Mobilization Branch said.

"Revision of the Officer Advanced Courses means we have to identify an officer's next projected assignment for training purposes," said Diana Lueker, program manager for the Officer Advanced Course Advanced Assignment Program.

When the schools such as the new EOAC begin to add branch-specific modules to the advanced courses, some officers will stay in school longer than others. The newly revised officer advanced course is 20 weeks long. Also, there will be from one to six weeks of intensive, job-specific, follow-on training available after EOAC," she said.

About six weeks before the advanced course begins, officers will be asked to tell the Army where they would like to be assigned after training. Approximately two months before courses begin, assignment managers will write to officers concerning their tentative assignments.

"Branch assignment managers who visit within the first two weeks of each advanced course will talk with the officers and make changes, if any, to the original assignment," Ms. Lueker said.

Shortly thereafter, requests for orders will be sent to gaining commands. These will decide which type of unit or duty position each officer will be assigned. The schools will then decide what follow-on training is needed for the officers to do their jobs.

Details of the new policy are listed in a November message sent to major commands. Officers should visit their local military personnel officers for more information or contact CPT Dwight Durham at MILPERCEN, ATTN: DAPC-OPF-E, 200 Stoval St., Alexandria, VA 22332-0400. The telephone numbers are AV 221-7504/7505/7506, commercial (202) 325-7504/7505/7506. Officers may also contact CPT Thomas Milo at AV 354-2184/1048 or commercial (703) 664-2184/1048 before arriving at Ft. Belvoir.

Corrected Number:

The correct number for officers to call to get a copy of the new pocket guide for officer record briefs is AV 221-8140. The pocket guide was issued January 11.

NCO & Enlisted Soldiers' Branch

Article 15 Transfers:

The chance for some NCOs to have an Article 15 moved from their performance fiche to their restricted fiche of their Official Military Personnel File (OMPF) will expire Oct. 31, 1985.

Non-commissioned officers who were in grade E-6 or above on Nov. 1, 1982, must make their request to the Department of Army Suitability Evaluation Board (DASEB) before Oct. 31, 1985. After October 31, NCOs can only petition the Army Board for the Correction of Military Records (ABCMR).

Robert R. O'Connor, Chief, Personnel Actions Branch, United States Army Enlisted Records and Evaluation Center, Ft. Benjamin Harrison, IN, said, "Considering the publicity given this administrative mechanism to help the soldier improve his or her record before review by DA Promotion Selections Boards, the argument that the applicant was not aware of the opportunity to make an earlier request of the DASEB may be difficult to 'sell' to the ABCMR."

If a request is denied, a copy of the letter is entered on the performance fiche to show the selection board that the NCO has made some attempt to improve his record. The procedures for petitioning the DASEB and its address are contained in paragraph 3-43, AR 27-10, *Military Justice.*

O'Connor said the letter, in military format, should be directed to the DASEB from the NCO. The letter does not have to go through channels. "Preferable, the letter should be accompanied by letters of support from the NCO's commander or supervisor and any other signed documents attesting to outstanding performance and professional development," O'Connor added. The letter should state why the soldier feels the intent of the non-judicial punishment has been served and why it is in the Army's best interest to transfer the Article 15.

The board normally returns petitions without action unless at least one year has passed and one non-academic evaluation has been received since the Article 15.

Toll-Free Number:

The toll-free number established last year to aid enlisted soldiers in contacting the Information and Assistance office located in the Enlisted Personnel Management Directorate at MILPERCEN has changed. Soldiers seeking personnel assistance should now call 1-800-255-ARMY.

SFC Dana L. Seegel designed and submitted last issue's Engineer Problem/Solution. Although the problem was mathematically correct, readers should remember that mine warfare doctrine allows only five total mines in the IOE with one antitank mine. The problem was intended as a practice exercise only.

"Threat forces" convoy to fighting positions for a forthcoming battle with maneuver units undergoing training at the National Training Center, Fort Irwin, CA (U.S. Army photo).