Engineer

THE MAGAZINE FOR ARMY ENGINEERS

FALL 1983

TRAINING DEVELOPMENTS

NTC TIPS FOR ENGINEERS □ NCOES SCHEDULES □ TRAINING MINES UPDATE

Chief replies:

Warrant Officer Training Is Professional and Extensive

by CW4 Eugene F. Thompson

Editor's Note: The following is a response to the Forum article, "Equipment Repair Technicians—Our Forgotten Engineers?" by CW3 Curtis R. Millner, which appeared in ENGINEER/Number 1, 1983.

For the most part, CW3 Curtis R. Millner's comments on the assignment and training policy problems for engineer warrant officers are good. We would be well advised to heed this warning. Exception must be taken, however to his blanket indictment of training provided in the warrant officer basic and advanced courses.

The Basic Course

To understand how the basic course content was derived, one must first understand its purpose. It was never intended that the course replace the prerequisite of being fully qualified for appointment. It should, however, provide the warrant officer with the skills and knowledge required of an officer and technical supervisor. The course should also fill technical knowledge gaps that may exist as a result of specialization in the enlisted ranks.

The qualification requirements for appointment to warrant officer are spelled out in AR 135-100, *Appointment of Commissioned and Warrant Officers of the Army.* The regulation specifies that to be eligible for appointment, each applicant must have education, technical training and practical experience sufficient for the rank. This is further amplified in DA Pamphlet 600-11, *Warrant Officer Professional Development* which says, "Prerequisite to appoint is the prior attainment of full qualification."

The purpose of the basic course, then, is not to be MOS-producing but to supplement or hone existing skills and knowledge. To accomplish this, an 11-week course was developed that covers supply and maintenance management, engines, power trains, construction equipment, power generation equipment, and special purpose equipment.

Obviously, it is not possible to provide training on each of the many systems and pieces of equipment in the engineer inventory. Nor is it possible to develop a course that totally meets all the needs of a student population with varying levels of military experience and expertise. The basic course as presently configured, however, does as much as possible to meet DA training requirements.

What is viewed by CW3 Millner as "a little training" is actually a substantial amount for a newly appointed warrant officer. If a WO1 cannot function satisfactorily in his first assignment, the individual's personal qualifications should be examined, not the Army training he receives as a warrant officer.

It is true that not all newly appointed warrant officers attend the basic course, and this is probably a mistake. Attendance should be mandatory for all warrant officers prior to their first assignment.

The Advanced Course

CW3 Millner's statement regarding the scarcity of technical material in the Warrant Officer Advanced Course was undoubtedly true at one time, but it is no longer the case. Unlike the Warrant Officer Senior Course, which is not MOS related and is, in fact, designed to develop senior warrant officers for high-level staff positions, the Mechanical Maintenance Warrant Officer Advanced Course is technically oriented and is MOS specific. To ensure each mechanical maintenance MOS is adequately covered, the course is divided into two phases.

Phase I is taught at the U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Maryland, and covers both common military subjects and technical subjects that are common to all MOSs in the mechanical maintenance field. Phase II of the course covers technical subjects that pertain to specific MOSs.

The engineer equipment repair technician (MOS 621A) receives five weeks of Phase II training at the U.S. Army Training Center Engineer, Fort Leonard Wood, Missouri. The training is technically oriented with emphasis on support-level maintenance.

(Please turn to page 9.)

Engineer

VOLUME 13 NUMBER 3 FALL 1983

UNITED STATES ARMY ENGINEER CENTER AND FORT BELVOIR, VA

On The Cover

An M9 Bradley infantry fighting vehicle is transported across Tompkins Basin by the 902nd Engineer Co. (Assault Float Bridge) (Ribbon), 11th Engineer Bn. (Combat) (Heavy), Engineer School Bde. Photo by SSG Rick Maleck.

FEATURES

9 **How to Prepare for Your SQT**

10 **Evaluating Soldier Proficiency**
by MAJ Thomas J. Aubin

11 **Training Mine Improvements Underway**
by MAJ Joseph G. Papapietro

12 **The Engineer School is Reorganizing**

13 **Building Supervisors**
by 1LT Albert G. Marin III

14 **Engineer NCOES**

17 **Between a Rock and a Hard Place**
by CPT Charles R. Maggio

18 **Getting Up to Speed**
by LTC John Mennig

21 **Call Your Readiness Group**
by LTC James L. Campbell

24 **On Time, Under Budget**
by CPT Frank A. Liebner

27 **Writing for Publication**
by Albert N. Garland & Marie B. Edgerton

32 **The Digital Landscape**
by MAJ David R. Bowen

DEPARTMENTS

Inside Front Cover: ***Forum***

2 ***News & Notes***
4 ***Clear The Way***
5 ***Bridge The Gap***
6 ***School News***
23 ***Hotline Q&A***
26 ***Engineer Problem***
31 ***Engineer Solution***
35 ***Career Notes***

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News & Notes

Six Engineer MOSs Are Reopened to Women

Female enlisted engineers can now serve in six of ten recently closed military occupational specialties (MOSs).

Earlier this year, ten Engineer MOSs were closed to women as a result of the Army's Women In The Army Policy Review Group report, which was approved by Army Secretary John O. Marsh Jr. But a six-month Army staff review of the direct combat probability coding system has resulted in the reopening of six of the MOSs.

Soldiers who have already taken steps to move from one of the reopened MOSs will be permitted to return if they wish.

Some units that contain the reopened MOSs will still be closed to women. The exclusion is due to those units' high probability of direct combat involvement.

Female soldiers serving in a unit closed to women will be transferred out of the unit during the next several years, in accordance with normal reassignment policies. □

OPEN AGAIN

- 51B Carpenter & Masonry Repairer
- 62E Heavy Construction Equipment Operator
- 62G Quarrying Specialist
- 62H Concrete & Asphalt Equipment Operator
- 62J General Construction Equipment Operator
- 82B Construction Surveyor

STILL CLOSED

- 00B Diver
- 51K Plumber
- 51R Interior Electrician
- 52G Transmission & Distribution Specialist

Link Reinforcement Set Extends Length of Medium Girder Bridge

The capability of the medium girder bridge (MGB) is expanding with the aid of a link reinforcement set (LRS).

The LRS was studied recently by test teams from the 264th Engineer Co., Ft. Bragg, N.C. The tests were conducted at Aberdeen Proving Ground, Md.

With the aid of the LRS, the 102-foot MGB can be extended to 163 feet. The bridge is used to transport tanks and other heavy equipment over large terrain depths. The bridge can be quickly erected and dismantled by soldiers under the direction of one senior NCO. □

Engineers In Grenada

The 307th Engineer Bn. (Combat), 82nd Airborne Div., Ft. Bragg, N.C., participated in the recent rescue mission in Grenada. Details will be in the Winter issue of ENGINEER.

A bridge erection boat (shallow draft) transports a section of a ribbon bridge. Modifications to the boat are scheduled for application next year.

Boat Improved

Improvements are being made on the bridge erection boat (shallow draft), following recommendations from the field.

The boat is being refitted to employ the ribbon bridge more efficiently. The boat will decrease launch and retrieval time and offer an operating draft which is more compatible with that of the ribbon bridge. Thus, constraints on the selection of crossing sites will be reduced.

Modifications to the boat consist of a reinforced push knee assembly, a hose kit for out-of-water engine operation, an improved fuel filter pipe, a fore deck grab rail, and rubber sleeving for the cradle stanchions.

The changes are scheduled to appear on the boats in USAREUR by June, and on CONUS-based boats by September 1984.

The 27-foot boat has been fielded since February 1982. Currently, there are about 250 such boats in the U.S. inventory. □

POLE POSITION—*SP4 Russell Dukes (left) and PFC Cedric Archie paint the downtown flagpole in San Francisco, as part of a renovation project. On this site, the first U.S. flag raising in Northern California occurred in 1846. The flagpole is located in the city's Chinatown district. Dukes and Archie serve in D Co., 864th Engineer Bn., Presidio of San Francisco, Calif. (Tim Dewar photo)*

School Route Made Safer

Combat engineers stationed in Korea made a school route safer for children while gaining experience in construction.

Soldiers of 2nd Plt., B Co., 2nd Engineer Bn., 2nd Infantry Div., Camp Casey, Korea recently constructed a stairway along a cliff and a footbridge across a stream near the San Kwang Orphanage in Chunhyon-Myon. The orphanage houses about 80 children who range from toddlers to teens.

Before the bridge was constructed, the children were getting to school by "wading through the stream after scrambling down the cliff," according to SFC James P. Schaller.

The project involved constructing 20 meters of footbridge and pouring 60 meters of concrete for the sidewalk and stairway. Holes were drilled into the face of the cliff and steel bars were used to stabilize the concrete, which was mixed nearby and carried in buckets to the construction site. □

Microcomputer Selection Guide Available to Buyers

Information to assist Army engineers in selecting microcomputers for managing construction activities at field offices has been published by the U.S. Army Construction Engineering Research Laboratory (CERL) in Champaign, Ill.

The Microcomputer Selection Guide for Construction Field Offices is designed to assist managers in deciding what microcomputer systems and software packages should be purchased to improve their operations. According to Glenn Colwell, one of its authors, the selection guide "provides a single source of information on microcomputers for construction managers, many of whom have little time to keep up with the rapidly changing computer field."

The guide takes a prospective purchaser of a microcomputer system through the selection of a system. It presents an overview of microcomputer systems, available software packages, and examples of their use in the field. The guide helps the field manager assess office needs for automation and determine which microcomputer system would meet his needs best. Construction managers can then select a microcomputer system and software from a list of those available.

The microcomputer selection guide will be updated periodically to keep up with changes in the microcomputer field. Copies of the selection guide can be purchased in hard copy or on microfiche from the National Technical Information Center, 5282 Port Royal Road, Springfield, VA 22161, or by contacting the Publications Branch at the U.S. Army Construction Engineering Research Laboratory at (217) 352-6511, ext. 354, FTS 958-7354. Individuals ordering the selection guide from NTIS should identify it by its accession number—ADA130245. The complete bibliographic reference is:

Francois Grobler, Michael J. O'Conner and Glenn E. Colwell, *Microcomputer Selection Guide for Construction Field Offices*, Technical Report P-146 (U.S. Army Construction Engineering Research Laboratory, June 1983). □

CLEAR THE WAY

by MG James N. Ellis, Commandant, U.S. Army Engineer School

Make A Commitment To NCOES

NCO training is an investment that benefits all of us.

An effective noncommissioned officer corps is central to a ready Army. The level of our NCOs' dedication and the extent of their ability as trainers determine the quality of our Army. Trainers in peacetime and combat leaders in wartime, NCOs are a reflection of the Army's health. They must be the focal point upon which we develop new initiatives and the base upon which we expand during mobilization.

How do NCOs attain these required levels of performance? By experience on the job, supplemented with formal schooling.

Over the past few years, formal schooling for NCOs has evolved into an extensive system of courses called the Noncommissioned Officers Education System (NCOES). The NCOES provides leadership training and MOS specific training. But having a system is not enough. For the quality combat leaders needed to fight and win the AirLand Battle, soldiers and leaders at every level must make a strong *commitment* to supporting the NCOES.

Investing for the Future

The system is only as good as the individual, his associates, and his leaders make it. Investments made today will bring dividends for years to come. As with any investment, some current resource must be saved and a little "pain" felt so that the account can grow. In the case of the NCOES, investments must be made by a number of people. The commander must make the hard decision to reduce his "present-for-duty" strength, while simultaneously competing for training funds and allocations needed for each course. A platoon may lose a key NCO for a while; other soldiers in the unit will have to pick up the extra work load. Command sergeants major and first sergeants will have to go that extra mile to recommend the best student for each course, and then assure backfilling of vacant positions during the schooling. An up-to-date order of merit list at unit level is a must. The soldier-student, however, makes one of the biggest investments by attending a distant school away from his family and friends at some cost and hardship.

Selecting and sending a student to an NCOES course is only a part of the unit's responsibility. The battalion commander and command sergeant major must ensure that the best NCOs are selected and prepared, both mentally and physically, to attend. Lack of math and reading comprehension, weight problems, and poor physical condition are the most common student shortcomings. These problems need to be overcome *before* the student leaves for the school.

Courses On-Line

Development of the NCOES is a priority at TRADOC. The article beginning on page 14 provides detailed information about the NCOES.

The Engineer School has just launched at Fort Leonard Wood, Missouri, the 51H (Construction Engineering Supervisor) Basic Technical Course (BTC). An article about the 51H BTC appears on page 13. In about a year, another BTC will begin at Fort Leonard Wood, this one for the 62N (Construction Equipment Supervisor). Other specialized training for engineer tracked vehicle crewmen is under way at the Seventh Army Training Command; similar training will start at Fort Leonard Wood in late 1984. Also, the Defense Mapping School recently began offering advanced schooling for cartographers and terrain analysts.

The Engineer NCOES is moving forward to lead the way in Army NCO training. The quality of the Engineer NCO Corps, and of the entire Army, will improve in direct proportion to the amount of effort we all put into the system.

BRIDGE THE GAP

by CSM O.W. Troesch Jr., U.S. Army Engineer Center & School

Are We Sending the Right People to NCOES Courses?

Sometimes we're not. NCOs must be in the front rank helping to correct the situation.

As the Army moves forward with the development of high-technology weapons systems and equipment, there is an increasing need for a well-trained noncommissioned officer corps to conduct individual soldier training. But are we, as noncommissioned officers, prepared to accept this awesome responsibility and to live up to our reputation as the trainers of soldiers?

Priority to NCOs

When I visit units, I review unit order of merit lists for NCO professional development schooling at the Primary NCO Course, the Primary Leadership Course, the Basic NCO Course, the Primary/Basic Technical Courses and other NCOES courses. I continually ask, "When will we give attendance priority to noncommissioned officers who, for whatever reason, have never attended NCOES courses?"

Every unit has reasons for not training its noncommissioned officers, reasons ranging from preparing for an upcoming ARTEP or AGI to "some specialists four are better soldiers and deserve the opportunity to attend first."

Don't discount these reasons, but rather consider the reason the Army approved the NCOES development system and the program's purpose: to train noncommissioned officers to be small-unit leaders. The NCOES system was set up so NCOs could help soldiers "bridge the gap" from what they learned at Initial Entry and One Station Unit Training to the additional training needed to survive and to win on the battlefield.

If we continue to train the wrong soldier in our NCOES system, the noncommissioned officer corps will fail to accomplish its second most important task, to develop a professional NCO corps.

No Control?

You may say that we NCOs have no control over who goes to NCO schools. I say, not true.

Have we lost the moral courage to stand by our convictions? Are we unable to tell our commanders that we are sending to courses students who do not fill leadership positions, who are not promotable (on a promotion standing list to the pay grade of SGT/SP5), who are overweight, who cannot pass the PT test, who are not qualified with their basic weapons, or who have not mastered at least 70 percent of the tasks in their job books?

Do we look our commander in the eye and say that noncommissioned officers must go to school? Or do we just turn away, as untrained NCOs are promoted and are expected to learn how to be effective leaders and trainers through on-the-job training only?

Are we willing to accept short-term goals as a substitute for the long-term benefit to the Army of a properly trained and professionally developed NCO corps?

If you are a part of the NCO support channel but are not actively involved in selecting NCOES students, then you are shirking one of the responsibilities given to us by the chain-of-command. This responsibility is second in importance to our performance as promotion board members.

If we are to become an Army of excellence and if Engineer branch noncommissioned officers are to continue the tradition of being standard setters for the Army, then we must rededicate ourselves to becoming personally involved with selecting the students sent to NCOES courses and to becoming personally involved with the training of our soldiers and units.

Strive for excellence. In your efforts to educate and to develop junior noncommissioned officers, help them to "bridge the gap" between being a soldier and being a leader of soldiers.

School News

Directorate of Combat Developments (DCD)

Product Improvements Proposals (PIP): There's good news for users of the ribbon bridge. The TRADOC-DARCOM Spring 1983 Product Improvement Program (PIP) Review conditionally approved PIPs for the bridge. The condition for approval is completion of required coordination and staffing. The PIP includes adding a steel cap to the ramp bay tie-down pin; reducing the size of the roadway dog-bone connector; and elimination of hydraulic fluid leakage from the ramp bay hydraulic system. These improvements address complaints often heard from engineers in the field.

Maneuver Control System (MCS): An operational capability for automated engineer command and control may be nearing reality. The MCS consists of a tactical computer terminal and tactical computer system. MCS offers a responsive capability for battlefield management of engineer assets, instantaneous situation assessments and immediate transfer of information between the maneuver force and its supporting engineers. Although engineer requirements are not included in the initial MCS buy, they are considered in the follow-on program.

Armored Combat Earthmover (ACE) M9: The first four M9s of the initial production contract are being assembled at the PACCAR Company plant in Renton, Wash. These M9s will be delivered to Aberdeen Proving Ground, Md., by April 1984 where they will undergo vigorous testing. Successful completion of this testing will lead to a competitive full production contract award in July 1984. The remaining M9s from initial production will be used for force development testing at Ft. Hood during late 1984 and at Fort Lewis during early 1985.

Countermobility-Demolitions: This fiscal year, DCD focuses attention on engineer operational requirements for demolitions. DARCOM will examine state-of-the-art demolition technology to satisfy engineer requirements for improved one-step systems for producing obstacles.

Already underway is preparation of a requirement document for a bridge, road and tunnel (BRAT) munition. Plans are to review bulk explosives. Atomic demolition munitions (ADM) in the force structure are under review. There is a possibility of identifying a "special conventional" demolition role. Thus, the MOS 12E (ADM specialist) faces the prospect of considerably increased responsibility.

Defense Mapping School (DMS)

Terrain Analysis Seminar:

The first Terrain Analysis Seminar was held in July at Ft. Belvoir. The working seminar was attended by 99 people, 25 of whom were terrain analysis technicians from theater, corps and division terrain teams from Europe to Korea. The seminar grew out of an idea discussed at the 1982 DoD Mapping, Charting and Geodesy Conference.

The first half of the seminar was devoted to briefings to update the 841A (Training Analysis Technician) personnel on such topics as the Engineer Mission Area Analysis, DMA Production Program, CMF 81 and 841A career fields, topographic equipment, the Topographic Support System, the Digital Topographic Support System, and the quick response multicolor printer.

The second portion of the conference was dedicated to discussions among the terrain analysts on techniques employed in their units to support commanders with terrain analysis, mobility operations on urban terrain, weather effects, and trafficability. By consensus of participants, there will be another terrain analysis seminar in 1984.

Directorate of Training and Doctrine (DOTD)

Engineer Drills:

The Directorate of Training and Doctrine (DOTD) has recently developed 23 engineer drills which initially will be published as three separate field circulars titled Mobility Drills, Countermobility Drills, and General Engineer Drills. After publication as field circulars, these engineer drills will be revised to include comments from the field, and will eventually be incorporated into appropriate field manuals.

Also DOTD is programming to develop survivability and topography drills. The coordinating drafts for mobility and countermobility drills are now in production and should reach field units by the end of December 1983.

Engineer drills are the link between individual and collective proficiency. They are standardized techniques and procedures of engineer training.

Drills include combat, administrative and logistical actions relating to fighting, fueling, fixing and supplying units on the battlefield, as well as other important collective tasks which should be trained repetitively. They also include those few, highly critical actions which must be taken in combat in response to an emergency situation.

Engineer drills provide small units with a courses of action that can be taken immediately without waiting for detailed orders.

Editor's Note:
For information on the reorganization of the Engineer School, see page 12.

Directorate of Training and Doctrine (continued)

ADSPEC 23 Course:

The Facilities/Contract Construction Management Engineer (additional specialty 23) course is available for officers programmed for assignments in facilities engineering or in engineer districts and divisions. The course consists of three modules: the Common Core Module, the Facilities Engineering Management Course (FEMC), and the District/Division Engineer Course.

The Common Core Module is designed to provide training in a variety of engineering disciplines. Both subject matter and practical applications in civil engineering, building construction technology, architectural engineering, electrical engineering, and mechanical engineering are discussed. Emphasis is also placed on construction management techniques, contract administration and other information appropriate to the role of the Facilities/Contract Construction Manager.

Upon completion of the Common Core Module, officers will attend either the FEMC or the District/Division Engineer Course. Those officers who will be assigned to a Directorate of Engineering and Housing attend the FEMC. Officers assigned within the Office of the Corps of Engineers (OCE) attend the District/Division Engineer Course, which is taught by instructors from OCE and the Huntsville District. This course provides detailed information on contract construction administration, how to be a contracting officer's representative, and general inspection techniques and procedures in accordance with OCE specifications and standards.

The next class is scheduled to begin on January 27, 1984.

Directorate of Evaluation and Standardization (DOES)

Follow-Up Training Evaluation:

The Engineer School is placing additional emphasis on determining whether the training received by soldiers in OSUT (One Station Unit Training) is meeting the needs of the field. Units in the field can expect to receive questionnaire packets asking the units about the quality of the OSUT graduates they are receiving.

12Es to Recruiting Force:

In an effort to provide CONUS stabilization for atomic demolition munitions (ADM) personnel, 12E personnel will become part of the Detailed Recruiting Force in the near future. A total of 22 E6 and 36 E5 12Es will be selected for a three-year tour with Recruiting Command. Personnel may volunteer by submitting a DA Form 4187 to MILPERCEN, ATTN: DAPC-EPL-E, 200 Stovall St., Alexandria, VA 22332.

How to Prepare For Your SQT

Follow these simple guidelines to improve your SQT score.

To prepare for the SQT, you must first know what to study. This information is provided in the SQT notice. The notice identifies all the areas on which you could be tested and lists appropriate references.

Each task listed in the SQT notice identifies the technical manual and/or field manual that explains how to perform the task correctly. The new editions of the soldier's manual also provide a checklist which your supervisor can use to determine your task proficiency.

After you have obtained the correct, current reference publications, the next thing to do is Study! Study! Study! By using the notice and soldier's manual, you can determine which section of the technical manual or field manual applies to the task you are studying. Here is one place where a lot of something may not be the best thing; study only those parts of the manual which are needed for the test. Save the rest for "light reading" when you have free time.

At the test site, make sure you have all the items needed for the test (pencils, scratch paper, test book, etc.) before you begin the test. This will prevent interruptions that might distract you while you are taking the test.

When you receive your test booklet, lightly read over the entire test to get a feel for what types of questions are being asked. Then take the test. Here is where your studying pays off. When you look at the list of possible answers, you will see that one or two of the choices have the least chance of being correct. After you eliminate these, you will narrow your choices to two or three possible answers. Now, select the correct answer. Once you make your selection DO NOT change it! In most cases, the answer you select first is the correct answer.

As you take the test, you will probably come across some questions that you won't be able to answer quickly. Skip these questions for now. By doing this, you won't waste time that you could be using to answer questions you know (remember, this is a timed test).

After you have answered all the easy questions, go back to those that gave you trouble. This is also a good time to check that your question and answer sheet numbers match.

It is a good idea to use most or all of the time allotted. This will prevent you from hurrying through the test and making mistakes. After you have answered all the questions, reread your answers to make sure you have marked the one you intended.

That's all there is to it! If you follow these simple rules, you should find that the time you invested preparing for your SQT really pays off.

Forum, continued

Phase II technical training for the 621A advanced course student is as broad in scope as possible. The student receives instruction on diesel engine repair, including repair of diesel fuel pumps and operation of a diesel fuel pump calibrating stand. The course also covers diagnostic procedures for construction equipment; operational and DA/BS maintenance characteristics (including warranties) of commercial construction equipment; and troubleshooting AC and DC electrical circuits, semi-conductors, and electronic components.

Performance tests and paralleling procedures for power generator sets are also studied at Phase II, along with: water diagnostic maintenance and repairing water purification units; diagnosis and repair of gas turbine engines; and use of test, measurement, and diagnostic equipment, including the simplified test equipment/internal combustion engine. In the area of maintenance management, the student receives instruction on the Army Oil Analysis Program, production control, quality control, material classification, and preparation of a DS/GS maintenance standing operating procedure.

While this list of subjects is not all inclusive, it should be sufficient to indicate the degree of technical training a 621A advanced course student receives during Phase II.

The basic and advanced are under continual review by the Engineer Equipment Committee as part of the effort to improve instruction quality and effectiveness. Feedback from former students and their commanders is an essential ingredient of the improvement program. Your comments are solicited.

CW4 Eugene F. Thompson is chief of the Engineer Equipment Committee, 4th Training Bde., Ft. Leonard Wood, Mo. He was previously assigned as the Battalion Maintenance Officer, 15th Engineer Bn. (CBT), Ft. Lewis, Wash. CW4 Thompson is a graduate of the Warrant Officer Basic Course and Distinguished Graduate of the Warrant Officer Advanced Course. He has an associate's degree in diesel technology from the College of the Redwoods, Eureka, Calif.

Evaluating Soldier Proficiency

by MAJ Thomas J. Aubin

The "old" three-component skill qualification test (SQT) is out. A new program called the Individual Training Evaluation Program (ITEP) has taken its place.

The ITEP uses a three-method system to evaluate a soldier's proficiency: the commander's year-round hands-on evaluation, the common task test, and the MOS-specific SQT.

Commander's Hands-On Evaluation

This part of the ITEP is an informal, local, hands-on evaluation of MOS task performance. The evaluation is given by the local commander. It can be conducted any time during the year and as many times as the commander desires. Tasks and locations for the evaluation are also selected by the commander. The test will be evaluated according to evaluation guides found in the new soldier's manual.

Results of the evaluation will not be formally reported. They are to be used by the local commander as diagnostic tools to evaluate soldier training and to enhance proficiency on MOS tasks.

MOS-Specific SQT

An MOS-specific SQT will be developed for each skill level of every MOS. The SQT will be a written test to measure an individual soldier's MOS proficiency. It will be taken annually during a three-month test period by all Active Component soldiers, E1 through E7. Reserve Component soldiers E1 through E7 will be tested during a six-month test period every two years.

Before each test period, an SQT Notice will be distributed to the unit. The notice lists the number and title of the tasks which may be tested. Only two-thirds of the tasks listed in the notice will actually be tested. There will be no practice questions on the notice. Local commanders will be able to score skill level one written tests using a FOR OFFICIAL USE ONLY printed answer key provided with the test. All MOS-specific written tests will be centrally scored and used for training decisions as well as for DA-level personnel management in the Active Component.

Skill qualification test feedback reports will be provided to soldiers and commanders. Individual Soldier Reports (ISRs) will be sent to soldiers and commanders within 30 days after submission of the test for scoring. This report will identify those tasks on which a soldier needs additional training. Summary reports will be provided periodically, or upon request, to the company through division-level commanders. This report will contain average SQT scores for all MOS skill levels tested.

Common Task Test

The common task test is a hands-on test with a written backup test which may be used when equipment is not available. The common task test is given annually and is used to evaluate the soldier's training on fundamental survival and combat skills. Selection of tasks for the test is based on input from major commands. The Army Training Support Center produces the common task test using material furnished from the Army service schools. FM 21-2, *Soldier's Manual of Common Tasks*, is the basic publication for training and evaluating common tasks.

All soldiers E7 and below will take the common task test. The results will be reported for diagnostic use only. However, commanders are encouraged to use test results when preparing enlisted evaluation reports and when making recommendations for promotions and other career decisions.

Phase-In

The new Individual Training Evaluation Program will be phased-in during FY 1984-86 as new soldier's manuals are published for most of the Corps of Engineers' 37 MOSs and 103 skill levels. When fully implemented, the new program will provide local feedback for improving training, as well as a basis for equitable personnel decisions at DA level. For more information about ITEP, contact: SQT/QA Branch, Individual Training Division, Directorate of Training and Doctrine, USAES, Fort Belvoir, VA 22060; (703) 664-6051, AV 354.

MAJ Thomas J. Aubin is chief of the Engineer School's SQT/QA Branch, Directorate of Training and Doctrine. He served earlier with the School's Directorate of Combat Developments and with Computer Systems Command. He is a graduate of Command and General Staff College and has a bachelor's degree in computer science and statistics from the University of Southern Mississippi.

ENGINEER HOTLINE

Problems, questions, and comments relating to engineer doctrine, training, organization, and equipment can be addressed telephonically 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. Callers should state their 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.

TRAINING MINE IMPROVEMENTS UNDERWAY

by MAJ Joseph G. Papapietro

Training mine deficiencies are among the most serious problems faced by engineers and other members of the combined arms team. The recent Mission Area Analysis (MAA) studies for Close Combat Heavy, and Combat Support Engineering and Mine Warfare highlighted these shortcomings, and the Engineer School is moving as rapidly as possible to provide relief.

First, a brief look at how we arrived at the troublesome position we're in today. There are several problems with currently-fielded training mine devices and the logistical system that supports them.

Most of the training mines used today are inert versions of production line service mines. They are old, many are no longer available, and they have limited training value—especially for collective training tasks.

Plastic molded replica mines were an improvement; but, unfortunately, production was done in a piecemeal fashion, to varying specifications and by different agencies.

The training mine void forced many units to initiate in-house, short-term solutions. However, the lack of standardization and logistical support for these training mines has caused long-term problems.

Finally, and certainly still a problem to overcome, numerous training mine components, including fuzes and smoke grenades, are purchased through ammunition channels. That leads us to the conflict of budgetary priorities between "real" versus training ammunition.

By now you're probably saying, "Enough problems, how about solutions?" We have solutions on the way. The problems noted above identify several needs.

First, we must have mines that are inexpensive and that can be purchased and used in large quantities.

These devices must be responsive, and they should be applicable to both individual and collective tasks. Also, training mines must be easily procured through devices channels, not through ammunition channels.

Meeting all these requirements is a tall order. The solutions are in each of these three major developmental efforts underway at the Engineer School:

- the mine effects simulator (MES),
- the conventional training mine (CTM), and
- the family of scatterable mines (FASCAM) effects simulator (FES).

Mine Effects Simulator

The mine effects simulator (MES) has priority in the Engineer School's training device arena. Embodied as U.S. service mines and Threat mines, the MES is primarily intended for use by engineer and maneuver forces. The MES will provide realistic collective training opportunities for force-on-force, combined arms team training. Also, it will be applicable to both initial institutional and to individual sustainment training.

As experiences at the National Training Center (NTC) and during major combined arms team exercises have shown, the Army is unable to train on real-time employment, breaching and tactical considerations of mine obstacles.

The MES represents a significant advance in adding realism to the battlefield during training. It will cause commanders at all levels to consider the effects of mines. Real-time, real-world casualty assessment will give new emphasis to employment, breaching and tactical considerations. The MES will interact with Multiple Integrated Laser Engagement Systems (MILES) and will have safe, non-pyrotechnic smoke and flash visual detonation cues.

For example, imagine an NTC situation where a mechanized or armored column approaches an area of enemy activity. The column commander sees the telltale engineer tape and, using all his powers of deduction, smartly identifies the area as a minefield. If there are no umpires present, he crosses the area, suffers no casualties nor inconvenience, and receives no training.

The MES, however, will provide a different scenario. Gone will be the engineer tape. Instead, commanders will be forced to "read" the terrain, looking for likely areas in which the enemy might employ mines. If the commander proceeds, he will advance knowing that real-time casualties will be assessed if he errs. He and his men will have to learn to identify mines and minefields and know how to breach or bypass them.

Conventional Training Mine

The conventional training mine (CTM) is designed for use at the other end of the training spectrum. It is for the individual training of all mine users, including engineers, infantry, armor, field artillery, and other personnel with mine related soldier or ARTEP tasks.

The CTM will be a family of devices intended to replace all existing training mines. They will be exact, inert replicas of the M14, M15, M16,

Have a comment?

Developing training mines is the responsibility of the Engineer School's Training Support Branch, Unit Training Division, Directorate of Training and Doctrine. They are always interested in your suggestions and comments. Write to them or call (703) 664-4063/2465, AV 354.

M18A1, M19, and M21 service mines and will provide feedback to student and trainer.

The CTM has several advantages. First, it offers the opportunity to establish a new production base. This will increase availability and reduce costs. Although made of plastic or resin, CTMs will contain enough metal for normal detection and have ballast material for proper weight and feel. Also, a bell or buzzer will alert trainer and trainee of an incorrect arming or disarming procedure or of an unsafe condition.

FASCAM Effects Simulator

The FASCAM effects simulator (FES), like the MES, will give training realism and casualty assessment capability to the family of scatterable mines. The FES system is dependent on the MES's development and the challenge to miniaturize components but retain reliability. The FES is still several years from being fielded.

The mine effects simulator, the conventional training mine and the FASCAM effects simulator will give engineers, along with the rest of the combined arms team, unprecedented realism in mine and countermine training.

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THE ENGINEER SCHOOL IS REORGANIZING

The U.S. Army Engineer School and its Engineer Training Brigade (ETB) has begun reorganizing in accordance with Training Doctrine Command's "School Model '83." The reorganization is part of a TRADOC effort to improve the operation of all TRADOC schools. School Model '83 is designed to simplify the training process, to free assets for teaching and writing doctrine, and to make the training departments the focus of the school.

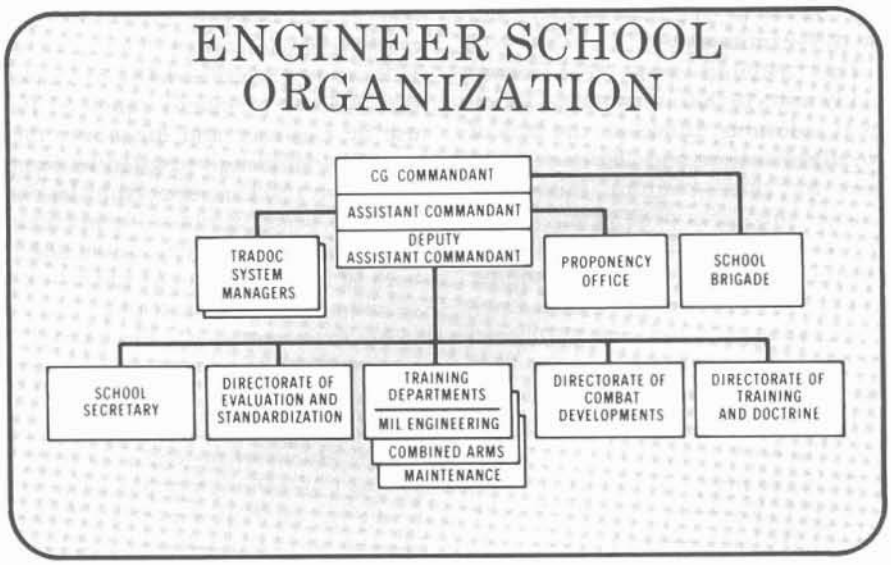
General William Richardson, TRADOC commander, has given top priority to training and also to expanding the responsibilities of school instructors. In addition to teaching, the instructor/subject matter expert will be responsible for writing doctrine and all training development material. Organizational changes at Fort Belvoir are:

- Consolidation of the Engineer Training Brigade (ETB) with the Engineer Center Brigade (ECB) into one School Brigade.
- Establishment of a third training department—the Department of Maintenance.
- Establishment of a school secretary to centrally manage the three training departments and to provide logistical support.
- Establishment of a Directorate of Evaluation and Standardization (DOES).
- Establishment of a Proponency Office.

The reorganization at Fort Belvoir began October 1 and should be completed by April 1. These changes should have no effect on the number of military and civilian jobs at Fort Belvoir.

Once complete, the Engineer School will consist of the:

- Office of the School Secretary
- Departments of Maintenance, Combined Arms, and Military Engineering
- Directorates of Training and Doctrine, Evaluation and Standardization, and Combat Developments
- School Brigade
- Proponency Office



Building Supervisors

A new course begins for 51H Construction Engineering Supervisors

by 1LT Albert G. Marin III

Construction engineers play a vital role in the success of the modern Army. Wherever United States troops are stationed, there is a need for shelter, plumbing, electricity, and storage facilities. Military Occupational Specialties (MOSs) 51B, Carpentry and Masonry Specialist; 51C, Structures Specialist; 51K, Plumber; 51R, Electrician and 51H, Construction Engineering Supervisor exist to satisfy this need. It is important that soldiers with these MOSs be proficient in all aspects of construction engineering.

To help soldiers with MOSs 51B, 51C, 51K, and 51R become construction engineering supervisors (51H), a Basic Technical Course (BTC) has been developed. The 51H BTC is to teach newly, or soon to be, promoted 51Hs the skills necessary to plan, supervise, and inspect vertical construction projects. The BTC is a six-week long course which started this November at Fort Leonard Wood, Missouri.

Course Requirements

Recently (August 1 through September 16, 1983) a 51H BTC pilot course was held. Nineteen students participated in the trial course. The course design proved acceptable; however, the students were deficient in mathematics and reading. Students encountered few problems with the technical aspects of the course, which is explained by the nature of construction engineering.

Carpenters, electricians, and plumbers require only those skills necessary for actual construction or installation. Not so with construction supervisors.

Construction engineering supervisors must be capable readers. Supervising construction projects means dealing with construction directives, construction prints, construction details, bills of materials, and all the other written directives and explanations common to the field. It is important that these documents be read accurately and understood.

Supervisors must also have a good working knowledge of basic mathematics. Addition, subtraction, multiplication, division, ratios, and basic geometry are essential for planning any construction project. Being deficient in either math or reading can hurt your career.

How to Improve Your Skills

To determine your math and reading skills, contact your installation Army Education Center (AEC). Ask to take the Adult Basic Learning Examination (ABLE). The ABLE results will show your strong points and indicate where you may need refresher training.

Based on ABLE results, the AEC will recommend to your unit commander that you participate in the Basic Skills Education Program (BSEP). With approval from your unit commander, the AEC will enroll you in classes to increase your basic mathematical and reading skills. Classes are normally available in the morning or in the afternoon, allowing for a workable agreement between you and your commander.

Before you attend the 51H BTC, or any other noncommissioned officer course, contact your education center to make sure you have the skills needed to complete the course. Don't be caught by surprise; prepare now before it is too late.

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ENGINEER NCOES

A comprehensive listing of NCOES courses for the engineer NCO.

The Noncommissioned Officers Education System (NCOES) provides job related, progressive training for NCOs and specialists throughout their careers. It applies to all enlisted personnel of both Active and Reserve Components. NCOES is an integral part of the Enlisted Personnel Management System.

The objectives as noted in AR-351-1, *Individual Military Education and Training*, are to:

- Prepare NCOs to be trainers and leaders.
- Provide necessary job proficiency training to NCOs.
- Improve unit readiness and collective mission proficiency through individual proficiency of NCOs and subordinate soldiers.

NCOES is divided into four levels: primary, basic, advanced, and senior. NCOES courses focus on training tasks in the next higher skill level. For example, courses at the primary level prepare the skill level one (SL1) soldier (E4) for duty at SL2 (E5). Courses at the basic level prepare the SL2 soldier (E5) for duty at SL3 (E6), etc. Figure 1 shows information about the NCOES courses available for engineer soldiers. Figure 2 shows planned additions to the NCOES.

Reserve Component personnel are eligible to attend all resident NCOES courses, and they may enroll in any available nonresident courses. In addition, members of the Reserve Component may attend NCOES courses conducted by U.S. Army Reserve schools and National Guard NCO academies.

NCOES COURSES FOR ENGINEER SOLDIERS

Course	Purpose	MOS Pre-requisite	Location/ Length	Priority for Attendance	Remarks
Primary NCO Course (PNCOC)	Prepares SL1 combat arms soldiers (E4) for duties at SL2 (E5).	12B, 12C, 12E, 12F	NCO academies CONUS and overseas 4 weeks	E4 selected for promotion to E5, and E5/E6 with no prior leadership training. E3/E4 performing in E5/E6 leadership positions for which the course is necessary due to unit NCO shortages.	Qualified soldiers selected by unit commander to attend.
Primary Leadership Course (PLC)	Prepares SL1 CS/CSS soldiers (E4) for SL2 (E5) and SL3 (E6) supervisor duties.	All CS/CSS MOSs	NCO academies CONUS and overseas 4 weeks	E4 selected for promotion to E5, and E6 with no prior leadership training E3/E4 performing in E5/E6 leadership positions for which the course is necessary due to unit NCO shortages.	Qualified soldiers selected by unit commander to attend.

Figure 1

Course	Purpose	MOS Pre-requisite	Location/ Length	Priority for Attendance	Remarks
Primary Technical Course (PTC)	Trains critical SL2 technical tasks of MOS.	12C	USAES, Ft. Belvoir 5 weeks	Soldiers selected for promotion to E5, or E5s performing in, or assigned to, E6 positions in their MOS.	Commanders nominate to MILPERCEN qualified soldiers to attend.
		52E	Facilities Engr Support Agency, Ft. Belvoir 52 weeks	E3/E4 performing in E5 positions for which the course is necessary due to unit NCO shortages.	
		52G	USAF, Sheppard AFB, 6 weeks		
		00B	USN, Port Hueneme, CA 9 weeks		
		52C	USAES, Ft. Belvoir 11 weeks		
		52D	USAES, Ft. Belvoir 11 weeks		
		62B	USATC, Ft. Leonard Wood 4 weeks		
		82D	DMS, Ft. Belvoir 6 weeks		
Combat Engineer Basic NCO Course (BNCOC)	Prepares SL2/3 soldiers (E5) for duties at SL3 (E6). Develops SL3 weapons systems and equipment experts who can train and direct subordinates to maintain, operate, and employ weapons and equipment. Develops skilled NCOs who can train and lead subordinates and give and supervise the execution of orders.	12B, 12C, 12E, 51H, 51B, 51C, 51K, 51R	Fts. Bragg, Campbell, Ord, Hood, Polk, Riley, Stewart, Schoefield Bks, 7th ATC. 4 weeks plus 1 week local add-on	Soldiers selected for promotion to E6, and E6s who have not previously attended the course. E4 and E5 performing in E6 positions for which the course is necessary due to unit NCO shortages.	Qualified soldiers selected by unit commander to attend. E4 must be PNCOC graduate. Soldiers in CMF 51 must be combat eligible.
12F BNCOC	Trains CEV and AVLB commanders and sergeants	12F	7th ATC, USAREUR 6 weeks	Same as Combat Engr BNCOC	Qualified soldiers selected by unit commander to attend. 12F in USAREUR attend this course in lieu of Combat Engr BNCOC. 12F BNCOC to be established at Ft. Leonard Wood in 4th quarter FY 84.

Figure 1 (continued)

Course	Purpose	MOS Pre-requisite	Location/ Length	Priority for Attendance	Remarks
Basic Technical Course (BTC)	Prepares SL2 (E5) CS/CSS soldiers for supervisory duties at SL3 (E6).	81C	DMS, Ft. Belvoir 7 weeks	Soldiers selected for promotion to E6, or E6 in SL3 positions for which training is designed. E4(P) to E5 performing in E6 positions due to unit NCO shortages.	Commanders nominate to MILPERCEN qualified soldiers to attend.
		81Q	DMS, Ft. Belvoir 12 weeks.		
		82D	DMS, Ft. Belvoir 14 weeks		
		00B	USN, Panama City, Fl 18 weeks.		
Advanced NCO Course (ANCOC)	Trains SL3/4 soldiers on technical and advanced leadership skills and subjects required to train and lead other soldiers. Prepares SM for duty at SL4 (E7)	All Engineer MOSs CMF 12, 51, 81	USAES, Ft. Belvoir 14 weeks		Selection for attendance made by DA Selection Board. CMF 81 soldiers must complete MOS BTC prior to attendance or after completing common engineer track. Available through Army Correspondence Course Program.
		62B, 52C, 52D, 52F	USAOS, Aberdeen Proving Ground 12 weeks		
First Sergeant Course	Prepares SL4 soldiers (E7) and SL5 soldiers (E8) for duty at unit First Sergeant.	All MOSs	USASMA, Ft. Bliss 7th ATC, USAREUR 8 weeks	All 1SG designees (E8, E7(P), E7). 1SG responsible for up to 12 MOSs.	Commanders nominate soldiers to attend. Selection made by MACOM, NG, OCAR, MILPERCEN.
Sergeants Major Academy	Train selected soldiers (E8) for positions of highest responsibility throughout the DoD.	All MOSs	USASMA, Ft. Bliss 22 weeks		Selection for attendance made by DA selection board for both resident and non-resident courses.

Figure 1 (continued)

NEW DEVELOPMENTS IN NCOES

Course	MOS	Location/Length	Start Date	Remarks
Primary Leadership Development Course (PLDC)	All MOSs	NCO academies CONUS and overseas 4 weeks	FY 84	Combines PNCOC and PLC.
52F PTC	52F	USAES, Ft. Belvoir 11 weeks	Oct 83	New MOS established in Oct 83.
12E BNCOC Track	12E	7th ATC, Ft. Hood 1 weeks	2d Qtr FY 84	Additional 12E training for students attending Combat Engr BNCOC.
51H BTC	51H, 51B, 51C, 51K, 51R	Ft. Leonard Wood 6 weeks	Nov 83	Course is for newly promoted E6 or E5 promotable to MOS 51H.
62N BTC	62N, 62E, 62F, 62J, 62G, 62H	Ft. Leonard Wood 6 weeks	Oct 84	Course if for newly promoted E6 or E5 promotable to MOS 62N.

Figure 2

51H 62N Between a ROCK and a HARD PLACE

by CPT Charles R. Maggio

"Congratulations on your promotion to E6, SSG Jones, and good luck at your next assignment." A few months ago Jones was awarded that first rocker, the battalion commander shook his hand, and Jones felt proud of himself. His assignment with the terminal service company had been a good assignment for a 62F (Lifting and Loading Equipment Operator). There had been plenty of opportunities to operate cranes and forklifts. As an operator, he was one of the best.

Now at his new unit as he surveys the the line of dozers, graders, backhoes and other earthmoving equipment in the combat heavy battalion's motor pool, he finds himself in a disturbing position. That promotion to E6 was more than just a new set of stripes and jump in pay; it was a transfer from operator to supervisor and a change of MOS from 62F to 62N (Construction Equipment Supervisor). It automatically made Jones an "expert" in equipment operation. He would now be expected to supervise projects and to guide soldiers from MOSs 62E, 62F and 62J. Though he possessed an engineer MOS as a 62F, he was not assigned to an engineer unit. Now, in the midst of an engineer battalion, he feels at a loss. What can he do? Can anyone help?

The 62N is a "capper" MOS for MOSs 62E, 62F and 62J at the E6 level and for 62G and 62H at the E7 level. These MOSs are grouped together because they are all related to construction equipment operation. Though engineers in each of the 62N feeder MOSs receive specialized training as an operator, there is not yet training for the 62N supervisor.

This dilemma is shared by other cappers in Career Management Field 51. The 51H (Construction Engineering Supervisor) is a capper for MOSs 51B, 51C, 51K and 51R. The 51T is a capper for 51G, 81B and 82B. The supervisors in these cappers are responsible for overseeing the actions of several MOSs of which they may have only general knowledge.

The Engineer School is aware of the supervisors' dilemma and is developing basic technical courses (BTCs) for MOSs 62N and 51H to provide newly promoted E6 and promotable E5 personnel with the technical skills and knowledge to perform as supervisors. The BTCs will focus on training critical skill level three tasks.

Both courses will cover equipment utilization, construction techniques, use of planning documents, and basic supervisory and management techniques. The courses will be held at Fort Leonard Wood, Missouri, beginning with the six-week 51H BTC in November 1983 and the eight-week 62N BTC projected to start in October 1984.

Commanders will nominate to MILPERCEN soldiers qualified to attend resident BTCs within 30 days of the soldier's attaining E6 promotion list status. E6s who have not received the training will be scheduled by commanders for attendance within 30 days of being assigned to supervisory positions. E5s or E4s performing in E6 positions may also become eligible to attend.

So, SSG Jones, you won't be stuck much longer between the proverbial rock and a hard place. Help is on the way. The new 51H and 62N BTCs will help equipment operators make a smoother transition to new duties as supervisors.

Editor's Note: Turn to page 13 for more information about the 51H BTC.

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NTC exercises give combat engineers the chance for realistic countermobility training.

Getting Up To Speed

by LTC John Mennig

Exercises at the National Training Center show ways to make engineer units more effective

The tough, realistic training program at the National Training Center at Fort Irwin, California, has given engineers the opportunity to fine tune their combat support skills. It has also exposed deficiencies shared by many engineer units.

The problem areas are grouped here under the basic combat engineer responsibilities of mobility, countermobility and survivability.

Mobility

Problems with using engineers in mobility operations generally start at the planning phase.

When an offensive operation at task force level is being planned, the supporting engineers, normally led by an engineer platoon leader, should be consulted. Usually, however, there has been no habitual association between the battalion and its special platoons at home station. In such a

case, the platoon leader probably has no experience in supporting a maneuver task force in the field, is not sure how to go about it, and is uncomfortable dealing with a battalion commander whom he has never seen before. The result frequently is that the engineers travel behind the task force trail company instead of with the lead company in a direct support (DS) role.

The location of engineers during the attack is up to the task force commander, but the two places engineers probably should not be are leading and trailing. Commanders at NTC who have placed engineers at the front quickly lost their engineer assets to direct and indirect fire, while commanders with engineers to the rear did not have them immediately available when minefields and obstacles stopped their unit's forward momentum.

Although the decision on how to use engineer assets rests with the task force commander, the engineer unit leader is responsible for informing the commander engineer of the capabilities and limitations. That information should be furnished during operations planning and should include all aspects of engineer support, including recommended breaching techniques.

Countermobility

Countermobility operations is the area in which engineers at the NTC have received their most constructive training.

As with mobility operations, countermobility problems begin during the planning phase. Inadequate consideration of the mission, enemy, terrain, troops and time available (METT-T) with respect to engineer support is the root of most problems. It is essential that the task force commander's engineer representative provide professional advice early. That advice could resolve some of these common problems:

- Inadequate barrier planning resulting in a shortage of barrier material.
- Lack of planning for transporting barrier material forward.
- Lack of coordination between the fire support officer and engineer platoon leader about the use of the family of scatterable mines (FASCAM).
- No priorities regarding obstacle construction.
- Time required to construct obstacles not considered.
- Engineer resources not consistently employed throughout the exercise.
- Obstacle completion not reported and minefield reports not made.

These problems may appear simple, but they are the most common. Engineers understand the combat multiplying effect of using engineers correctly (a good article on that subject appeared in the January 1983 issue of *Military Review*). The difficulty comes in making the system work efficiently. There is always more work to be done than engineers available to do it. Lets consider each problem and resolve it as much as possible.

First, before an NTC exercise, consider what material will be available and what influence you can have upon its availability. Then, knowing what you can obtain, plan ahead and coordinate transportation. The only solution may be prepositioning mines and barrier material. In any event, remember that it is much easier to modify an existing plan than to create one from scratch.

The planning stage is also the time to develop procedures for coordinating minefields with the supporting artillery unit. They will be using FASCAM and will be covering obstacles with indirect fire. Know the artillery's capabilities and limitations. If you have thought about these things ahead of time, they usually will not be forgotten during the exercise or in a real combat situation.

Next, when you work with the commander to develop the plan for obstacles, develop priorities. During the exercise, things may happen that prevent you from accomplishing all that you had planned, so have a plan that tells you where the emphasis is needed.

Be certain the commander knows how long it will take to construct obstacles. He has to know what he can expect in the time available. Do not forget to present options. (For example, how much longer could he expect the enemy to be delayed if he supplemented the engineer mine laying effort with infantry? You will not be able to answer that question unless you give it some thought ahead of time.)

Also, plan to use all of your resources. Troops cannot be expected to work 24 hours a day, but reports show that engineers are frequently idle because of a lack of planning. A good plan will keep engineers busy providing the commander with important combat multipliers.

Finally, you must report the obstacles that you emplace. This is important so that passage lanes can be

A poorly constructed antitank ditch is used by OPFOR armor as a fighting position. The tanks are M551s visually modified to resemble Soviet T72 tanks.

controlled and closed at the appropriate time. Lane closing has been a perennial problem at the NTC. Engineers can help remedy this deficiency.

Engineers can prevent another common problem—failure to make minefield reports. Our doctrine dictates that minefield reports will be made, but that has not been happening. The reason for the reports is very simple. We will likely be fighting over the same terrain more than one time, and our mines are just as deadly as theirs!

Survivability

Limited time at the NTC has been devoted to the survivability mission of the engineers. Time during defensive operations is largely spent on countermobility tasks. Most of the time spent on survivability has been to develop earth berms in front of fighting positions. However, limited consideration has been given to how wide a berm must be to provide adequate protection from direct fire weapons. Also, overhead cover and camouflage of berms has been forgotten. It is of little value for a defender to have a berm to his front giving him a false sense of security or one that prominently marks his position for the OPFOR.

Plan & Coordinate

Engineers can be an effective combat multiplier if used properly. Engineers will be used properly if they make their capabilities known ahead of time to the task force commander. It is up to the engineer to provide his expertise to a very busy commander. The engineer must assist with planning, and then he must coordinate the engineer operating system to make sure it works effectively.

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National Training Center

At the National Training Center (NTC), combat engineers can dig miles of tank ditches and survivable fighting positions, erect miles of barbed wire obstacles, use tons of barrier material and emplace hundreds of mines.

Located at Fort Irwin, California, the 660,000-acre NTC gives combat engineers ample room to train. The center's wide-open spaces and sophisticated training support package gives the Army the opportunity to conduct intense, highly realistic combat training for heavy task forces.

A factor adding realism to the NTC training concept is the opposing force (OPFOR) the task force encounters. The NTC provides a well-trained, numerically superior opposing force using Threat tactics and replicas of Threat vehicles. The OPFOR is organized as a motorized rifle regiment and provides realism on a scale not possible at home stations.

The NTC also increases realism on the training battlefield with the Core Instrumentation System (CIS). Within this system, 500 players and approximately 2,000 weapons equipped with the Multiple Integrated Laser Engagement System (MILES) are electronically monitored by Fort Irwin's main computer system. The system provides continuous position/location, firing information, and radio transmission information for most of the major weapons systems and key players on both the "Red" and "Blue" sides in the training exercise. Data is automatically collected at a number of stations in the engagement simulation area and displayed graphically on screens at the 31 individual control stations.

The system's ability to receive, store, and replay required data at any time is an invaluable tool for trainers. During an after-action review (AAR), the digital input; video input (from mobile television cameras and a large, 4,000-millimeter lens camera); plus the observations of 30 observer/controllers are compiled to determine the status of the task force undergoing training.

Sophisticated electronics, a realistic OPFOR unit, and an expansive maneuver area make the National Training Center the most unique training ground in the world.

Need to improve unit training?

Call Your Readiness Group

by LTC James L. Campbell

Limited training resources, little training time, and managing a unit that is often geographically separated, all tax the Reserve Component (RC) engineer commander's ability to give his soldiers quality training.

How does the RC commander train his skill level three, four, and five NCOs? How does he train soldiers in low density MOSs who are the unit's sole representatives of that MOS? And what about individual training for officers? How does he put together a solid training program in NBC survivability skills?

Assistance Available

One solution to these training challenges is to ask your supporting readiness group for assistance.

Readiness groups are made up of branch assistance teams (BATS) for each major specialty such as infantry, artillery and engineer, depending on the type and number of RC units supported.

In addition to the branch-oriented teams, there are several teams that have cross-branch orientations. The administration team provides finance, mess management, supply and administrative support. The "MAIT team" provides maintenance assistance. The Training Management Development Office provides a variety of assistance to all types of units.

Branch assistance teams have several training assistance packages available to support RC engineer units. The more unusual assistance programs of the engineer team, Readiness Group Fort Snelling, are described here in hopes that reservists and guardsmen will call their readiness group and request similar support.

The Fort Snelling programs include the tactical bivouac model, an adaptation of the Combat Engineer Game, obstacle planning, and NBC team training.

Tactical Bivouac Model

Properly setting up a tactical bivouac site is important. Yet, many of us have been in a unit that moved into a bivouac area, set up, then had to tear down and set up again because it wasn't done correctly the first time.

One solution to this problem is to use a model of the terrain, vehicles, weapons and personnel as a walk-through guide for tactical bivouac procedures. The Fort Snelling readiness group uses a 3-foot by 3-foot rubber terrain board with scale model trucks and weapons for this hands-on training exercise.

First, several hours of classes are held to instruct leaders on the organization and mission of the advance party. Then, using the terrain model, the leaders move their equipment into the area and discuss set-up tasks. (The sequence in which the set-up tasks must be performed is described in the soldier's manuals. For instance, the responsibilities of various leaders in setting up defensive sectors are shown as soldier's manual tasks.) This training session for leaders reduced bivouac deficiencies during annual training.

The Combat Engineer Game was developed by the Engineer School and is being redesigned. The initial version was independently reworked by the engineer team, Readiness Group Fort Snelling, into a training device for NCOs. It is designed to

train level three, four, and five 12B and 12Z NCOs in certain company, platoon and squad-level engineer ARTEP tasks.

The Combat Engineer Game is played on a small game board that fits into a small case. Markers, symbols and equipment are included for the players. Up to five players can play the game, which lasts two hours. Each player selects a unit mission and starting site on the board. The players state what unit equipment will be required to accomplish the mission. The mode of transportation (air or ground) is also determined by the player.

The players, in turn, begin moving from the starting point to the mission site by answering questions about level one and two, 12B soldier's manual tasks drawn from the movement card pile. When the players answer correctly, they move toward their mission site (via supply or coordination points if the mission requires such intermediate stops).

Once at the mission site, the players, in turn, must answer questions (within one to three minutes) about planning their unit mission, using FM 5-34, *Engineer Field Data*. Each correct answer earns one point. When ten points are accumulated, the player is given 20 minutes to prepare an oral operations order briefing on his unit's mission. If a "go" briefing is presented to the game board manager, the person is declared the winner and play continues to determine the subsequent order of finish.

Typical missions of the game include bridge demolition, Bailey bridge construction, landing site preparation, mine field clearance, and other common engineer tasks. The Combat Engineer Game is a good way to challenge leaders to improve their individual training levels and to review FM 5-34.

Obstacle Planning and Employment

Applying the rules of obstacle placement to form an integrated network of obstacles covered in depth by antitank fires of TOW, DRAGON and tanks is a formidable task for the engineer officer. He rarely gets the chance to see the effects of his obstacle placement. The effects of obstacles with covering fires are demonstrated by using the Dunn-Kempf game terrain board as a training aid.

This eight-hour exercise is intended for the squad leader through company commander. The training begins with a two-hour class on the employment of obstacles. A three-hour, hands-on drill is used to determine the tactics, boundaries, weapon systems location, and obstacle locations on the terrain board. The final three hours are spent playing the Dunn-Kempf game to test how covering fires increase the value of the obstacles sited by the unit leaders. The model affords the opportunity to discuss tactics, targeting priorities and enemy equipment.

This training vehicle is an excellent way to encourage unit leaders to site obstacles in conjunction with the maneuver unit's weapon systems. Using the Dunn-Kempf war game gives the chance to explain the terrain analysis and use allocation techniques of Command and General Staff College Reference Book 100-9. This is an effective way to improve the obstacle planning and employment capability for all engineer units, especially those in the CAPSTONE program.

NBC Team Training

Survival on the "dirty battlefield" mandates a high level of individual NBC proficiency and well-trained NBC teams. Each company-size unit should have four NBC teams. These are the control party, the radiological survey and monitoring team, the chemical detection team, and the decontamination team.

An intensive weekend training program is conducted by the readiness group engineer team to train these NBC teams. The control party spends all weekend training together. Each of the other teams receive eight hours of training in their primary area and then three hours of cross training on each of the two other team responsibilities.

The control party includes an NBC school-trained officer, NCO and an enlisted alternate. The training refamiliarizes the control party with unit NBC equipment; NBC reports; the operational exposure guide (OEG); mission-oriented protective posture (MOPP) tables; and consideration, plotting, and dissemination of NBC information. (*Figure 1* provides a synopsis of key topics that are covered.) A complete analysis and review of the unit's NBC annex to its field SOP completes the weekend of NBC training.

CONTROL PARTY TRAINING ITEMS

- IM93 Radiac Meter with PP1578 Charger
- IM174 Radiac Meter
- AN/PDR27 Radiac Meter
- M15/256 Chemical Detection Kits
- OEG Analysis
- MOPP Analysis/Considerations
- Protective Suits On/Off Procedures
- NBC Reports
- NBC Advice to the Commander
- Ground Survey (T6) Practical Exercise
- Aerial Survey (DVC 3-3) Practical Exercise
- M8 Chemical Alarm
- Equipment Decontamination Station
- Personnel Decontamination Stations
- Team Organization Procedures
- Unit NBC SOP

Figure 1

The radiological survey and monitoring team has an NCOIC, one primary and one alternate operator for each IM174 and AN/PDR27 radiac meter. A review of basic radiation sources, how to conduct radiation surveys and how to use various unit equipment is included in the weekend of training. (The items covered are shown in *Figure 2.*)

The chemical detection team has an NCOIC and a primary and alternate operator for each M15 or M256 kit in the unit. The training familiarizes personnel with chemical and biological weapons' effects, technological background data, and the actions of the chemical detection team. (The equipment covered during the training is noted in *Figure 2.*)

NBC TEAM TRAINING OUTLINE

Radiological Survey Team	Chemical Detection Team	Decontamination Team
Topics:	**Topics:**	**Topics:**
Radiation Sources Review	Chemical Agents Review	Contamination Sources Review
Protective Suits On/Off Procedures	MOPP Modes and Tables Practical Exercise	MOPP Considerations and Practical Exercise
NBC Reports (1, 2, 4)	Protective Suit Practical Exercise	Protective Suits On/Off Procedures
Simplified Fallout Prediction	NBC-3 Report	Operate in Protective Clothing
OEG Analysis and Recommendations	Chemical Contamination Plotting	Equipment Decontamination Station
Team Organization and Procedures	Proper Unmasking Procedures	Personnel Decontamination Station
	Team Organization and Procedures	Team Organization and Procedures
Equipment:	**Equipment:**	**Equipment:**
IM93 Radiac Meter with PP1578 Charger	M15 Chemical Detection Kit	M13 Kit
IM174 Radiac Meter	M256 Chemical Detection Kit	M58 Kit
AN/PDR27 Radiac Meter	M72A2 Chemical Training Kit	M11 Decontamination Apparatus
Aerial Survey Training Set PE (DVC 3-3)	M8 Chemical Alarm	M12A1 Decontamination Apparatus
Ground Survey Training Set PE (T6)		

Figure 2

The decontamination team has an NCOIC and eight enlisted members. The training familiarizes personnel with NBC weapons' effects and the requirements of the decontamination team. (The hands-on training covers the items in *Figure 2.*)

Crew Drills

The low-density MOSs are usually formed into crews such as armored vehicle launched bridge crews, combat engineer vehicle crews and water purification sections. Your readiness group can assist in training these specialized crews. Members of your readiness group BATs are trained in these low-density MOSs.

Challenge Your Readiness Group

Your readiness group exists for one reason—to help train your unit and its leaders. The training assistance available to you is limited only by your imagination. Challenge your readiness group to conduct leader training, low-density MOS training and to help in a variety of ways.

Readiness group training teams are usually busy, so request assistance early. Remember—your readiness group is there to help you.

LTC James L. Campbell commands the 237th Engineer Bn., 7th Engineer Bde., USAREUR. His previous assignment was as chief of the Engineer Team, Readiness Group Fort Snelling, Minn. He has also served in several engineer troop units, with the Engineer Studies Center and with the Engineer Command, Vietnam. LTC Campbell is a graduate of the Command and General Staff College, has a master's degree from Texas A&M University, and is a registered professional engineer.

Hotline Q & A

Q. How can we obtain one of the Engineer Programmable Calculators?

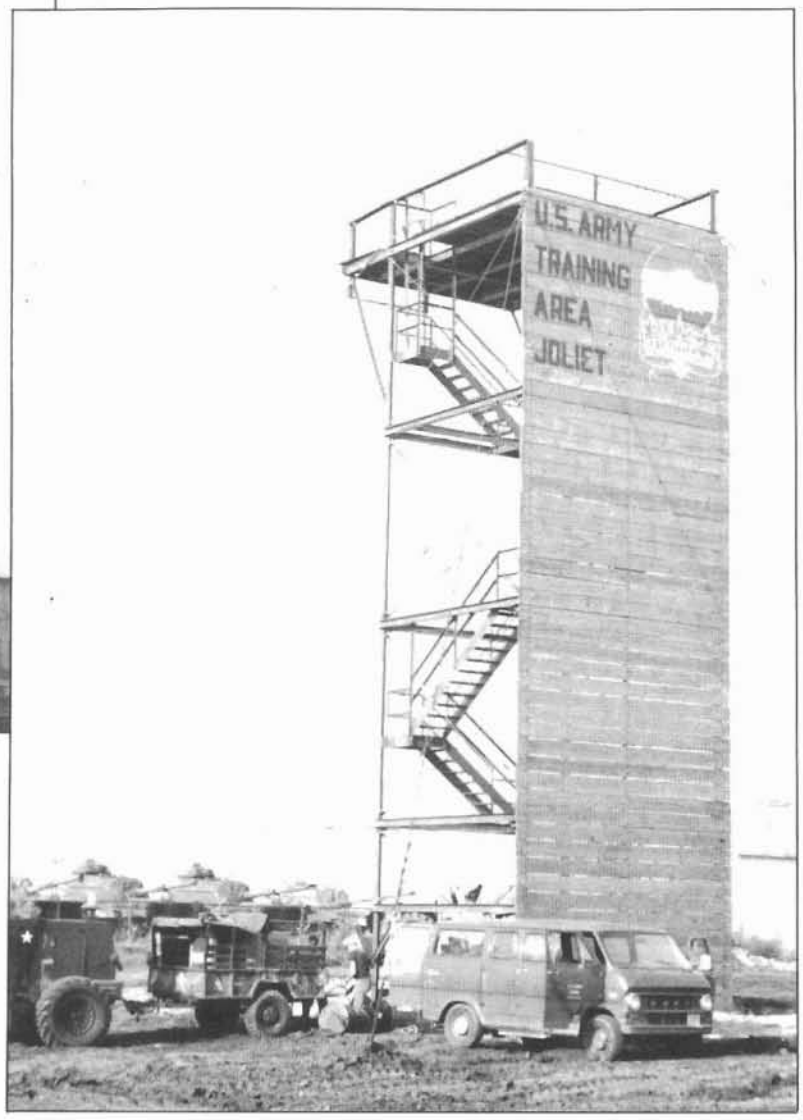
A. The calculator is still being tested, but the read-only-memory chip (ROM) is available from the Construction Engineering Laboratory, CERL-FS, P.O. Box 4005, Champaign, IL 61820.

Q. Has the 155mm artillery round for delivery of the family of scatterable mines (FASCAM) gone into production?

A. The 155mm antitank and antipersonnel mines are in production and are being fielded in Europe.

Q. I need references for the 51M (Firefighter) MOS.

A.
- The *National Fire Protection Agency Handbook*
- TM 5-315, *Firefighting Rescue Procedures in Theaters of Operations*
- TM 5-51M, *Firefighter*
- ARTEP 5-500 *Engineer Cellular Teams*



An airfield tower at Ft. Sheridan (left) became a rappelling tower in Joliet, Ill.

ON TIME, UNDER BUDGET

by CPT Frank A. Liebner

What do you do with an extra 30-ton aircraft control tower? Take it apart, move it 80 miles, and reassemble it as a rappelling tower.

When the installation commander at Fort Sheridan, Illinois, asked if the post's obsolete Healy Airfield control tower could be recycled, the answer was yes. The 533rd Engineer Detachment at Fort Sheridan was tasked to move the control tower 80 miles to the U.S. Army Training Area at Joliet, Illinois, and to turn it into a rappelling tower complete with cantilevered top deck for simulated helicopter rappelling.

The project was completed on time, under budget, and using fewer soldiers than anticipated.

The Healey Airfield control tower was made of structural steel with an observation deck cupola of wood and glass. The tower rested on four massive 15.6-foot square concrete footings. Three-quarter inch anchor bolts mounted half-inch thick baseplates at each leg. The main vertical elements were angles (Lx6x6x½), running up continuously 41 feet from the baseplates.

Riveted and bolted splice plates carried additional sections to the top at 62 feet. Horizontal structural elements (W 8x31) were at elevations 12, 25, 38, and 40 feet. One-inch diameter sway braces provided structural rigidity. The observation deck, perched at the 52-foot level, consisted of W 8x31 sections and C 8x11.5 floor joists. The original decking was 2x6xRL tongue and groove oak with a wooden gable roof that had been fitted over a metal parapet at the 62-foot level. Steel stairways and handrails led to the observation deck.

The Planning Process

The recycling project was planned carefully. The 533rd Engineer Detachment commander and the senior engineer construction supervisor developed an operations plan that included working drawings detailing the modifications required, site and movement test models, an activity list, duration estimates, the Critical Path Method (activity-on-the-arrow), the initial construction schedule (resource balancing), equipment lists, bills of material, and required service contracts (i.e., soil testing). All structural design proposals were approved by a civil engineer at the Fort Sheridan Engineer Plans and Services Division, Directorate of Engineering and Housing (DEH).

Time estimates, developed through engineering performance standards (TB 5-420-series), initially called for 45 working days and an average workforce of 23 soldiers. Specialized construction equipment was provided, by DEH and the 863rd Engineer Battalion (Heavy) (USAR).

The project was divided into two phases: administrative and construction. The administrative phase consisted of reviewing and approving final working drawings, material ordering, soil testing, requisitioning equipment from parent organizations, and obtaining budgetary approval.

The construction phase included three concurrent operations: movement operations, Joliet site preparation, and operations at Fort Sheridan. The movement element, which proved to be a limiting factor, involved transporting the major tower structure, delivering materials and moving construction equipment between the two sites.

Preparing the Joliet Site

At the Joliet site, soil analysis identified the requirement for 5x5-foot spread reinforced concrete footings with #4 bar, 6 inch OC x 2. A 2x2-foot square column with eight #6 bars carried the structure from the footings to the design elevation. Baseplates and anchor bolts were duplicated from the original specifications.

Since the proposed 16x52 foot rappelling surface would present wind loading problems, the resulting 70-kip design load required that four deadmen be placed to fix the corners. Concrete cubes 6x6x4 feet, reinforced against the direction of stress, were buried under nine feet of compacted fill. In these were embedded 1½-foot threaded anchor rods (A-36 steel); turnbuckles allowed for 14 inches of linear adjustment. One-inch wire rope tied the turnbuckles to the points of attachment on the tower.

Good site drainage (a project priority) later prevented costly construction delays during several summer storms. A pneumatic sump pump provided an additional capability for incidental water collection in the various excavations.

A crane raises a modular tower section onto a new foundation.

Dismantling Begins

To save time, a modular disassembly process was used. Safety was emphasized. Several existing structures hindered free movement of equipment, and a 5-kva powerline ran overhead. The parapet and the observation deck were freed, intact, from the structure and lowered to the ground. The remaining stairways, swaybraces, and upper angle columns were removed, as required, down to the 41-foot level.

The next step involved an innovative rotational maneuver. Lifting slings were attached to the lower 41 feet of the structure, the anchor bolts were cut free, and the tower was lifted and rotated from the vertical position to the horizontal and onto waiting cribbing.

In the horizontal position, the top 15.5x41-foot "panel" was secured by lifting slings. This enabled the elements of the left and right panels to be disassembled. The tower row was reduced to the upper and lower panels, two deck sections, and miscellaneous beams, stairs, brackets, and braces.

Modification and Transporting

While the tower was on the ground, all components were scraped, primed, and painted (color specification: Engineer red, naturally). Onto one component were mounted three series of channel sections (C 4x5.4) that ran the entire length of the tower on these six lag bolts. Pieces of pressure-treated lumber (2x12x16-feet) were mounted to form the rappelling surface.

The upper and lower panels, deck sections and other elements were loaded onto an M870 semitrailer for transportation to the Joliet site. Since the load approached 16-feet wide and 44-feet long, special road clearance permits and route mapping were obtained from the Illinois State Highway Department. Escort vehicles and a scout vehicle were used. Two additional trips with the tractor-trailer were required to carry the remaining components to the Joliet site.

Reassembling and Completing

Site management was the key at the assembly area. Grade irregularities were first leveled with cribbing. Careful placement of components and equipment siting ensured rapid reassembly of the tower. Before lifting the lower section, two diagonal braces (HP 8x36x16.8 feet) were fixed to the panel baseplates for the required compressive rigidity for the horizontal-to-vertical tilting maneuver. After the lower 41-foot section was set on the baseplates, the vertical alignment was rechecked by both instrument and direct measurement.

The 52-foot level deck was modified while on the ground to accept a 6-foot cantilever section. Steel grating (1 foot by 3/16 inches type 19W4) was welded in place and formed the new deck. Then the top section of the rappelling surface and the remaining two angle columns were married to the deck and secured. The entire subassembly was lifted into place, bolted, and aligned, as before.

The top deck was then completed on two sides with a waist-high safety rail. From three attachment rings, mounted on the deck surface, rappelling ropes would pass over a pipe rail. This rail, which was secured 3 feet from the edge and at a height of 40 inches above the deck, provided a better rope position. On the cantilevered deck, UH1 skid and UH60 door positions were fabricated. Pipes were welded along both deck edges to preclude rope damage. On either side, two sand pits served as landing sites. Finally, chain link fencing was erected to secure the site.

Training Benefits

Besides the troop training value in individual skill development, many personal lessons were learned from the recycling effort. Soldiers had to deal with three-to-four hours of round trip travel daily. Construction techniques were often learn-as-you-go, and soldiers were faced with heat, insects, fatigue, and equipment breakdowns throughout the project.

In spite of these difficulties, the tradesmen-soldiers of the detachment completed the project on time, and $8,500 below the committed budget. A work force of 23 engineers was not needed. Instead, a dedicated crew of eight completed the entire project. The rappelling tower training facility, now in service at the U.S. Army Training Area, Joliet, Illinois, stands as another example of the esprit of the engineer soldier.

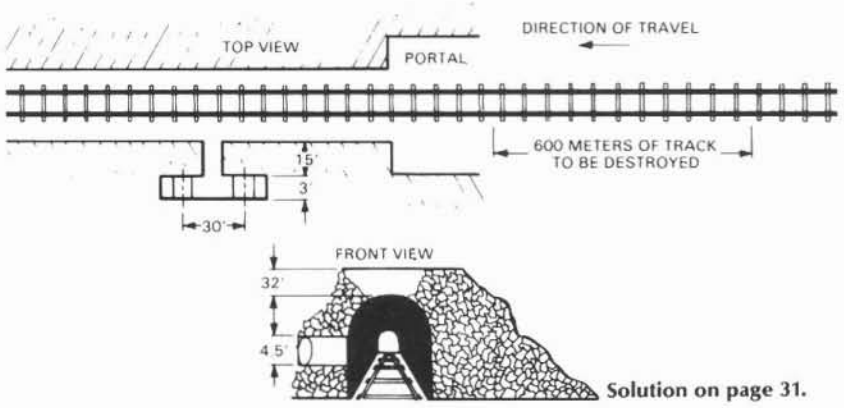
CPT Frank A. Liebner is assigned to HHC, 130th Engineer Bde., in Germany. He served at Fort Sheridan, Ill., as commander of the 533rd Engineer Det. (Utilities) and with the Directorate of Engineering and Housing. He has also served with mechanized, heavy and airborne combat engineer units. CPT Liebner has a professional degree in architecture from the University of Notre Dame, and a master's degree in computer systems and operations management from the University of Illinois.

Engineer Problem

Given the following extract from a hasty demolition reconnaissance report, plan the most effective and efficient means of destroying the tunnel and 600 meters of railway leading into the tunnel.

- Explosives available:
  - -100 lbs of TNT
  - -2000 lbs of C4
- Time is not critical.

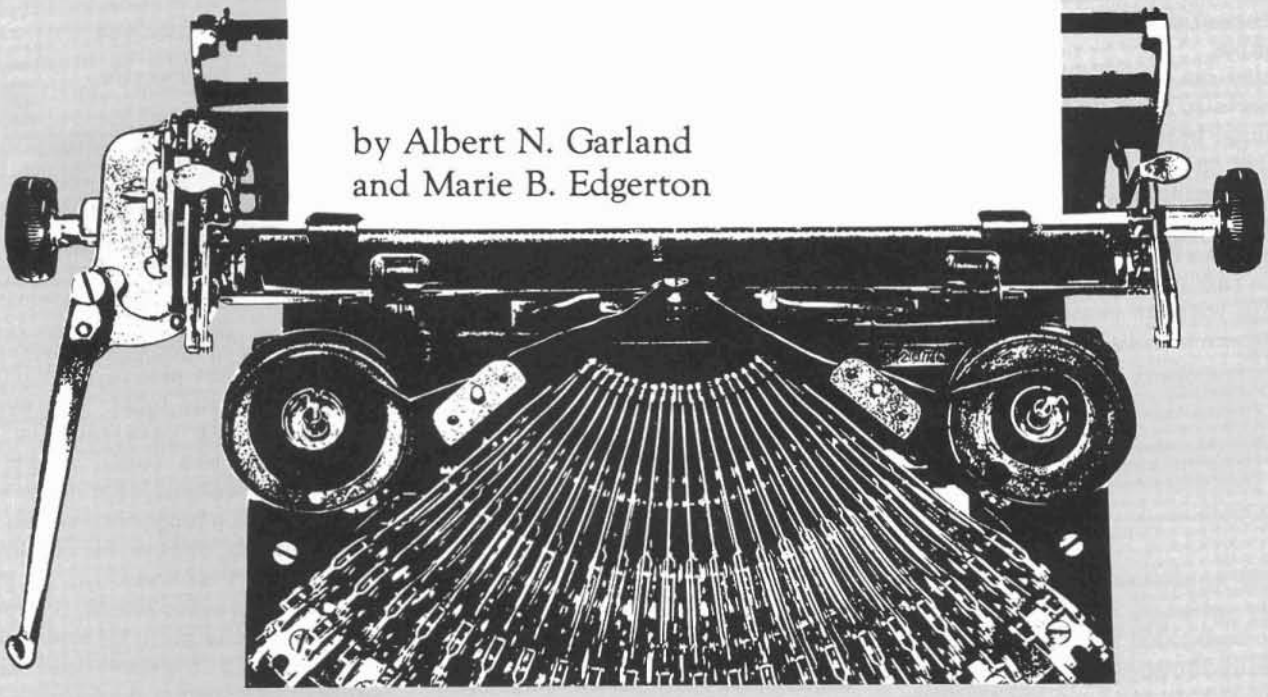
REQUIRED TASKS: Describe the method, placement and amount of explosives required for destruction of (1) the 600m of track, and (2) the tunnel.



Solution on page 31.

Writing for Publication

by Albert N. Garland
and Marie B. Edgerton



If you are writing for publication (drafting a staff paper or simply preparing a memo), these guidelines will make you a more effective communicator.

First, a prospective author should be aware that in a professional journal of any kind the most important consideration is the subject matter of an article. This is especially true of military publications. Each journal usually has its own particular reason for existing, a stated mission to accomplish through its pages—a specific category of material to cover and a specific group of readers to reach.

A prospective writer, therefore, should study the publication he wants to write for to see what kind of material it normally uses, and then he should write with that publication in mind. Or if he already has an idea for an article on a certain subject, he should look for just the right publication for the article. (In no case should he send it to more than one publication at a time. And he should always send an original manuscript, not a copy.) But how can he find out what kind of material each wants?

He can go to the library, for one thing, and look at various magazines to get a feel for what they normally use. If he doesn't find the magazines there, he can at least get their addresses and write or call the ones he is considering. Most magazines offer sample copies to anyone who is

interested, and most also have writer's guides to send along. Most editors are also happy to discuss article ideas by telephone or by mail and to advise a writer on the best approach to use.

While a prospective writer is looking at various magazines to see what subject matter each covers, he should also look at the style of writing in each. Style may not be easy for a new writer to detect, but he can usually tell, for example, whether the writing is formal or informal, serious or light, and whether the magazine uses scenarios, dialogue, or humor, for example.

Once he has done all this, an author also must do his homework. He must become well versed in his subject matter, using the nearest library facilities to fill in any gaps in his own knowledge. And he should not select a subject that is too broad. It is a rare person who can write an article without some preparation; and there is not one who can solve all the world's problems in 2,000 words.

A military writer should be aware, too, that writing for a military publication is not the same as "military writing." The two are quite different, in fact, although we're not sure why that should be. Military writing, unfortunately, is stereotyped and usually follows certain prescribed steps with little deviation permitted. Much of it is filled with meaningless cliches and bureaucratic jargon that together make it essentially unintelligible except to insiders, and often even they find it difficult.

Writing for publication in a military journal, and especially in a civilian magazine, is another matter entirely. The author of a magazine article cannot force another person to read his material as the author of a "military paper" can. The writer must first attract the reader's attention and then work hard to keep it. And he does this by making his writing tight, concise, and interesting—by coming through as a person expressing a human situation, a bit of reality with which a reader can associate himself as a person.

Warnings

Before he begins to write, there are a few more things a writer should know:

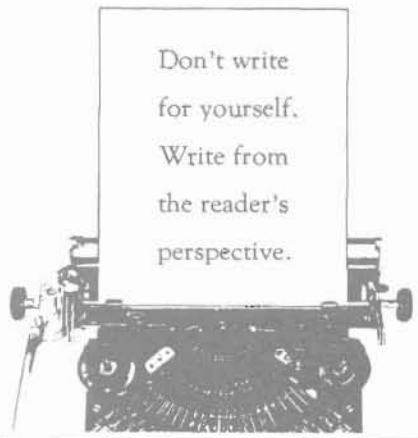
- Writing is not easy for most people. A writer's goal should be to make the reading easy; as a famous editor once put it, "Easy writing makes damn hard reading."
- Writing cannot be hurried. It must flow naturally in its own time. And it must follow the author's thoughts in a logical and progressive way.
- Writing is a lonely job. An author cannot share the experience until he has completed at least one draft of his article. No one else can help him write; it is a task that he must do alone.
- Writing requires patience. It requires the ability to sit at a desk or the dining table, or on the floor, to compose draft after draft. A writer should not expect to produce a finished product on the first try. He has to be ready to rework it again and again. If he does not, he can be sure that an editor somewhere will do it for him—assuming, of course, that the editor sees something valuable enough in the manuscript to bother doing it.

Even then, after all this work, his article may be rejected. Sometimes it will be a good article but at the wrong time or the wrong place. The article may be on a subject that does not appeal to the editor who reads it at that particular time, or the editor may already have accepted a similar article. Rejection is a fact of life in the writing business. But it should not discourage a writer from trying again.

Techniqes

Certain techniques are involved in good writing. The following are only a few of those we have found to be particularly useful.

First, an article should be complete. It should answer all the



questions it raises—all the questions a reader might ask in connection with the specific topic. The writer accomplishes this chiefly by narrowing his topic down to something he can deal with satisfactorily in a magazine article.

The article should be coherent, meaning it should all "stick together." In other words, it should have a definite point to make, and everything in it should lead to or support that point. And along the way, the author should say what he has to say simply, clearly, and directly. He should not wander; if he does, his reader will also wander, never to return.

The length of an article is a matter of personal choice, although magazines do usually have limits, both upper and lower, on the length they will consider. Conciseness requires planning, but if a writer makes a reasonable effort to outline his ideas before he starts to write, he should be able to stay within the desired limits. One rule of thumb we use when talking with prospective authors is, "Say what you have to say and then stop. Don't say it over and over again."

A writer should not attempt dialogue unless he has had a great deal of experience with it. Good, realistic dialogue is difficult to write,

even for the most experienced writer, and amateurish dialogue will turn an editor off quickly. (For us, the best turn-off is an opening scenario. In most cases, it only indicates that the writer did not know how to begin and used a scenario as a crutch.)

Footnotes are useful for certain types of articles. Separate bibliographies are also necessary if an article is based on historical research or on the findings of a board. But no manuscript should be cluttered with long quotations that only restate what the author is trying to prove. An author should be able to make his own case strongly enough with a minimum of outside help from authorities. Only especially astute or well-stated comments should be quoted directly, and the source of these should be given in the text.

An author should be as objective as possible about his subject. He should be careful not to base an article on assumptions that may not hold up. If everything he writes is dependent upon a neatly phrased premise that he states in the beginning, then he must first establish that premise as a fact.

He should be careful, too, about using superlatives, comparatives, and absolutes. Something he labels the best, for example, may be the best in his opinion only. And few things in the world are so absolute that an author can safely say that something is always this way or never that way. If he does, he must be prepared to support his contention.

In regard to "forum" articles—in which an author expresses his opinion on an issue—we recommend that a writer avoid criticizing the way something is done unless he has a good substitute solution to offer. Too many writers appear to have a personal axe to grind without really helping solve the problem. But that is not to say that every article must hew to the "party line," the established doctrine. Most magazines welcome controversial articles, because such articles stimulate a healthy dialogue, not to mention a healthy interest in the magazines themselves.

Finally, any would-be author should be his own copy editor. Although editors expect to have some work to do in preparing an article for publication, an author will stand a better chance of having his article accepted if he will look at it as an editor might. Besides, by doing this, he can often make his thoughts clearer and thus avoid the possibility that the editor may unintentionally change his meaning in the process of doing the editing for him.

Over the years, we have read thousands of manuscripts, ranging from the very good to the very bad. As a result, we have developed a number of writing tips that we think will benefit any military writer—if he uses them properly.

The tips that we have chosen to use here are especially intended to help a prospective author write simply, clearly, and concisely, because too much Army writing is the direct opposite of simple, clear, and concise. The examples used to illustrate these tips have been collected over the years from military writing found in various documents and publications.

Writing Tips

Use the active voice. Although there are times when the passive voice is best—when, for example, the action itself is more important than who does it—the active voice is generally clearer and more concise. "It was ordered that . . .," without saying by whom, may look like a dodge to avoid saying who ordered it. In any case, it certainly does not tell the reader who did it, and getting a real live person into a sentence almost always makes it more interesting and easier to read.

As another example, "The equipment was repaired by the soldiers," does tell who, but "The soldiers repaired the equipment" is shorter and more straightforward. Writers should especially avoid the impersonal, stilted, and typically Army "It is regretted that," saying instead simply "We regret," or "The Army regrets . . ."

The use of the passive voice often leads to monstrous constructions such as this: "The mobilization of all available resources will be made." Although it is somewhat better to say "All available resources will be mobilized," this is still in the passive voice. Much better is the active, "We (or somebody) will mobilize all resources."

Once a writer consciously decides to use the passive voice in a sentence, however, he must be consistent. Switching from the passive to the active in mid-sentence leads to confusion, as this example illustrates: "The senior enemy air defense controller was taken out of the picture by cutting his communication cables." The word "cutting" clearly requires someone to do the cutting, and the enemy air defense controller probably did not cut his own cables to take himself out of the picture.

There are two solutions to this problem: In the passive voice, "The . . . controller was taken out of the picture when his communication cables were cut." Or, in the active voice, "(Someone) took the air defense controller out of the picture by cutting his communication cables."

As this example also illustrates, it is sometimes impossible for an editor to convert a sentence to active voice, because he may not be able to figure out who the doer is supposed to be. Only the author can provide that information.

Make modifiers clear. A word or phrase that is used to modify another word or phrase must be placed so that the relationship between them is clear. This example from a post daily bulletin will illustrate: "Warning: Any toy chest used for storing toys with a hinged lid is a strangulation hazard to a small child." The phrase "with a hinged lid" should go after the word "chest," since the warning is about the chests

with hinged lids, not about toys with hinged lids. (Besides, the phrase "used for storing toys" is unnecessary; that is what a toy chest is for. In this case, then, taking out the intruding phrase solves the problem.)

The dangling particple, which has plagued English students throughout their school years, also falls into this category of misplaced or unclear modifiers. For example, "Walking by the motor pool, the truck hit the fence," taken literally means that the truck was walking by the motor pool. But a more likely meaning is, "As I was walking by the motor pool, I saw the truck hit the fence."

Use parallel construction. Parallel construction means putting like elements in a sentence in the same grammatical form. In "preparing, coordination, and evaluation," the word "preparing" does not agree with the others. All should have "tion" endings, or all should have "ing" endings. (The "ing" endings are best, incidentally, because verb forms are generally better to use than nouns.)

In a description of the U.S. flag, "red, white, and blue" are parallel—all adjectives—but "red, white, blue, and made of nylon" are not. The last item in the series is a phrase, not an adjective; therefore, it is not a true series.

This "false series" is the single most common error of parallelism. If three or four items are involved, many writers tend to treat them as a series without analyzing them for logic.

As another example, "He gave them orders, maps, aerial photographs and showed them a sand table of the command post." An "and" before "aerial photographs" to complete that series, "orders, maps, and aerial photographs," would help. (Despite popular belief, there is nothing wrong with using two ands that close together in a sentence as long as it is not hard to read.) Another example, "The new M1 tank runs smoother, faster, and responds easier," is not as easy to solve. It might be better to say, "The new M1 tank is smoothrunning, fast, and responsive."

Faulty parallelism is fairly easy to detect if a writer carefully reads what he has written and applies some logic to it. For example: "His job is developing training, doctrine, materials, and training the officers" presumably means "His job is to develop training doctrine and materials and to train the officers."

Use correct idioms. An idiom is an individual peculiarity of language—a construction that is generally accepted and widely understood but without any real grammatical basis. For example, we say "instead of going" but "rather than go," and even linguists cannot explain why.

Many idiomatically strange constructions have crept into Army writing recently: "Officers are charged to satisfy" and "are responsible to satisfy" appear with some regularity. But the normal idioms are "charged with satisfying" and "responsible for satisfying," and it seems strange to most readers to see them otherwise.

As another example, "to assist the boss to prevent" should be either "to assist the boss in preventing" or, better, "to help him prevent." We normally say, not "acquaint to" but "acquaint with," not "curiosity of" but "curiosity about," not "permeated with" but "permeated by." (Such lists are available in many grammar books and style guides.)

Use transition devices. Transitions are words or phrases that let the reader know what direction the author is taking next. The most common of these are and, but, and for, but there are many others: consequently, therefore, however, nevertheless, subsequently, on the other hand, earlier, later, previously, and so on. Often entire sentences must be used to provide transition. All of these devices help the reader keep track of what the author is saying without having to reread a passage several times. Such devices should be used in sentences, between sentences, between paragraphs, or between major sections of a piece of writing—anywhere there is a shift in the subject.

Be concise. Concise does not mean necessarily brief; it means saying everything that needs to be said to make a point clear but without any unnecessary words or phrases. The examples shown above include redundancies (using two or more words that mean the same thing) and general wordiness (using more words than necessary).

These are only a few of the many

Avoid Wordiness and Redundancies

Instead of	Try
seems apparent	appears
new innovations	innovations (they are new)
many and numerous	many
final and ultimate	final (or) the last
around the perimeter	around (the line that goes around something is its perimeter)
skirt around	skirt (or) go around
important essentials	essentials (important by definition)
serious crisis	crisis (serious by definition)
at this point in time	now
until such time as	until
in the near future	soon
a sufficient amount of	enough
in a timely manner	on time
casual factors	causes
make provision for	provide for
is indicative of	indicates
be cognizant of	know
have the capability	be able
be in agreement	agree
give authorization	authorize
be in possession of	possess
give encouragement	encourage
serve the function of being	be

examples of redundancy and wordiness. To change the habit of writing this way, a writer first has to become aware of the problem; then he has to go back over what he has written to see whether he has used any words that need to be cut.

Use short, familiar words. Part of a writer's task is to choose the right word. And sometimes the longer words, such as those listed on the left below, are best, especially in formal writing. But generally, the shorter, more familiar versions are just as good, and they are more concise. (In formal writing, the longer ones sometimes sound pretentious and stuffy.)

Simple Words Are Best

Instead of	Try
numerous	many
facilitate	ease
the remainder	the rest
individual	man, woman, soldier
sufficient	enough
provide	give
attempt	try
obtain	get
possess	have
desire	want
prior to	before
subsequent to	after
utilize	use
endeavor	try
myriad	many

(On this last item, myriad means many; therefore, a myriad of, which is used so much, makes no sense whatever.)

Above all, a writer should never use a word unless he is sure he knows the meaning of it. (If he really thinks about it, he usually does know; misuse comes more from carelessness than from ignorance.)

It is not uncommon, for example, to see agenda confused with itinerary, defuse with diffuse, glean with gleam, hone with home (one hones skills, homes in on a target), breach with bridge (especially in breaching the gap, which, of course, is already breached), and wreckless with reckless (direct opposites, in fact, when talking about driving.) A pet peeve of ours is the word enhance, which seems to be a favorite these days. Enhance means to increase or augment, but normally it is applied to something that is already good, such as value or beauty. To speak of enhancing lethality (a questionable word in itself) is ludicrous. What's wrong with using increase? Or improve?

Avoid jargon. Many people in the Army (and in other specialty fields as well) become so accustomed to seeing jargon, which is a specialized use of language, that they adopt it for all their writing. But the only time jargon of any kind is acceptable in writing is when the writer knows that all his readers will understand it. When a magazine goes to all kinds of people all over the world, he can be sure that many of them will not understand it. Any writer must therefore make a conscious effort to see that the words and phrases he uses are not only clear and concise but free of specialized uses of words that some will not understand.

Read and practice. Finally, anyone who seriously wants to write for publication should make it a habit to read everything he can. He will not only be stimulated by the ideas of others, he will also be exposed to the way those ideas are put together in writing. This, in turn, should make his own writing come easier.

He might even consider reading some of the many books on writing that are so popular now. One that has always been popular, and one that any writer would recommend, is *The Elements of Style,* by William Strunk Jr., and E. B. White. It is concise and easy to read (its authors practice what they preach).

In addition to reading, a prospective writer should practice writing every chance he gets. Only through practice can he sharpen his skills.

The most important thing about an article is its contents—the message that it has for a magazine's readers. If we see something good enough in a manuscript that is submitted to us, no matter how much help the writing may need, we will help the author get it published, either by giving him specific instructions for rewriting it or by editing it for him.

Our purpose here is to encourage writers, not to discourage them. These tips are designed to help the writer make that "something good" in a manuscript clearer and easier to get at so that an editor somewhere will want to publish it.

This article originally appeared in the September-October 1983 issue of INFANTRY magazine. Albert N. Garland is deputy editor of INFANTRY and Marie B. Edgerton is the associate editor.

Engineer Solution

For destruction of the 600m of track: Given an individual rail length of 7.5m, 80 lbs of TNT would be required to destroy 600m of track.

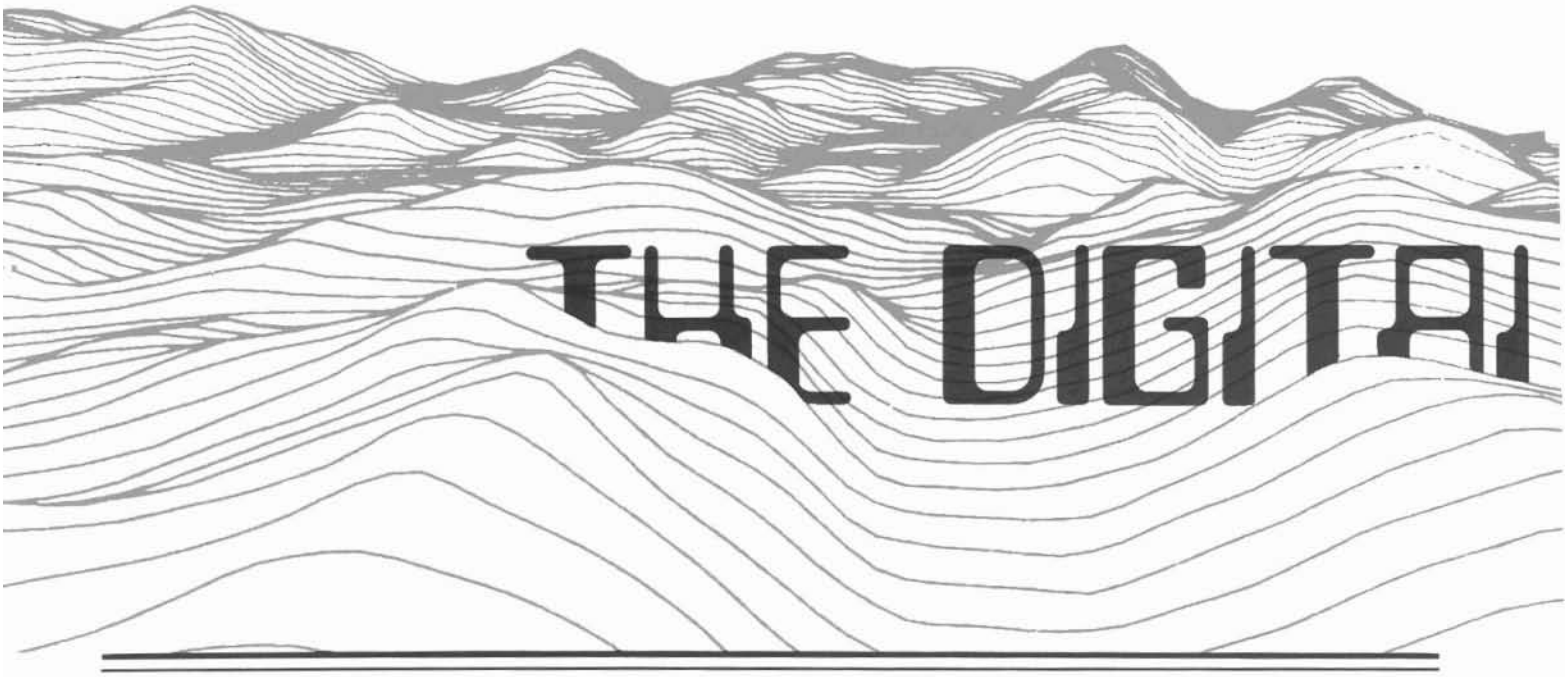
$$600\text{m} \times \frac{1\text{ lb TNT}}{7.5\text{m}} = 80\text{ lbs TNT}$$

The one-pound charges would be placed on alternating connections of both tracks to economize on the amount of explosives used. Tamping is not required but could be used to destroy a longer length of railroad track.

(Reference: FM 5-25, *Explosives and Demolitions,* para 4-40, a, (2), p. 4-56)

For destruction of the tunnel: Given a T-type chamber with a length of 60′, two 750-pound charges of high explosives (C4) should be used for a total of 1500 lbs of C4. Charges should be placed on 30′ centers.

(References: FM 5-25, para 4-41, c, p. 4-58)



THE DIGITAL

Digital technology is transforming topographic products from individual weapon plots to cruise missile guidance systems.

Mapmaking is undergoing revoluntionary change, particularly within the military. The shift from traditional "squint and print" maps and charts to today's semiautomated topographic products is the result of several new surveying, photogrammetric, and cartographic techniques, all employing digital technology.

Today's map is more than a symbolic picture of terrain and manmade features; it is a composite of "digits." These digits are supplied by the military cartographer to support weapon guidance, land navigation, terrain analysis, simulation, and command control systems.

Digital Topographic Data Base

Digits are topographic data that is compiled and converted into computer-compatible form. A collection of organized and evaluated digits make up a digital topographic data base (DTDB). The information for each DTDB is collected by various electronic methods and has recall capabilities for editing and updating.

With the DTDB, military cartographers are supplying digital topographic information for weapon guidance and command and control systems. For example, support system for the Pershing II; Firefinder MX; Airborne Warning and Command System (AWACS); and terrain contour matching (TERCOM) data for cruise missiles all use DTDB information.

Computer Graphics Maps

The traditional paper map has not been replaced; this critical tool will be used for years to come. However, computer-assisted cartography has eliminated many of the time-consuming processes of mapmaking. Some of the advantages are analytical stereoplotters for rapid data collection; interactive editing systems for updating digital information; and innovative programming to allow choice of scale, projection, symbolic detail and grid. There is another recent advantage—use of computer graphics.

In computer graphics, computer impulses are converted into man-readable information and imaged instantaneously on a display device. It offers three-dimensional (3-D) displays with cultural, vegetative tactical and other map-related overlays for terrain and military analysis.

Three dimensional maps (projections) are produced by connecting discrete elevation measurements (from the DTDB) taken at regular intervals along a straight line or profile. The resulting fishnet appearance causes the terrain to "pop up" from the page, certainly adding dimension to the extended battlefield of the AirLand Battle concept.

The 3-D oblique map (Figure 1) is constructed so that projecting rays are parallel, whereas a 3-D shaded (color) perspective map's rays come together at a distant point.

These two computer-generated displays are not maps in the true sense of the word. Even though they represent a portion of the earth's surface, they are not drawn to scale. However, both projections are superior to the standard topographic map when there is a requirement to visualize and to analyze the terrain and its effect on military operations.

Terrain is generally analyzed by military commanders in five aspects: observation and fire, cover and concealment, obstacles, key terrain, and avenues of approach. The 3-D maps allow the commander to "see" the channelizing effect of avenues of approach, and they clearly emphasize key terrain features.

Recommendations for barriers, minefields, and other fortifications can be more easily made with com-

LANDSCAPE

by MAJ David R. Bowen

puter maps. Location of observation posts, forward observers, and ground movement or flight routes can be analyzed more effectively since varying elevations can be easily seen. Also, the shaded perspective map's "sunagle" can be altered to produce various shading effects, with either a gray or color-layering portrayal, to designate graduations in relief. This is a particularly valuable characteristic in analyzing terrain for trafficability characteristics.

These two 3-D computer graphic maps were produced from digital topographic (elevation) data. Figure 2 is an example of manipulating and reconstructing aerial photography views and extract or insert various elevation, planimetric (all other components of a map except relief) or military data.

Today with the combination of 3-D computer graphics, the DTDB, and the original imagery, users can select a specific piece of ground and obtain 3-D oblique or perspective by computer to produce a computer-generated map. This technology, called Digital Image Analysis Laboratory (DIAL), was first developed at the U.S. Army Engineering Topographic Laboratories (ETL), Fort Belvoir, to analyze digitized aerial photography for vegetation information.

For example, the user could request slope information, construct radar masking diagrams or request civil engineering data (e.g., cut and fill requirements and flood-peculiar parameters). The DIAL System is interactive, and depending on the DTDB and other military or engineering data available, unlimited views and combinations of overlay information can be generated in graphic or tabular form.

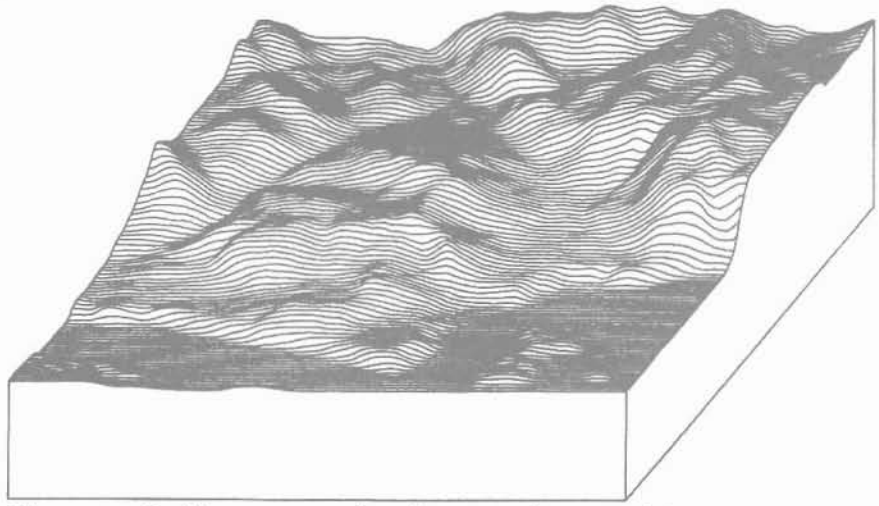


Figure 1. 3-D oblique map produced by vector (storage tube) computer graphics.

The visual impact that 3-D computer graphic maps offer to enhance terrain analysis is obvious. However, the primary advantage of a computer graphic map over a conventional map is that it can be produced rapidly and offers unlimited fields of view. The noted examples can be produced almost instantly on a display screen, and because of the interactive nature of computer graphics, they can be altered by the user in a matter of seconds.

This interactive advantage allows the user to rotate the map to obtain any desired azimuth and height of view. The commander can "see over the horizon" or visualize how an adversary "sees" his area of responsibility. Also, the DTDB can be accessed to superimpose vegetation, cultural features, grid lines, and other critical military data over the base elevation matrix. Overlaying such data (e.g., vegetation and military units) would certainly assist in the analysis of cover and concealment as well as observation and fire.

Some areas of computer graphic maps may not be visible because of landform obstruction or masking by the terrain. Also, vertical exaggeration could be applied to the display to obtain a desired false differential of elevation. The masking factor

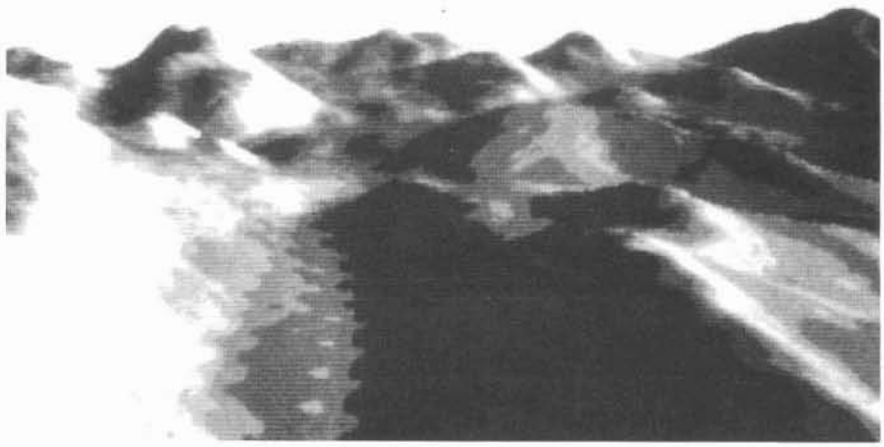


Figure 2. 3-D shaded perspective map produced by raster computer graphics.

can be overcome interactively at the computer graphics terminal by changing direction of view or by elevating the viewer's visual perspective. Vertical exaggeration, if applied, must be to avoid an inaccurate analysis.

The weapon placement plot is an example of the application of five aspects of terrain analysis with computer graphics technology. In this example, (Figure 3), a computer-generated two-dimensional map (contours only) is produced, and a weapon system (M60 machine gun) is placed anywhere on the map to study the effect of terrain on the weapon's characteristics.

The weapon plot, in this case, graphically indicates the weapon's effectiveness. The left and right limits of fire and range are indicated. Also, taking into account the height above ground, the kill zone (shaded area) and dead spaces (open areas in the fan) are displayed. The weapon's orientation and height above the ground can be changed to see various fans of weapon capability. Vegetation and cultural features could be added to the display to increase the realism of the weapon's effectiveness.

The Orthophotomap

An orthophotomap (OPM) is a special topographic map particularly suited for rapid-response mapping requirements. Unlike the conventional line map where total map detail must be transferred from source information, the OPM is an actual picture of the ground with little of the displacement inherent in normal aerial photography.

There are many programs in progress to acquaint the military community with computer graphic mapping. The Field Exploitation of Elevation Data (FEED) system is a demonstration package on computer graphic mapping using a minicomputer-based graphic system. The FEED system is self-contained in a van and has been displayed at several Army and Air Force installations.

The Combined Arms Center, Fort Leavenworth, Kansas, uses a computer graphics system called Battlefield Visualization Graphics (BVG) to produce computer-generated views of terrain for simulation exercises. The computer graphics laboratory at West Point produces computer graphic maps to aid land navigation training. Finally, the National Training Center at Fort Irwin, California, uses a computer graphics display system so instructors and participants can see graphic replays (computer maps overlain with military symbology) of what actually took place during ground exercises.

The computer-generated maps noted in this article, are only a sample of some of the new mapping products being developed and tested.

Computer graphics technology coupled with digital topographic, planimetric, and tactical data offer an innovative, rapid-response tool for the battlefield commander.

MAJ David R. Bowen is executive officer of the 30th Engineer Bn. (Topographic), Ft. Belvoir. He has a master's degree in geography from Arizona State University and is a graduate of the Infantry and Engineer Officer Advanced Courses, the Command and General Staff College, and the Armed Forces Staff College. He served at West Point as assistant professor of cartography and terrain analysis, and was an exchange officer from the Defense Mapping Agency to the Australian Survey Regiment. While serving in Australia, he conducted research in automated cartography and commanded the regiment's cartographic squadron.

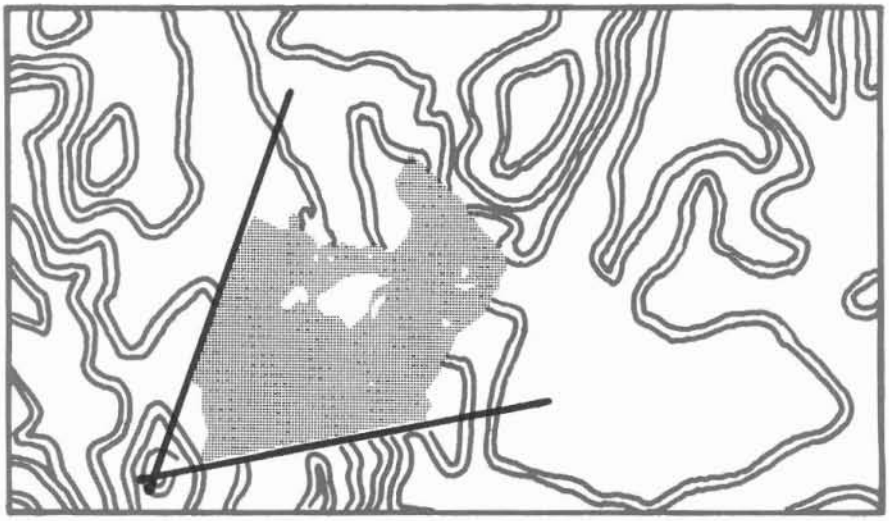


Figure 3. Weapon placement plot with a computer-generated contour map.

Career Notes

Commissioned Officers' Branch

(202) 325-7504/7505/7506, AV 221

LTC Peter G. O'Neill
Branch Chief

MAJ John Basilotto
Lieutenant Colonels

MAJ Steve Rust
Majors

CPT Tim Wood
Captains

CPT Bo Temple
Lieutenants

MAJ Dennis Cochrane
SC 49 Assignments

CPT Philip Jones
Professional Development

1983 Promotion Recap:

The results of the 1983 field grade officer promotion boards have been released. Below is a recapitulation of the promotion statistics for SC 21 (Engineer) officers and all Officer Personnel Management Directorate (OPMD) managed officers.

Generally, the promotion rate for SC 21 majors was above the OPMD average, the rate for SC 21 lieutenant colonels was below the average, and the rate for SC 21 colonels was above the average.

SC 21 PROMOTION RECAP (percent selected)

RANK	PC	FTC	PC & FTC	BZ
COL	0	51.8	40.0	3.2
LTC	11.9	68.9	47.0	2.3
MAJ	22.6	81.9	71.9	.8

OPMD PROMOTION RECAP (percent selected)

RANK	PC	FTC	PC & FTC	BZ
COL	6.9	44.6	25.7	2.6
LTC	16.1	71.7	47.8	2.9
MAJ	22.3	78.8	63.9	.5

PC = previously considered
FTC = first time considered
BZ = below the zone

Career Notes

Warrant Officers' Branch

(202) 325-7838/7839, AV 221

Warrant Officers Sought:

CW4 Edward Cole
Warrant Officers

More than 600 enlisted soldiers in combat service support specialties could soon exchange their stripes for bars.

The Army is critically short of warrant officers in five technical fields, according to technical service managers at MILPERCEN.

"We need about 600 NCOs in the supply and maintenance fields to fill our critical shortage of warrant officers in those five specialties," said CW4 Lloyd Washer of the Technical Services Branch, Warrant Officer Division, Officer Personnel Management Directorate, MILPERCEN.

Washer added that interested soldiers, E5 and above, serving in one of the feeder fields, should contact their military personnel offices or personnel action centers to apply for appointment as warrant officers. Enlisted service members in the top three grades, E7 through E9, can request appointment as a chief warrant officer two, incurring a six-year obligation, Washer said.

Warrant specialties to be filled under this program are 310A, Utilities Operation/and Maintenance Technician: 621A, Engineer Equipment Repair Technician; 630A, Automotive Repair Technician; 761A, General Supply Technician; and 726A, Support Supply Technician.

Feeder skills for the five warrant officer fields include a variety of combat service support military occupational specialties.

The Utilities Operation and Maintenance Technician (310A) specialty is open to soldiers serving in these MOSs:

- 51B (Carpentry and Masonry Specialist)
- 51G (Materials Quality Specialist)
- 51H (Construction Engineering Supervisor)
- 51K (Plumber)
- 51R (Interior Electrician)
- 62E (Prime Power Production Specialist)
- 42C (Orthotic Specialist)
- 42D (Dental Lab Specialist)

Soldiers serving in the following specialties are eligible to apply for the 621A warrant officer program as an Engineer Equipment Repair Technician:

- 52C (Utilities Equipment Repairer)
- 52D (Power Generation Equipment Repairer)
- 52F (Turbine-Driven Engine Generation Repairer)
- 62B (Construction Equipment Repairer)

For the 630A, Automotive Repair Technician, field, soldiers serving in the following MOSs may apply:

- 41C (Fire Control Instrument Repairer)
- 41J (Office Machine Repairer)
- 44E (Machinist)

Warrant Officers' Branch (continued)

- 52C (Utilities Equipment Repairer)
- 52D (Power Generation Equipment Repairer)
- 52F (Turbine-Driven Engine Generation Repairer)
- 52K (Tank Turret Repairer)

The following MOSs are feeder skills for the 761A, General Supply Technician, warrant officer program:

- 76C (Equipment Records and Parts Specialist)
- 76J (Medical Supply Specialist)
- 76P (Materiel Control and Accounting Specialist)
- 76V (Materiel Storage and Handling Specialist)
- 76W (Petroleum Supply Specialist)
- 76X (Subsistence Supply Specialist)
- 76Y (Unit Supply Specialist)
- 76Z (Senior Supply Sergeant)

Finally, soldiers in most skills listed for 761A may also apply for the 762A, Support Supply Technician.

Military personnel officials emphasized that soldiers must meet several requirements in addition to their present MOS.

Any soldier serving as an E5 or higher in a skill listed, should contact his or her local military personnel center or personnel actions center to look at AR 635-100 and DA Circular 601-82-13.

NCO & Enlisted Soldiers' Branch

(202) 325-7710, AV 221

Six MOSs are reopened to women; see News & Notes, page 2.

LTC Liston Edge
Branch Chief

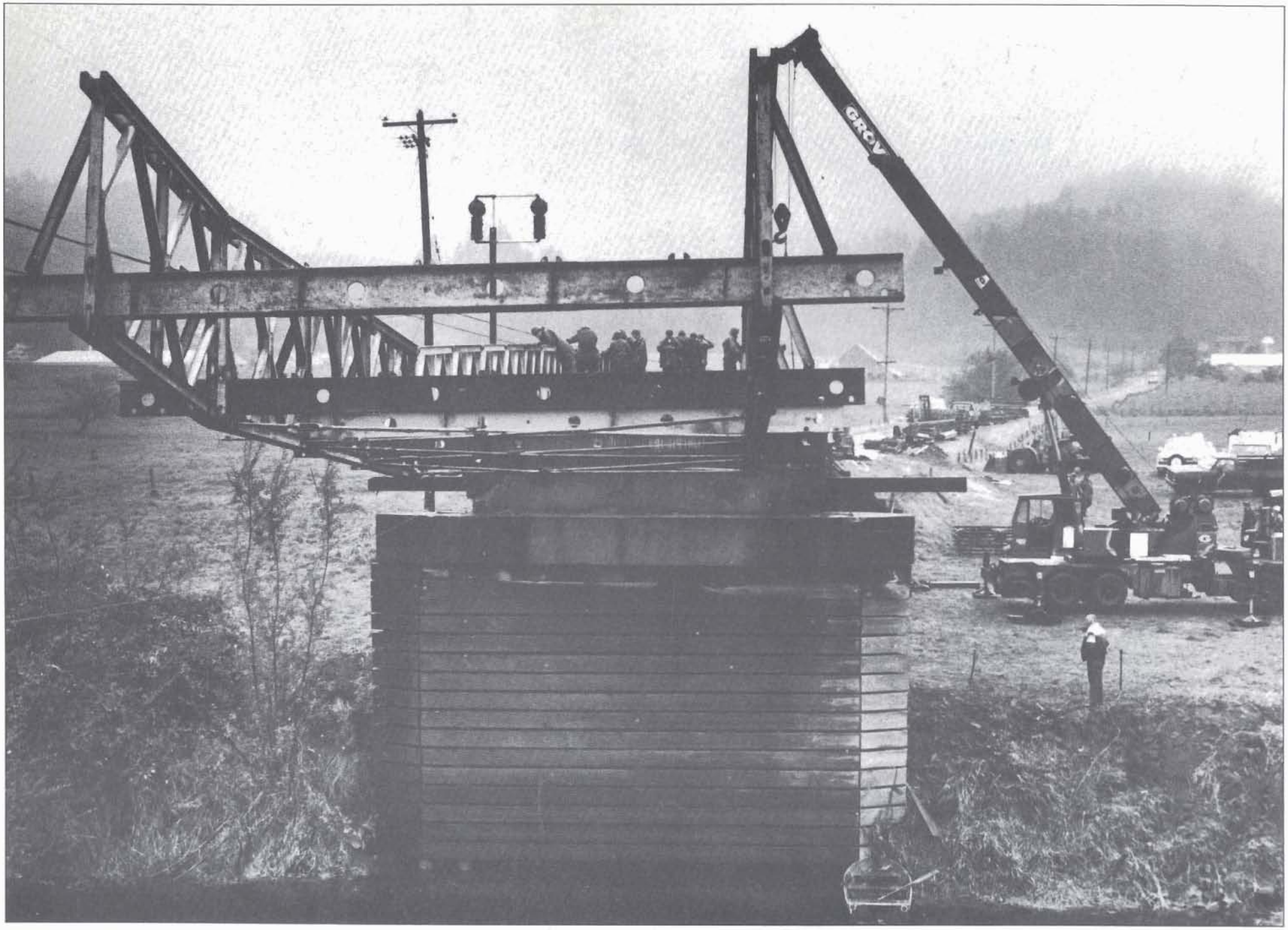
SGM John Peterson
Branch Sergeant Major

MSG James Blair
CMF 81, MOS 12Z(E8s)

SFC Richard Markle
CMF 12

SFC John Lane
CMF 51

SFC Gary McAllister
Professional Development



A Bailey bridge over the Nestucca River takes shape in Coverdale, Oregon. Engineers of the Oregon Army National Guard's D Company, 1249th Engineer Battalion built the bridge, which replaced an old, rotted wooden bridge. (Photo by SSG Dail Adams)