Engineer

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ENGINEERS & AIRLAND BATTLE DOCTRINE

ENGINEER CHALLENGE: EUROPEAN RANGE MODERNIZATION □ PLATOON INSPECTIONS

INTUITION and LEADERSHIP

A Personal Viewpoint

by MAJ Lee A. Peters

Military leaders will increase their effectiveness and efficiency as they increase their use of intuition.

Intuition is the ability or power to gain direct knowledge or cognition without rational thought, inference, or deductive reasoning. The great Swiss psychologist Carl Jung called it a sixth sense—a way of gaining information or of making observations—in addition to the five senses of smell, touch, taste, sight, and hearing.

Intuition, which is already used by military personnel, is often called "gut feel" or "hunch." Although military leaders have a vague understanding of what is going on in their minds, they are often fearful of using intuition because it is not empirical and they are unaware of its reliability.

Other leaders use it without realizing what it is or what it does. Platoon leaders who "know" their soldiers use intuition to predict their troops' collective and individual responses to situations, to diagnose problems in the platoon, and to direct actions that motivate the platoon to accomplish its missions.

An aircraft pilot flying nap-of-the-earth lets intuition (the sensor for the subconscious) "feel" the aircraft and its responses while giving the conscious mind the task of watching the terrain. The pilot may let intuition direct the responses to the terrain—"going on automatic."

Intuition has other military applications. For example, it can be used to predict how units will react under stressful situations, to identify what's happening in a member's home life, to operate a tank, to structure combined arms teams, or to diagnose simple enemy movements or to discover a new enemy location.

Eric Bern, in his book *Beyond Games and Scripts*, defines intuition as subconscious knowledge without words, based on subconscious observations without words. Under the right circumstances, he says, it is more reliable and accurate than conscious knowledge based on conscious observation.

In the book, Bern includes, as an example, a psychiatric examination once used for people entering the military. Psychiatrists asked the entrants two simple questions: "Are you nervous?" and "Have you ever seen a psychiatrist?" Using intuitive reactions to the answers, they determined whether a person was psychologically fit for the armed forces. The psychiatrists were 90 percent accurate.

Intuition is the receiver, the antenna, for inductive reasoning. Inductive reasoning uses the proof of a specific case or of a few facts to reach a general conclusion, whereas deductive reasoning uses a series of facts or empirical data to prove a general situation.

Inductive reasoning is the logic of the subconscious. The five senses are the antennae of the conscious and deductive reasoning its logic.

When experience is emphasized by the military, it gives intuition—internalized understanding—a data base that translates into diagnosis, prediction, and action in future situations. The conscious mind may not know that understanding and its internalization have happened until intuition retrieves the data.

Because information voids exist in literature and research on intuition, the subject is often misunderstood. Army leadership publications do not mention intuition. Management literature, however, does recognize it as means of classifying managers. Ralph Stogdill's *Handbook of Leadership* mentions it only as a means of sizing up other people and of determining their place in society.

The military must accomplish the following to fill the informational void and to improve leadership:

- Acknowledge that intuition exists.
- Identify the process of internalizing knowledge.
- Research the use of this internalized knowledge in the intuitive process.
- Help leaders to recognize that they use intuition.
- Develop methodology to determine the reliability and accuracy of intuitions.

Military leaders can perform more effectively if they understand this sixth sense. They should know what intuitive talent they possess, how often they use it, and how reliable and accurate it is. Using intuition will help leaders to better identify priorities for decision making. The accepting intuition as a leadership tool will increase the effectiveness and efficiency of the military.

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Engineer

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On the Cover

A CEV from the 522nd Engineer Co., 194th Armored Bde, breaks through a barricade during a training exercise at Ft. Drum. (Photo by SFC Dale Butler.)

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Letters to the Editor

More Info on 51H Course

Building Supervisors in the Fall 1983 issue was much appreciated in calling the attention of the Engineer community to the 51H NCO professional development course offered at Fort Leonard Wood. However, two major aspects need additional information—the basic intent of the course and how to attend.

We have too long ignored the professional development needs of our noncommissioned officers. CSM Orville Troesch's message in the same issue offers some hope in addressing this problem.

To correct a possible misconception arising from the *Building Supervisors* article, we are *not* offering a technical course of instruction intended to produce proficient building supervisors. The 51H Basic Technical Course (BTC) taught at the 4th Training Brigade's Crusader Academy produces noncommissioned officers who are technically qualified and better prepared to assume the leadership responsibilities required to lead Engineer soldiers. While the skills necessary to supervise construction activities are important, they must be subordinate to those leadership skills required of effective members of the chain-of-command.

Noncommissioned officers attending Basic and Primary Technical Courses at Fort Leonard Wood live and learn in an academy environment designed to prepare them to be the Engineer leaders of tomorrow. Leadership skills, physical fitness, drill and ceremonies, and communications skills training supplement the Academy's technical instructions. Crusader Academy is commanded and staffed by senior noncommissioned officers of the 4th Training Brigade who are technically proficient and proven leaders.

Engineer noncommissioned officers eager to be tomorrow's leaders and set the standards of excellence for Engineer soldiers are welcome at the Crusader Academy and are encouraged to attend. Attendance at the BTC and PTC courses may be by "TDY enroute to a new assignment" or by "TDY and return to current unit." The former option is a matter between MILPERCEN and the soldier, while the latter option involves the soldier's chain-of-command. Reserve Component noncommissioned officers should consult their chain-of-command for attendance procedures. For additional information, contact the Commandant, Crusader Academy, 4th Training Brigade, Fort Leonard Wood, MO 65473 (AV 581-6650/4144).

Preparing Engineer noncommissioned officers in the 51H, 62B, 62N, and 12F MOSs for leadership roles awaiting them is a responsibility we take seriously. Developmenting dynamic leaders, technically proficient in their MOS, is a responsibility we should all take seriously. Our Army depends on it.

COL William M. Shepherd
Commander,
4th Training Brigade
Fort Leonard Wood, MO

52E Update

The *Engineer NCOES* article in Fall 1983 ENGINEER correctly identified the 52E course as a Primary Technical Course. Soldiers, however, must apply according to AR 350-224. The following is a synopsis of the qualifying criteria and instructions for applying.

The Army's Facilities Engineering Support Agency at Fort Belvoir operates a one-year course to teach soldiers how to operate, maintain and rebuild large electrical power plants.

Graduates receive a primary MOS 52E with an additional skill identifier in mechanical, electrical or instrumentation areas.

Applicants must meet the following basic requirements:

- Be in grade E6 or below.
- Have a high school diploma or GED.
- Have a credit for one or more years of high school algebra.
- Have GT/ST and EL scores of 110 or higher.
- Score 70 percent on a basic math and science test available through Army education centers.

Soldiers selected for the one-year course must be prepared for hard work. The American Council on education has recommended that course graduates receive college credit for their work. Graduates also can take the exam for the third-class license offered by the National Institute for the Uniform Licensing of Power Engineers.

Applications are being accepted for the class starting April 1985. For more information call AV 354-5241 or toll-free 800-336-3095, Ex. 5241.

Jo Simpson
Public Affairs Officer
U.S. Army Facilities
Engineering Support Agency

The Wrong Pitch?

You published an article entitled *The Digital Landscape,* by MAJ David Bowen, in your Fall 1983 issue. I applaud MAJ Bowen's efforts to publicize the technology trends in mapmaking and hope that the article will focus attention on the possibilities of tailoring terrain data displays to commanders' requirements.

By pitching the article at the general appeal level, however, you may have invited some unfortunate misinterpretations.

When we put out information about systems under development, let's clearly state up front whether we're doing it to drum up interest, to educate the readers, or to advertise capabilities that are funded, fielded, and operational.

Richard G. Johnson
MAJ, CE
Honolulu, Hawaii

News & Notes

516th Engr. Co. Makes Good Showing in Edinburgh

The 516th Engineer Company team from Hanau, Germany, scurry to build an MGB during the bridge-building competition in the 37th Annual Edinburgh Tattoo.

The 516th Engineer Co.'s team from Hanau, Germany, participated in a medium girder bridge building competition as guests of the British Royal Engineers in the 37th Annual Edinburgh Tattoo held in Edinburgh, Scotland.

The highlight of this year's Tattoo was the first round-robin competitive building of the medium girder bridge, a most dynamic crowd pleasing engineer performance. With 17 events being for competition, the 516th Engineers won five of them.

The 516th Engineer Co.'s team, of the 559th Engineer Bn., competed against teams from the 11th Field Squadron Royal Engineers and the 104th Field Squadron Engineers, a volunteer army unit similar to our National Guard.

The 516th Engineer Co., is one of only four active duty units (two of them in Europe) in the U.S. Army that have the medium girder bridge. Before going to the Tattoo, they underwent a rigorous 12 week training program which included running, weight lifting, and bridge building under the supervision of SFC Christopher B. Waters, the team's noncommissioned officer in charge.

After arriving in Edinburgh, the teams practiced new bridge building techniques to improve their speed. "We had to change our plans once we got there," Waters said. "We had been building the bridge differently. The other teams knew a few tricks."

Each night the teams competed against each other in constructing a four-bay single story bridge over a simulated 20-foot gap in the arena.

Teams assembled after trucks carried the bridge parts into the arena. On the command, "Go," the bridge parts were dumped and the soldiers scurried to assemble the bridge. The winner was the first team completing the bridge and having all of the team members formed on the "far shore." With a time limit of 11 minutes, the 516th's best time was 4:47.

ENGINEER ROCK-SP4 Joseph Townsend of the 562nd Engineer Company at Fort Richardson, Alaska, sweeps snow off of his unit's unique sign after more than a foot of snow fell. The two-ton rock, the brainchild of 562nd 1SG Patrick Cannon, appeared in front of the company after several persons confused the unit with another engineer company housed in a neighboring barracks. The 562nd Engineers call themselves, "The Rock of the 172nd Infantry Brigade." (U.S. Army Photo by SP5 Jon M. Chelgren.)

New Antifreeze Preservative

A new method of preserving antifreeze has been developed at the Belvoir Research and Development Center that could, according to Army officials, save the military millions of dollars annually.

The liquid chemical extender, scheduled to enter the supply system next spring, should prolong the life of used antifreeze at least four years, says project engineer James Conley.

"Presently the Army's composition based antifreeze should stay effective for at least five years," Conley says. "If used properly and in conjunction with the technical bulletin governing standard use of antifreeze, this additive could extend antifreeze life to ten years."

According to Defense Department procurement figures, the Army is presently spending over $12 million annually on antifreeze replacement. Officials say with proper use of the test kit and reinhibiting extender this figure could be reduced to $2 million.

News & Notes

Generator Control Shelters Save Money and Manpower

At the request of the Army's Facilities Engineer Support Agency (FESA), the Electrical Equipment Division of the center's Engineer Service Support Lab agreed to design and construct 11 generator control shelters. The structures will make it possible for a minimum number of soldiers to operate four 750kw generators in parallel, saving the Army millions of dollars.

The generator shelters, were needed to fill a gap in the Army's mobile generator capabilities and greatly reduce manpower hours.

Under present procedures, eight operators and two supervisors are needed during each shift to operate four separate 750kw generators. The new system will allow all controls to be centralized, and only three people will be needed to operate the consolidated generators, drastically reducing daily manpower needs.

The structures will also allow for operations flexibility, as any combination of the Army's five generator types can be paralleled within the system.

Much of the inital cost-cutting stemmed from adopting standard shipping contrainers to house the control stations instead of designing and building entirely new external structures. Additionally, low-salaried interns and summer hires manually **placed the panels inside the shelters. This freed the division's engineers and technicians for other assignments.**

Further manpower savings are anticipated when the shelters are used to provide back-up and emergency power and to supplying electricity during routine maintenance operations at large military installations.

Have something for News & Notes? Please send your item (with photographs) to ENGINEER Magazine, ATZA-TD-P, Stop 163F, Ft. Belvoir, VA 22060.

S.A.M.E. Awards

The winner of the 1983 Sturgis Award was SFC Eugene Middleton, Co. C, 9th Engineer Bn. (CBT) (CORPS), 7th Engineer Bde., USARUR.

SFC Middleton, a platoon sergeant was cited for his exceptional leadership and technical competence. He and his platoon excelled in a variety of troop exercises and completed several projects supporting the unit's surrounding community.

The Winner of the 1983 Itschner Award was Co. C, 249th Engineer Bn. (CBT) (HVY), 18th Engineer Bde., USAREUR, for their outstanding work during the "GRAF '83" construction period. This range modernization project in Europe is an estimated four-year project costing $55.1 million.

The top engineer Army Reserve unit, according to S.A.M.E. was Co. D, 411th Engineer Bn. (CBT) (HVY), Guam, for their exceptional performance in a variety of construction projects. They were especially commended for their support of schools, churches, and other community centers.

Co. D, 1457 Engineer Bn. (CBT) (CORPS), Utah, earned the Itschner Award as the top Army National Guard unit and also received a C-1 rating for their exceptional training programs. They displayed their "high state of readiness" by winning the Utah State Marksmanship Trophy and the Pershing Plaque for their outstanding marksmanship.

The Wheeler Medal, awarded to an individual making the most significant contribution to military engineering, was presented to John J. Blake at the annual meeting of the Society of American Military Engineers (S.A.M.E.) at St. Paul, Minn.

All three engineering awards are presented each year by S.A.M.E. to honor those individuals and units contributing the most to the Corps' mission.

SP4 John A. Kennel, 814th Engineer Company, ties a splint on his buddy's arm at the first aid station during the military stakes in Hanau, Germany.

The 814th Engineers won first place among 40 teams at the competition by completing all of the events in the least time. Events included map reading, assembly and disassembly of the M16A1 rifle, a 2½-ton truck pull, an obstacle course, a boat row, and a first aid station.

Overstrength MOSs

The chances of career progression (promotions and assignments) are extremely limited in overstrength MOSs. Soldiers in overage MOSs should consider voluntarily reclassifying into shortage MOSs. DA Circular 611-82-3 provides a list of the status of all MOSs. Soldiers interested in voluntarily reclassifying should contact their AG Personnel Management Branch for more information.

Engineer People

Olympic hopeful, 1LT Wayne Dickert, fights the rapids.

Engineer: World Class Boatman

Whitewater rafting may not be the best way to relax for many people, but it is for 1LT Wayne Dickert of the Directorate of Training and Doctrine at Ft. Belvoir.

In fact, Dickert is on the U.S. Canoe and Kayak Whitewater Team and is training for the 1985 World Championships to be held in Garmisch, Germany, this June.

Dickert, 24, started canoeing in college as a YMCA camp counselor. "It's a lot of fun, like a constant roller coaster ride," he says. "The racing has helped my technique. I've gained experience and knowledge."

Dickert has raced for two and a half years, participating in the European Cup and in the Pan American Games competitions.

Dickert says he canoes almost everyday. This spring he begins speed work in his canoe — a Delphin. Delphins are new to the U.S. team, he says. Although they are risky to use because they tip over easier, they are designed for more speed than conventional canoes and kayaks.

"Balance and strength are important (in canoeing)," Dickert explains. "You have to know how to follow the water. You have to know how to use the water."

Dicket says he's also beginning to train with kayaks. He will compete in the U.S. Olympic trials in Lorton, VA., April 9 through 14.

"Kayaks are more stable than a canoe," he says. "But even though they're easier to control, they're faster and do not turn as quick. You also use a two-bladed paddle as opposed to the one-blade you use for a canoe."

Although being in the military allows Dickert little practice time, his chain of command understands his need to train so that he can remain a world class competitor. The Ft. Belvoir area is also advantageous because the U.S. team coaches and other competitors live and practice there.

Soldier-Student: Works Towards 13 Month Associate Degree

While completing two years of college in 13 months is a commendable feat for the average student, it's even more astounding when the student is also a soldier.

SP4 Tom Farmer, a plumber with D Co., 548th Engineer Bn., Ft. Jackson, S.C., is a full-time student at the University of South Carolina. He completed 19 semester hours during the 1983 fall semester and is currently enrolled for 22 credit hours. If successful, Farmer will receive an associate of arts degree in liberal arts in May 1984.

"A lot of people just don't take advantage of their educational opportunities," Farmer says. "Many aren't aware of Army educational programs that are available to them."

Maintaining a 3.60 grade point average, Farmer also enrolls in electronic and electrical military correspondence courses. "The classes I've taken are related to what I'll be doing in my career as a production specialist (52E)," he says. "It includes mechanical and electrical engineering."

He says he plans on using his knowledge while attending the Army's 13-month power engineer school. The "study habits and time management skills" he is developing now will help him through the long course, he says.

As the company's publications, deployment records and legal records clerk, Farmer has no time for studying during duty hours, says CPT Ross A. Burton, Company Commander. He attends classes four nights weekly and studies during weekends, before work in the morning, during lunch, and between classes.

SP4 Tom Farmer studies for his college degree.

CLEAR THE WAY

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

AirLand Battle, A United Effort

We must keep abreast of AirLand Battle Doctrine

The term AirLand Battle Doctrine has become familiar to most engineer NCOs and officers. Leaders at all levels must now make it more than a familiar term. We must study, understand, and train in this new doctrine.

Over the past several years the training and doctrine community has been working hard to develop and publish doctrinal revisions. The Engineer School has been a full partner in this effort. In the coming months, a new series of doctrinal manuals will be published detailing engineer doctrine for the AirLand Battle. This new doctrine is needed because of technological advances and the nature of our potential adversaries.

The U.S. Army is facing a threat in which the potential enemy not only possesses superior numbers but has also closed the technological gap in terms of weapon systems' capability and lethality. The next decade will be marked by a continuing flow of significant changes to the U.S. Army's equipment, organizations, and doctrine. It will be a time when all of us are challenged to not only keep abreast of the demands of our day to day missions but to also read, study, and incorporate the new tactics, techniques and procedures that will allow us to simultaneously exploit the capabilities of our equipment and organizations and the weaknesses of the enemy's.

Several years ago it became clear to the Army's leaders that we could not win future wars from a defensive posture as prescribed in the "active defense" doctrine of a few years past. The only way to successfully operate against a threat that has the capability to employ its attacking forces in echelon is to carefully coordinate and synchronize all elements of the U.S. forces toward creating and seizing the initiative. AirLand Battle doctrine, published in FM 100-5, Operations, establishes guidelines for the Army and describes how commanders can most effectively use all resources at his disposal. It is a doctrine that depends upon initiative, depth, agility, and synchronization. The successful commander will rely heavily upon these basic tenents of AirLand Battle doctrine.

The combined arms team will continue to be the backbone of our land forces. The outcome of AirLand Battle will depend heavily on how well the task force commander coordinates, plans, and uses the fighting resources at his disposal. The engineer plays a key role determining the success of the combined arms team. I challenge each engineer officer, noncommissioned officer, and soldier to ready, study, and understand AirLand Battle doctrine and its implications and, more importantly, to train with the combined arms team at every opportunity.

This issue of ENGINEER contains a synopsis of the extensive doctrinal effort at Ft. Belvoir. We have worked very hard to implement AirLand Battle doctrine into the major battlefield functions of the combat engineer. Writing and publishing a workable doctrine is not an end in itself. It must be read, practiced, and improved upon as better ways to accomplish things are discovered. You are the key to this process. We welcome your comments and suggestions and depend upon you to determine and help us write "what works best."

This is the last issue of ENGINEER with Mr. John Florence as the editor. His efforts have made ENGINEER a readable, informative, and useful publication. Mr. Florence will be missed. We wish him success in his new job in the Second Army Public Affairs Office.

BRIDGE THE GAP

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

Doctrine—The Key to Quality Training

As NCOs, we must apply the principles of doctrine to our daily training and activities

With so many abbreviations and acronyms used in the Army, many of us noncommissioned officers shy away from learning what these terms really mean and how we can apply them to our daily "Sergeant's Business."

Consider the terms: AirLand Battle; Army 21; TM 100-5; FM 5-100; battle drills, crew drills; doctrine; doctrinal literature and its "application to the modern battlefield." And what about mobility, countermobility, and survivability?

As noncommissioned officers, we have a great need to understand these terms and to be familiar with FM 100-5, *Operations*, and FM 5-100, *Engineer Combat Operations*. Both manuals describe the engineer's involvement on the AirLand Battlefield. We must tailor and conduct our training to include this AirLand Battle doctrine as we prepare to fight and win.

"Doctrine" is merely a philosophy or theory of how to organize and fight. FM 100-5 explains in detail employing both air and land forces, hence the title "AirLand Battle." In addition, it uses "combined arms" rather than the traditional terms of "combat arms," "combat support," and "combat service support."

It wasn't until recently while in Europe that I really understood what combined arms means. During a visit to a DISCOM (division support command) element, I noticed their motto, "Try Fighting the Next War Without Us." How true that simple statement is—and how important it is for us as noncommissioned officers to understand it and to apply it to the doctrine in FM 100-5.

Just as important is FM 5-100, Engineer Combat Operations. This manual should become our reference book for everything we do in preparing and conducting training—including FTXs and MAPEXs, as well as supporting maneuver units in combined exercises. FM 5-100 defines the terms mobility, countermobility, and survivability. When used properly, the manual assists us in defining our responsibilities and role in the AirLand Battle and how to apply current engineer doctrine to all of our training activities.

Here are brief definitions for mobility, countermobility, and survivability. A more detailed discussion is in the 1984 version of FM 5-100.

a. MOBILITY—As engineers, one of our roles on the battlefield is to permit freedom of movement for our maneuver and combat support elements. We do this by employing obstacles, by locating bypasses to enemy emplaced obstacles, or by neutralizing obstacles quickly and efficiently.

b. COUNTERMOBILITY—Another major role of engineers is to detain, channelize, or disrupt enemy movement by using barriers and obstacles in conjunction with natural terrain.

c. SURVIVABILITY—We take measures as individuals and as units to survive on the battlefield. As engineers, we help to ensure the survival of our fellow soldiers, equipment, and units. Only by surviving on the battlefield can we expect to win.

So how does AirLand Battle, FM 100-5, FM 5-100, and mobility, countermobility, and survivability relate to Sergeant's Business?"

Sergeant's Business is, first and foremost, training soldiers and units for war. It entails a thorough knowledge of weapon systems, maintenance, and units' tactical strengths and weaknesses. To properly conduct Sergeant's Business, we have to understand how our commanders plan to support maneuver forces and fight battles.

The more common definition of Sergeant's Business pertains to garrison type duties such as barracks, formations, PMCS, and common skills training. While not entirely an inappropriate definition, it still does not cover all of the tings you need to know in order to become a proficient engineer NCO.

I suggest that Sergeant's Business is a combination of both definitions with a heavy dose of doctrine.

Once we learn and understand the doctrine of how to fight, we will be able to apply it while training and preparing our soldiers and units. I urge each NCO to be a part of "bridging the gap" by using doctrine in their daily business of running the Army, training our soldiers, and supporting our commanders.

School News

Directorate of Training and Doctrine (DOTD)

TM 5-232 Revision: Training-developers at the Engineer School's Topographic Engineering Branch are revising TM 5-232, *Elements of Survey*. This revision is necessary because of new equipment being fielded with the Topographic Support System. While maintaining the accuracy standards of the current manual, the new version will include revised portions of TM 5-441, *Geodetic and Topographic Surveying*. TM 5-441 will become obsolete when the new TM-232 becomes available to troop units. TM 5-242 is scheduled for review in the field in early 1986 and for publication in mid-1987.

ITEP Brochure Available: To aid Engineer commanders in understanding the Individual Training and Evaluation Program (ITEP), the Engineer School decided to take the program to commanders via the Engineer Commanders' Training Conference held in December 1983. A booth prepared by the SQT Branch was set up in the display area. An excellent brochure explaining the ITEP was made available to the conference participants to read and distribute to their subordinates. Copies of this informative brochure are available on request. Write to: Commandant, U.S. Army Engineer School, ATTN: ATZA-TD-I-S (Mr. Munoz), Fort Belvoir, VA 22060.

Directorate of Evaluation and Standardization (DOES)

USAES Graduates Evaluation: Under the Engineer School's Evaluation Program, DOES developed a new evaluation approach which will provide systematic feedback on Engineer school training programs. The emphasis will be on the Advanced Individual Training and Primary Technical Courses. All engineer units which receive graduates from courses taught at Ft. Belvoir and at Ft. Leonard Wood will be affected.

Under this program, DOES will mail surveys to a representative number of recent course graduates and their immediate supervisors. Responses to the survey will indicate the degree to which Engineer School graduates meet the needs of field units. Specific survey forms are being developed for each MOS course. Several of these survey forms already developed are currently being validated. When finished, the surveys will be sent to field units. These surveys will help the Engineer School meet the soldiers' needs by providing an opportunity for the soldiers and their leaders to improve Engineer training.

Directorate of Training and Doctrine (continued)

Language Training for Europe-Bound:

During his recent trip to Europe, MG Ellis, Commandant of the Engineer School, identified as a problem that facilities engineers and directors of engineering and housing (DEHs) bound for Europe do not receive language training before reporting for duty overseas. The Engineer Proponency Office is requesting that TRADOC coordinate with the Defense Language Institute (DLI) on including FE and DEH personnel in their language training program. Because of the amount of contact DEH and FE personnel have with Europeans, the DLI program will be more beneficial to them than the in-country Gateway Language Program which teaches very basic conversational skills.

Directorate of Combat Developments (DCD)

Countermine Update:

The Track Width Mine Roller with an M-60 tank mounting kit was type-classified "standard" during a special in-process review on Nov. 22, 1983. The Belvoir R&D Center sent the roller to the Tank-Automotive Command for production contracting. The roller will be field in for June 1985.

Department of Combined Arms (DCA)

DCA Summary:

The Department of Combined Arms (DCA) became a separate training department under the new Engineer School model in October 1983. Aside from transferring logistic instruction to the newly formed Department of Maintenance, DCA remains unchanged. DCA provides instruction in tactics, combined arms operations, combat and threat intelligence, leadership, training management, military history, communicative arts, communications electronics and personnel management.

Many new initiatives will affect DCA this year. These include involvement with the Engineer Captains' Training Team's development of the new EOAC (to be implemented in October 1984;) implementation of the ENCOA common core curriculum, developed by the Sergeant Majors' Academy; implementation of the Lieutenant's Leadership Common Core Curriculum, developed by the Center for Leadership at the Command and General Staff College; and the revision of the Battalion and Brigade Commanders' Pre-Command Course.

School News

Department of Combined Arms (continued)

Pre-Command Course: Personnel within the Department of Combined Arms (DCA) coordinate and conduct the Engineer Brigade Group and Battalion Pre-Command Curse (PCC). Recently, DCA personnel worked in coordination with the Director of PCC, at the Command and General Staff College (CGSC), in an effort to develop a pre-command course experience for all brigade, group, and battalion command selectees. The thrust of the development effort is to provide them with a course that will thoroughly and appropriately prime them for success as a commander in a combined arms Army. Now, the remainder of the TRADOC community is involved in the development effort that began at the Engineer School.

Department of Maintenance (DOM)

DOM Summary: The Department of Maintenance was established as the Engineer School's third academic department within the Engineer School on January 4, 1984, with LTC Roger C. Strom as director. The department provides Advanced Individual Training instruction in power generation equipment repair, utilities equipment repair, and turbine engine driven repair. The department also provides maintenance and logistical management training to officers attending EOBC, EOAC, the Engineer Senior Officer Course, Engineer Warrant Officer Advanced Course, and to the noncommissioned officers attending the Engineer ANCOC. Besides providing instruction, the department also develops lesson plans offers academic counseling, and provides training evaluation. The department was designated as the worldwide point of contact for engineer maintenance.

Department of Military Engineering (DME)

USAES Systems Software Catalog: The Engineer School has compiled a catalog of available ADP software. These programs, the majority of which are written in IBM (versus BASIC) language, range from theater of operations road and airfield design to tactical rafting operations planning. The basis for the programs are the current TMs and FMs applicable to the subject material. Requests for copies of the catalog should be sent to: Commandant, U.S. Army Engineer School, ATTN: ATZA-TE-EM, Ft. Belvoir, VA 22060.

ENGINEER DOCTRINE FOR THE AIRLAND BATTLE

by COL William C. Burns, LTC Larry Wood, and Mr. Hap Hambric

"Doctrine" is a term that conjures up a diverse collection of images; everything from a martinet blindly following set procedures and rules, to a collection of directives in a dusty book that are seldom used because they bear little relation to the realities facing the commander on the ground. The truth, of course, is that doctrine lies somewhere in between.

U.S. Army doctrine establishes the fundamental principles, procedures and techniques by which our forces operate in order to accomplish the mission. Although doctrine is authorative and represents the best professional judgment available, common sense is necessary in its application. It should be neither followed blindly nor ignored, but studied and understood by the professional soldier.

Doctrine is not static. It must be continually adjusted to take advantage of changes in technology and weapon capabilities. In response to improved target aquisition systems and the lethality of weapons being introduced into both allied and threat force armies, the United States Army has revised its basic war fighting doctrine. The new doctrine, called "AirLand Battle", is presented in the 1982 version of FM 100-5, *Operations*.

AirLand Battle doctrine stresses combined arms operations over large areas. Combat operations to defeat the threat will be conducted in the rear, close-in, and deep battle areas. Relative force size and weapon capabilities dictated significantly increased engineer requirements to ensure the friendly force's freedom to maneuver throughout the battlefield. The requirement to impede enemy movement and to protect key installations also has increased significantly and will continue to increase as threat mobility and weapon lethality improve.

Although much of what a combat engineer must do remains the same, the emphasis on timing, on location, and on certain tasks was altered. It was evident that Engineer Doctrine would have to be extensively updated to meet the challenge posed by the threat force's capabilities, and to accommodate the requirements of our own forces' combined arms operations.

In response, the Engineer School developed the Engineer keystone manual, FM 5-100, *Engineer Combat Operations*. This manual presents the overall doctrinal framework for engineer support to the AirLand Battle. Seven other FM 5-100 series manuals which expand and elaborate the doctrinal framework contained in FM 5-100 are being developed. Together, these eight manuals will contain the fundamental doctrine describing how the engineers will support the combined arms team in the AirLand Battle. Although the doctrine is based upon current equipment and resource constraints, it clearly provides the rationale for equipment development. The following articles on pages 13 to 18 are a synoposis of the significant doctrinal points in the coordinating drafts of the first four of these manuals. These are all points of which the professional combat engineer should be aware. The production schedule for the FM 5-100 series manuals is shown in Figure 1.

The engineers in the field play a key role in doctrine development. First, they must learn the doctrine; secondly, they must teach it to others; and finally, they must practice the doctrine in training. It is the application of doctrine in exercises that validates that doc-

FM 5-100 SERIES PRODUCTION SCHEDULE

NUMBER	SUBJECT AREA	COORD DRAFT PUB	MANUAL PUB
FM 5-100	Engineer Combat Operations	FY82	FY84
FM 5-101	Mobility	FY83	FY84
FM 5-102	Countermobility	FY83	FY84
FM 5-103	Survivability	FY83	FY85
FM 5-104	General Engineering	FY84	FY85
FM 5-105	Topography	FY85	FY86
FM 5-106	ADM	FY86	FY87

Figure 1

ENGINEER'S MAIN BATTLEFIELD MISSIONS

MOBILITY	COUNTERMOBILITY	SURVIVABILITY
Countermine	Mine Warfare	Fighting Positions
Counterobstacle	Obstacle Development	Protective Emplacement
Gap Crossing		Protective Support Facilities
Combat Roads and Trails		
Forward Aviation Combat Engineering		

GENERAL ENGINEERING	TOPOGRAPHY
Lines of Communication Construction and Repair	Terrain Analysis
Logistics Facilities Support	Map Production and Distribution
Area Damage Control	
Construction Material Production	

Figure 2

trine. The engineer school is heavily dependent on combat engineers in the field to validate and provide changes to doctrine.

FM 5-100, *Engineer Combat Operations*, provides combat unit commanders and their staff with information pertaining to the role of the engineer in combined arms operations. It defines and expands on the engineer tasks, missions, and responsibilities outlined in FM 100-5, *Operations*. Battlefield missions of the engineers are placed in the five mission categories shown in Figure 2.

Before expanding upon the three primary functions—mobility, countermobility, and survivability—a review on how FM 5-100 outlines the engineers' role in conducting of the AirLand Battle is in order.

The key to providing responsive engineer support is two-fold. First, engineer planning must be integrated into each stage of development of the maneuver commander's tactical plan. Second, command and control of supporting engineers must be structured to provide effective, responsive engineer support to the combined arms team.

Integrate Planning

In the past, many commanders tended to develop their scheme of manuever, their fire support plan, and their engineer support plan in a linear sequence. Warfare concepts that place high reliance on maneuver, in turn place emphasis on effective engineer support. Planning these three elements, therefore, must be totally integrated and occur together. To help encourage more integrated planning, FM 5-100 contains an entire chapter on engineer staff planning. The intent is for engineers to provide better information to the commander during the decision-making process.

One of the significant organizational changes that affects the engineer's planning is including brigade and regimental engineer elements in the cavalry regiments, separate brigades, and the J-series heavy division.

In these units, the brigade or

Any Suggestions?

No engineer performs his task in isolation. He works as a member of the combined arms team to help the commander accomplish the mission.

Neither can an engineer field manual be written in isolation. The Engineer School retains the primary responsibility for the development of Engineer doctrine. However, extensive planning and coordination is necessary to produce any doctrinal product.

Engineer doctrine is written primarily by the instructors teaching the relevant subject matter. With the Engineer School's responsibility for over 160 field and technical manuals, this is no small task. Before a field manual is published, a coordinating draft is distributed to field units for comments. Each comment is reviewed and incorporated, as appropriate, into the final version of the manual. Since soldiers in units tend to develop unique solutions to common problems, ideas and techniques from the field for accomplishing engineering tasks are important in developing manuals, and training and field circulars. Doctrinal and technical publications are a way to share these good solutions.

If you are not sure where to send your idea, send it to the Engineer School's Doctrinal Literature Management Office, Stop 163, Fort Belvoir, VA 22060. They will ensure that the right people review your suggestion.

regimental engineer is organic to the unit and is a member of the commander's staff. He advises him on engineer matters and prepares engineer estimates, plans and orders. The staff engineer does not command engineer units that are attached, placed under operational control (OPCON), or in direct support of the regiment or brigade. He does, however, provide staff supervision of engineer operations. Having an organic brigade engineer cell provides the maneuver commander with the benefits of a full-time engineer planning element. Meanwhile, the company commander from the divisional battalion, normally associated with the brigade, is free to supervise his unit's engineer support to the brigade.

In maneuver brigades without an organic engineer element, the supporting engineer commander provides the brigade operations officer with engineer information. The operations officer then prepares the written engineer portion of plans and orders. In all cases, the unit engineer provides staff supervision of engineer operations.

Engineer planning should include an analysis of each course of action in terms of mobility, countermobility, and survivability and present a summary of the capabilities of available engineer forces. This will allow commanders to properly assign engineer priorities. The commander can allocate engineer effort, task organize if necessary, and assign missions according to the relative importance of maintaining force mobility, impeding enemy movement, or constructing protective positions.

Another chapter is devoted to command and control (something new in this edition of FM 5-100). Engineers must operate with command and control procedures that are responsive to the tactical commander. On the modern battlefield, forces operate over widely separated distances and with uncertain communications. This situation dictates centralized planning of engineer operations with the capability for decentralized execution.

Relations between engineers and supported units are designed to optimize engineer support. In combat, commanders will probably use attachment and operational control more, and use direct support relatively less than before.

FM 5-100 touches on general engineering work within the corps area regarding supporting combat operations. Most general engineering tasks will be done by theater army engineers in support of combat service support operations at echelons above corps. FM 5-104, *General Engineering*, which is being written now, will contain the doctrine for the general engineering.

The need for terrain information on the AirLand Battlefield will be greater than ever before. Major changes are required in topographic engineer support. The concept is to give division and corps level terrain detachments the capability to rapidly meet requirements for terrain and digital terrain data.

A new manual, FM 5-105, *Topographic Operations*, is being developed to provide the topographic unit commander, the maneuver commander, and the maneuver unit's intelligence and operations staff officers with a field reference on terrain analysis and topographic support. Work has just begun on this manual and a coordinating draft is scheduled for delivery to the field in fiscal year 1986.

Infantry & RAP Missions

Although engineers provide the greatest combat power by performing their five functional missions, they retain a secondary mission to fight as infantry.

To assume an infantry role, combat engineer units must be augmented with additional weapons, fire support teams and communications systems. The commander's decision to use engineers as infantry must take into account the long term loss in the overall combat power to the maneuver force because of the lack of engineer mobility, countermobility, and survivability support.

When employed as infantry, combat engineers are best suited for defensive missions but could be effective in the offense in bypass or hasty attacks.

Rear area protection (RAP) is a major concern on the AirLand Battlefield. The rear area begins at the brigade rear boundary and extends through the communications zone (COMMZ). RAP functions include rear area combat operations and area damage control. A command responsibility for RAP must be fully integrated into plans and orders of each echelon from division through echelons above corps.

Engineers will provide support to RAP operations on a task or OPCON basis as prearranged or designated by the appropriate commander. During emergency situations, engineers in the rear may be tasked by rear area commanders to directly support RAP operations regardless of their mission prior to the emergency. This includes not only engineer units within a particular area, but those passing through as well. Engineers at each echelon are integrated into RAP planning and assist the rear area commander and the rear area operations center (RAOC) in planning defenses and in conducting area damage control (ADC) operations. On the AirLand Battlefield, engineers must be prepared to provide their own security in bivouac, on the march, or at work sites. Separate security forces are not expected to be available except at the most critical sites.

There are some changes in engineer support at echelons above corps. The theater army engineer is the senior engineer on the theater army staff. The engineer command commander coordinates and supervises the operations of engineer units which are neither attached nor assigned to other commands within the COMMZ.

MOBILITY

AirLand Battle doctrine emphasizes mobility. It is essential that combat engineers be prepared to preserve the combat freedom of movement for manuever and combat support elements. The traditional

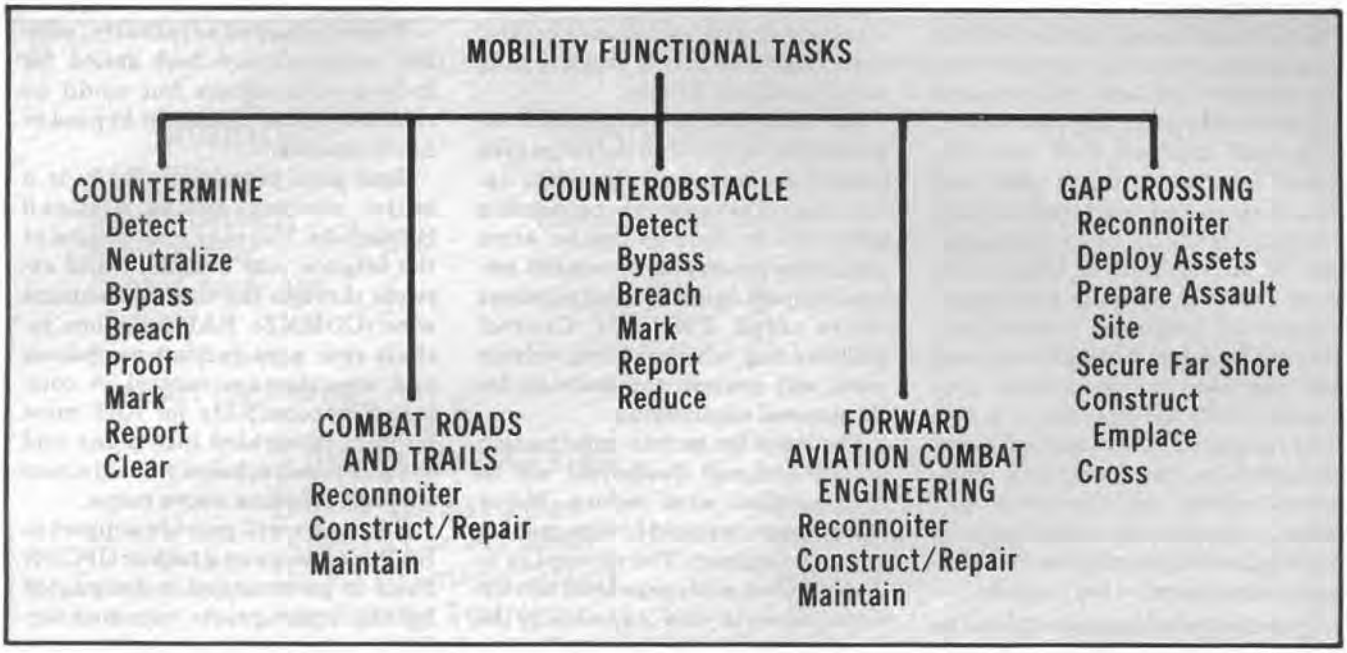


Figure 3

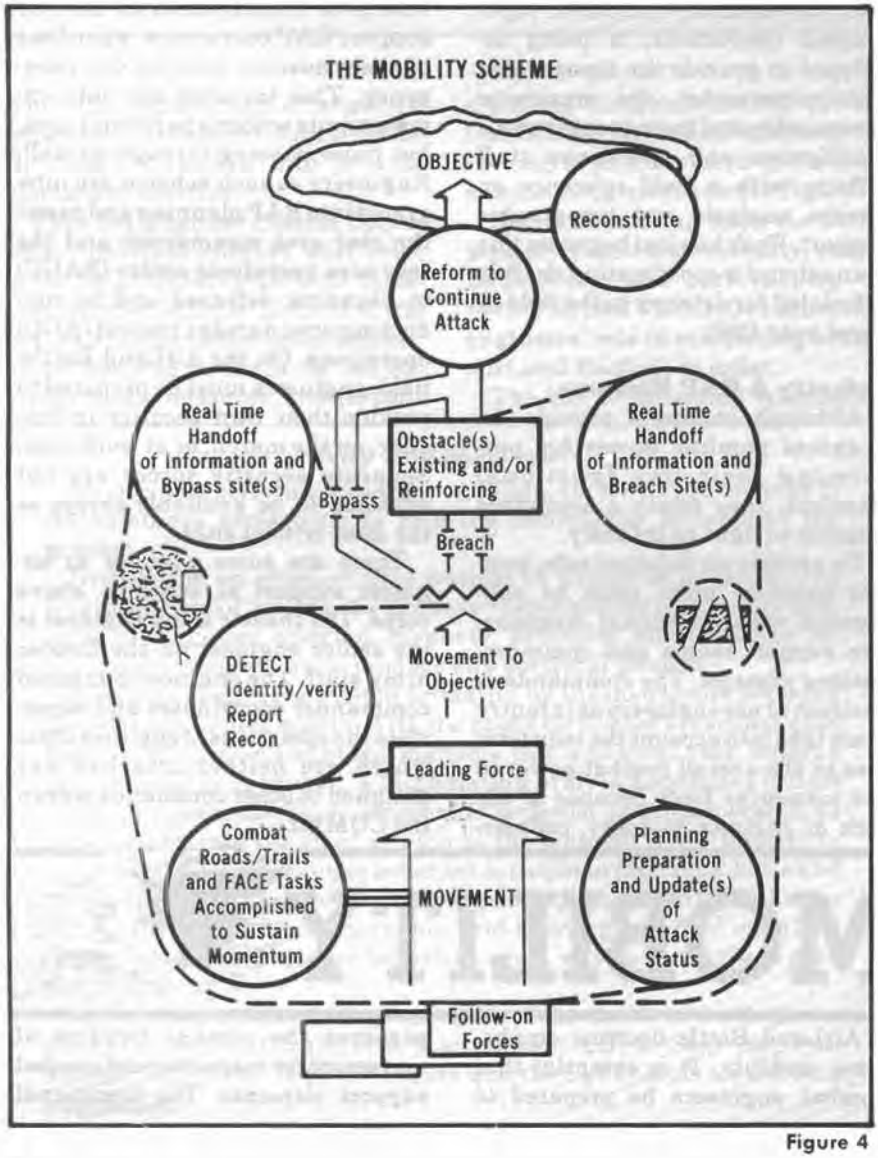


Figure 4

mobility tasks have been placed in five functional mission areas shown on Figure 3.

Throughout the battlefield, the combined arms team and support units can expect to be confronted by a variety of existing and reinforcing obstacles. The latter may have been employed by either friendly or enemy units.

To be successful in overcoming these obstacles, maneuver force commanders must plan for and provide their units with a "mobility system" capable of bypassing or neutralizing obstacles quickly and routinely, while continuing to provide all other forms of combat engineer support to the force.

Preplanning and proper use of intelligence is the key to successful mobility operations. These factors ensure the maneuver task force is properly equipped and prepared to counter obstacles and minefields. The maneuver force organized to overcome obstacles contains three separate forces:

- The support force: Normally the lead element which encounters the obstacle and then deploys to overwatch positions.
- The breaching force: Normally comprised of maneuver and engineer elements. It conducts the breach and secures the far side of the obstacle.
- The assault force: Comprised of the forces necessary to attack the

objective. This element attacks through or around the obstacle but remains oriented on the objective.

Doctrine developed for overcoming obstacles emphasizes the importance of locating combat engineers and engineer equipment well forward in the formation. When an obstacle is encountered, the leading force will request immediate suppressive fires, move into overwatch positions, and will become the support force base.

Scouts will reconnoiter the limits of the minefield or obstacle, looking for a way to bypass it. The engineers and dismounted infantry will reconnoiter the obstacle to determine neutralizing requirements. If bypassing is possible, this action is taken quickly. If it cannot be bypassed, the minefield or obstacle is hastily breached and the assualt continues. If the hasty attempt fails, a deliberate breach must be conducted.

Obstacles will be overcome one-by-one as they are encountered. Overcoming a complex obstacle and a large defending force will require extensive assets and effort. A simple obstacle or a complex obstacle poorly defended could be overcome using hasty breaching techniques requiring no engineer support except for readily available counterobstacle hardware such as the armored vehicle launched bridge. Larger, more complex or well defended obstacles might require a deliberate breach and will take considerably longer than a hasty breach.

Breaching and neutralizing minefields and obstacles, and crossing wet and dry gaps are a large part of the engineers' mobility responsibility. However, combat road and trail construction, and forward aviation combat engineering (FACE) missions will also place a large demand on the forces' engineers. The philosophy of the AirLand Battle's deep attack will require extensive engineer support to provide the mobility support necessary for units to thrust deep, conduct the attack, and to return safely before being/decisively engaged by the enemy. If the attack is successful in displacing the FEBA forward, the engineers must be prepared to upgrade roads and trails to aid combat support and combat service support mobility requirements.

FM 5-101, *Mobility*, scheduled for distribution to the field in December 1984, describes engineer mobility support to the combined arms team. It summarizes the doctrine and procedures manuever elements and engineers need to form a mobility system capable of overcoming any obstacle on the AirLand Battlefield.

COUNTERMOBILITY

Throughout history, countermobility has played an important role in military conflict. The degree of countermobility success, however, has not always matched the degree of effort expended. The lack of effectiveness of the Maginot Line in World War II is one of many notable examples.

Many factors contribute to making countermobility operations a success or failure. Almost always, the very basic factors are the most critical. Various combinations of time, material and equipment, firepower, terrain, and enemy knowledge and capabilities are normally the factors causing a countermobility effort to succeed or fail.

The advent of AirLand Battle doctrine and technological improvements have significantly changed how, where, and when countermobility efforts will be performed.

AirLand Battle doctrine emphasizes mobility and the ability to maneuver throughout the battlefield. Therefore, maneuver commanders must make conscious and difficult countermobility decisions regarding the need to stop, to delay, and to channelize the enemy, yet still retain the ability to move freely in the future. Naturally, this tradeoff will not occur in every situation, but commanders must carefully consider their own future mobility needs when emplacing obstacles, especially minefields.

Mine Warfare

Mine warfare is changing rapidly, yet the engineer remains the principal advisor to the commander on mine warfare. However, with improved mines and delivery systems, there is a need to clarify the definitions and role of mines in the AirLand Battlefield. We now have two categories of mines: conventional and scatterable.

Conventional mines do not self-destruct and are emplaced by hand or by mechanical mine planters. Conventional mines can be emplaced in classical patterns, or be emplaced randomly if the tactical situation dictates. Scatterable mines are delivered by ground system, artillery, helicopter, or high performance aircraft and contain a self-destruct mechanism.

If properly planned and employed, the family of scatterable mines provides the best of both worlds because they have a preselected self-destruct time. The commander can reap the benefits of a minefield which has slowed, stopped, or chan-

nelized the enemy, and then attack through the same area after the mines have self-destructed. Scatterable mines are smaller, more lethal, and can be emplaced remotely and much more rapidly than conventional mines.

With conventional mines, the only decision to be made is whether to mine or not to mine. With scatterable mines, the self-destruct time and the delivery method are additional factors that require decisions. Scatterable mines give the commander the flexibility to employ mines quickly anywhere on the battlefield, to employ them on short notice, and to place them in tactically critical locations based upon enemy movement.

Reporting FASCAM Munitions

Reporting and recording the use of the family of scatterable mines (FASCAM) is particularly important

MINEFIELD EMPLOYMENT AND AUTHORITY DELEGATION

TYPE MINEFIELD	MINEFIELD EMPLOYMENT AUTHORITY
Minefield containing Scatterable mines	Corps commander is the employment authority for all minefields containing scatterable mines within the corps area of operations.
Long duration (24 hours or more)	Corps commander. May delegate employment authority to division level. Division may further delegate to brigade level.
Short duration (less than 24 hours)	Same as long duration except authority may be further delegated to battalion or task force level.

Figure 5

SCATTERABLE MINEFIELD REPORT AND RECORD

LINE	INFORMATION REQUIRED	DATA
1	Approving authority	CDR 3AD
2	TGT/obstacle #	2XXX0157
3	Type emplacing system	ARTY
4	Type mines	AT/AP
5	Self destruct period	08161 OZ - 081900Z Oct 82
6	Aim PT/corner PTs of minefield	MB 01012935
7		
8		
9		
10		
11		
12		
13		
14		
15	Size safety zone from aim point	500M
16	Unit emplacing mines/RPT #	2/48FA/2
17	Person completing RPT	SFC Hollins
18	DTG of report	061645 Oct 82
19	Remarks	N/A

Figure 6

on a battlefield where the emphasis is on friendly force mobility. Plans for using mines must take into account the future maneuver scheme of the commander. FM 5-102, *Countermobility*, scheduled for publication in fiscal year 1985 will contain a detailed explanation of the employment, recording, and reporting procedures for both conventional and scatterable mines.

Scatterable mines require control, planning, and a rapid and accurate reporting system. Commanders who control scatterable mine use must positively delegate authority to employ the mines based upon the current tactical situation and his future plans. The employment authority and delegation levels are shown in Figure 4.

In addition to positive control, fast and accurate reporting is critically important when using scatterable mines. Figure 4 shows *The Scatterable Minefield Report and Record*. This reporting method is to be used regardless of the mine delivery system. In the example, artillery delivered scatterable mines were used.

Minefield information can be passed quickly by radio, posted to operations maps, and disseminated to units which need the information. The unit emplacing the minefield will initiate the report by radio and follow up with a written copy of *The Scatterable Minefield Report & Record*.

Locations for scatterable minefields should be planned as far ahead of their actual need as possible in advance. Prior planning will help ensure that the logistic requirements are met and that the mines are prestocked. It ensures that mines can be delivered rapidly in response to the tactical situation. Scatterable mines offer great flexibility and, when used in conjunction with other countermobility efforts such as conventional minefields, road craters, and tank ditches, they create tremendous mobility problems for the enemy. More significantly they create command and control problems for the enemy because of the constantly changing obstacle situation facing the enemy commander and his staff.

This aggravation of enemy command and control supports a key precept of AirLand Battle which places great importance on faster friendly assessment and reaction than the enemy assessment and reaction. In short, we "get inside his decision loop."

Even with these advantages, scatterable mines are not the panacea for all countermobility problems; the supply of scatterable mines will be limited and delivery systems will have competing requirements.

Existing and reinforcing obstacles are still important in both defensive and offensive operations. The engineer must identify the existing obstacles and integrate them into the obstacle plan. It is preferable to improve existing obstacles rather than to construct reinforcing ones. Reinforcing obstacles are grouped by design (constructed, demolition, and expedient). Mine warfare and obstacle planning must be accomplished concurrently with the commander's planning for maneuver and fire support.

For AirLand Battle doctrine to succeed, we must be able to disconnect enemy echelons and to provide the "windows of opportunity" necessary to assume the offense. Countermobility efforts that are well planned and well executed are a distinct asset that can strip away the enemy's most vital requirement, that of maintaining momentum and a high rate of combat operations.

The coordinating draft of FM 5-102, *Countermobility*, was sent to the field for comments in fiscal year 1984. The final manual is due to be published in fiscal year 1985.

SURVIVABILITY

Unlike the other engineer battlefield missions, survivability is a principle concern of each soldier regardless of his job or location on the battlefield. Camouflaging personnel and equipment, employing deception, ensuring operations security, and building individual and weapons system protective positions are only a few of the tasks that come under the broad category of survivability.

Although survivability on the battlefield encompasses a wide spectrum of activities, the engineer's responsibilities to the maneuver commander are focused primarily upon building or improving protective positions for fighting vehicles, assistance in hardening command posts, and protecting combat support positions. New engineer equipment such as the armored combat earth mover (ACE), and the small emplacement excavator (SEE) will improve the engineers mobility and capability to support the maneuver commander.

As with mobility and countermobility, each course of action must be evaluated in terms of survivability and recommendations made to the commander regarding the type and level of survivability support required. The commander must establish priorities and determine the percentage of the available engineer effort to devote to survivability. In preparing survivability estimates, the engineer must know the quantity and types of equipment in the unit he is supporting, the capability of his own equipment, and the tactical situation. All types of engineer estimates should begin with an unconstrained assessment, that is, plan what is required without considering limiting factors. This method gives the commander a good feel of what is necessary. It also gives him a baseline from which he can ask for additional engineer support and begin setting priorities. The bottom line is that the maneuver commander cannot make the proper decisions unless he is provided with good

estimates and alternatives.

There are several doctrinal guidelines to adhere to when preparing the survivability estimate and establishing priority of effort. They are:

- Field units have primary responsibility for developing, positioning, and initial construction of survivability structures.
- Engineer support is used to supplement the efforts of supported units based on availability and the commander's priorities.
- Engineer support must be concentrated on missions requiring unique engineer skills or equipment.
- The sequence of survivability work is to: use concealment measures, natural cover, construction, and finally, to continuously improve protection.

In addition, the commanders survivability plan must take into account each of the following points, which are critical to allocating effort and establishing priorities:

- Exposure to fire—direct and in direct, tactical air.
- Vulnerability to discovery and location.
- Mobility requirements.
- Protection from tanks.
- Distance from the forward line of troops (FLOT).
- Availability of natural cover.
- Redundancy—the importance of a unique equipment items, the loss of which would degrade other equipment.
- The enemy's engagement priority.

In the defense, substantial effort is required for fighting and protective position construction. General priorities for protective construction in a defensive battle position are:

- Antitank weapons.
- Tank positions.
- Armored personnel carriers.
- Command post position hardening.
- Combat support position hardening, (including, for example, field and air defense artillery, and mortar positions).
- Individual fighting positions, crew-served weapon positions, and covered routes between battle positions.

Although generally thought of as applicable to the defense only, survivability also applies to offensive operations.

During the offensive, protective fighting positions are developed whenever time is adequate, such as during a temporary halt for regrouping and consolidation.

Recommended priorities for protection at a halt in the offense are: antitank weapons, indirect fire weapons, and critical supplies (ammunition and POL). These should be expedient positions with frontal and side protection and make maximum use of the terrain.

Special situations, such as contingency operations, combined operations, and operations in special terrain require special considerations in performing survivability tasks. The planner must account for local support agreements, harsh climate and difficult terrain, shortage of materials, availability of local equipment and use of existing structures.

Performing survivability tasks in mountains, deserts, cold regions, jungle areas, and in urban areas often requires great innovation on the part of the engineers. Construction may be difficult, if not impossible, using conventional methods and equipment. Knowledge must be quickly developed on special construction techniques, such as explosive excavation, or use of snow and ice as construction materials. Knowledge of how to use special terrain features, and the ability to identify and use specific urban structures is critical. Certain existing structures can provide protection to the force with minimum construction by supporting engineers.

Implementation of Specific Positions

After the commander has established priorities, construction of specific protective positions and structures can begin. These positions must be designed, located, and constructed based on the tactical plan as well as cover and concealment requirements. These develop from an analysis of threat weapon and acquisition capability, and by the availability of materials and manpower. Furthermore, position design must consider the physical characteristics of the threat weapon systems in relation to the fighting and protective positions, and the effectiveness of the various materials used in design.

Numerous designs for protective positions have documented construction guidelines, bills of material, and time and equipment requirements. The effectiveness of these positions against specific weapon threats is also known. The categories of these generic position groups are:

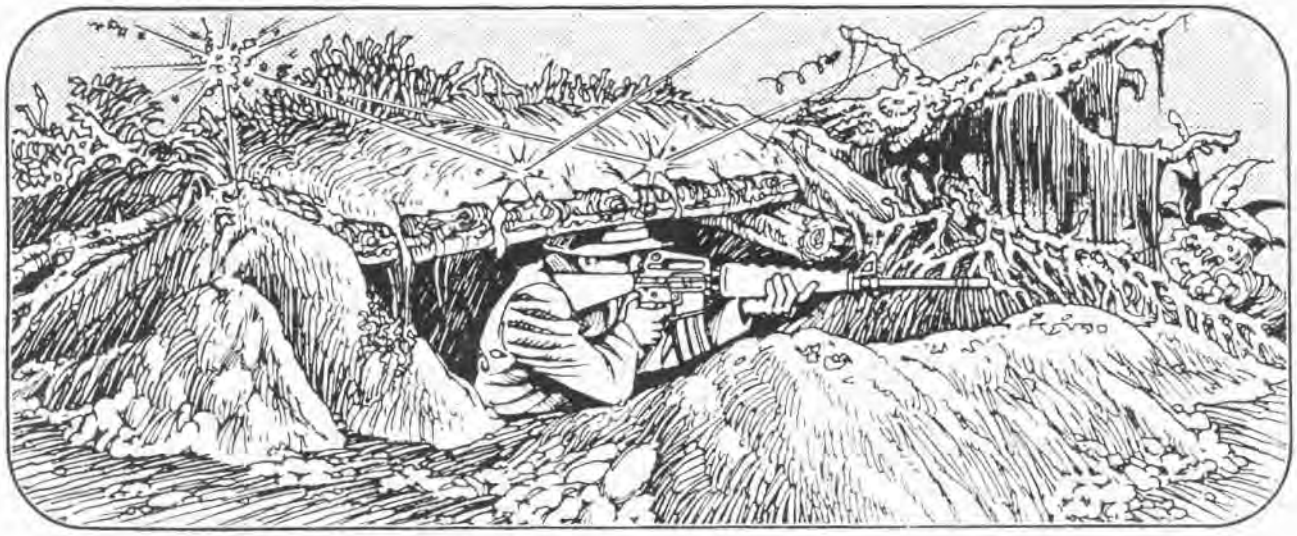
- Individual and crew-served weapon fighting positions.
- Major weapon emplacements.
- Multipurpose shelters.
- Protective barriers.
- Trenches.
- Unit positions.

Selecting what to protect can be made quickly while construction can be accomplished efficiently and properly using the illustrations and guidelines in FM 5-103, *Survivability*. The commander must have full knowledge of the limitations of the structures so he can make confident and accurate decisions concerning the vulnerability of his men and equipment. FM 5-103 provides this data.

Protective construction, in the form of fighting and protective positions, cannot eliminate vulnerability on the modern battlefield. It can, however, limit personnel and equipment losses by reducing exposure to threat acquisition, targeting, and engagement. Protective construction also gives the soldier in a fighting position the confidence to employ his weapon or weapon system more effectively.

For troops to be protected and to survive in the combat zone, their commander or leader must understand the importance of survivability tasks in the offense and defense. Commanders and leaders must also understand that initial responsibility for protective position preparation belongs with their own troops. Even within the fluid nature of the next battle, every opportunity must be seized to fortify a force's position.

All the information in this article appears in greater detail in the new FM 5-103, *Survivability*, now in coordinating draft. The final manual will be published in April 1985.



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LTC Larry Wood is the Chief of the Doctrinal Literature Management Office at the Engineer School. He has a masters degree from the University of Utah and is a graduate of the Command and General Staff College. He has served with various engineer troop units in Vietnam, Germany and CONUS.

Mr. Hap Hambric is a retired engineer officer. He is a graduate of the Engineer Officer Advanced Course and has a degree in computer science from the University of Southern Mississippi. Mr. Hambric currently serves as a doctrine development analyst in the U.S. Army Engineer School's Doctrinal Literature Management Office.

Engineer Solution

1. Enter Figure 6-7 (TM 5-312) or Figure 7-7 (FM 5-34) with stringer spacing 5' = 60". Read up to curve representing class 50-150 and across to vertical scale. Obtain required effective deck thickness (t_{dr} = 7.8").

2. **Plank Decking**

Generally, if required thickness is greater than 6", it is more efficient to use laminated decking. Nevertheless, if plank decking is desired it will have to be multilayer plank deck.

Therefore:

t_{act} (actual thickness) = t_{eff} (effective thickness) + 2"
= 7.8" + 2 = 9.8" actual thickness required

Selections "**c**" and "**d**" do not provide the thickness required for multilayer plank decking.

3. **Laminated decking**

Lamination percentage required, using 3" x 10" material, is calculated as follows:

$$\% \text{ lamination required} = \frac{t_{dr}\,(100)}{t_{act}} = \frac{7.8\,(100)}{10} = 7.8\% \text{ lamination required}$$

Answer "**a**" not adequate.

Lamination percentage required, using 4" x 12" material, is calculated as follows:

$$\% \text{ lamination required} = \frac{t_{dr}\,(100)}{t_{act}} = \frac{7.8\,(100)}{12} = 65\% \text{ lamination required}$$

Answer "**b**", 66 2/3% using 4" x 12" material, provides required lamination.

Planning Engineer ARTEP's *(the Easy Way)*

By CPT John A. Durkin

Preparing for an ARTEP (Army Training Evaluation Program) exercise is one of the challenging tasks faced several times a year by all battalion commanders and their staffs. Battalion staffs, however, often lack the time to properly coordinate with each other for planning major events like ARTEPs.

A planning tool that has worked well for ARTEP preparation in the 130th Engineer Brigade is the OMR (Outcomes, Methods, Resources) model. The OMR model is a systematic and simple approach designed to assist commanders and their staffs in planning. It is particularly useful as a staff-training exercise.

The OMR model helps the planner visualize and keep abreast of the planning process. Involving everyone concerned in the planning process, the model uses the "backward planning" approach in which the planners state their desired outcomes first.

Planners must answer the question: "What should our final results or outcomes be?" These results should be defined in specific, measurable terms. The planners then decide on the steps needed to achieve desired outcomes by answering the question: "How are we going to obtain these outcomes?" Finally, the planners consider the materials and resources needed to accomplish the steps by asking, "What resources do we need to carry out our plan?"

This is easy to achieve provided you give it some thought.

The OMR model is best illustrated by an example, the 549th Engineer Battalion's ARTEP planning. The battalion, located in Schwetzinger, Germany, consists of a headquarters and headquarters detachment (HHD) and two subordinate companies—the 541st Engineer Company (MAB), and the 959th Labor Service Company (Ribbon).

First, a planning session was held using the OMR model. The battalion executive officer, the S3, and the remainder of the staff (including staff NCOICs) attended the session. The brigade's organizational effectiveness officer acted as a facilitator and recorder.

Outcomes

The first step was to decide on goals. The staff asked itself, "What do we want to achieve during the evaluation period and how do we measure the terms?" The staff decided that one measure of success would be to evaluate itself and each company on certain tasks.

Each staff member then reviewed the ARTEP manual and isolated the tasks to be evaluated at the company and battalion levels. The lists were consolidated and approved by the battalion executive officer. The end product consisted of a list of tasks to be evaluated and the staff sections to evaluate them. Figure 1 shows part of the list.

The staff also decided to include as goals certain items not specifically outlined in the ARTEP manual. For example, one goal was to have no personal or vehicle accidents and another was to develop standard staff briefings for all future ARTEPs.

COMPANY TASK LIST

		MAB Co	RIBBON Co
(1)	PERFORM COMMAND & CONTROL FUNCTIONS		
1-1	Operate a network control station (NCS)	S3	S3
1-2	Establish and conduct radio communications	S3	
1-4	Install wire communications net	S3	
(2)	PERFORM ADIM & LOGISTICS FUNCTIONS		
2-1	Conduct unit supply operations	S4	S4
2-2	Establish a field kitchen	S4	S4
2-3	Operate a field kitchen	S4	S4
2-4	Supervise equipment maintenance	S4	S4/S3
2-5	Establish a unit motor pool	S4	S4
2-6	Establish a direct support maintenance shop operations		
2-7	Provide internal prescribed load list (PLL) support	S4	S4
2-8	Establish production and quality control procedures for maintenance operations	S4	S4
2-12	Perform field sanitation functions	S1	S1
2-16	Prepare and verify, if possible, casualty feeder report, (CFR), and witness statements on individuals	S1	S1
2-18	Prepare, verify, correct, complete and forward CFR and witness statements on individuals		
2-20	Orient replacements		
2-21	Initiate and maintain personnel data	S1	S1
2-22	Prep personnel daily summary (PDS)	S1	S1
2-23	Provide mail service		

Figure 1

FEBRUARY 1983 MILESTONE LIST

1 Feb	S-1	Request medics; communications (2 radios and 2 CEOIs); transportation from S-4; additional typewriters from S-4
4 Feb	S-3	Request crossing traffic
5 Feb	S-3	Request for telephone
10 Feb	S-4	Request transportation support (503rd)
10 Feb	S-4	Establish water point/refueling point/supply point
11 Feb	S-3	Request divers
11 Feb	S-3	Request air defense support
15 Feb	S-4	Request maintenance support (8592 Engr, 699 Ord.)
18 Feb	S-2	Order maps
20 Feb	S-3	Request river closures
25 Feb	S-3	Request smoke
25 Feb	S-3	Request signal security
25 Feb	S-4	Establish Class I account
25 Feb	XO	In process review
28 Feb	S-1	Request MOS inventory, personnel rosters and TOEs; suspense: 1 April
28 Feb	S-1	Fact sheet to units prescribing unit personnel report
28 Feb	S-4	Request reefer van
28 Feb	S-4	Coordinate with medical facilities

Figure 2

Knowing which tasks were to be evaluated, each staff section could concentrate on training its subordinates. The staffs could also estimate how much equipment support would be required.

Methods

The next step was to decide the best methods to run the evaluation. A scenario was developed by first having the S3 pencil-in the major events on a draft schedule. These included the date and time of deployment, major bridge missions, and rafting operations. Next, the S2 noted aggressor attacks and reconnaissance missions. The NBC NCO recorded NBC attacks and decontamination operations that would mesh with the schedule outlined by the S3 and S2.

The S1 and S4 also listed tasks to be evaluated. The S1 noted where casualties should be assessed so that casualty feeder reports would be forwarded; other personnel actions were also included. The S4 indicated where vehicles should be destroyed so that the units would be forced to requisition replacements during the prescribed resupply times.

The end product was a sensible scenario that included all the tasks developed during the "outcomes" portion of the session. All actions were coordinated and linked to other events in the scenario. All staff sections knew what actions for which they were responsible and how those actions fit into the overall plan.

Resources

The staff then analyzed and listed all the resources and materials required to support the plan. Based on this resource list and the plan, a milestone list was developed for each staff section. Milestones were established for every month prior to deployment. In addition, milestones were developed for items that would occur after the exercise such as the after-action report, letters of appreciation, and the maneuver damage report. Figure 2 shows the milestone list for February 1983.

End Results

By the end of the session, the staff had developed a list of tasks to be evaluated, the scenario, resource requirements, and a milestone list. The agenda is shown in Figure 3. Another benefit of the session was that it helped to promote communication among the staff. During the 549th's practice program, and later during the actual exercise using the ARTEP, the unit performed very well.

AGENDA

0900 — 0945	Introduction — OMR
0945 — 0955	Break
0955 — 1030	ARTEP Task list (each company)
1030 — 1130	Task list for Bn and Staff
1130 — 1230	Lunch
1230 — 1400	Scenario
1400 — 1410	Break
1410 — 1500	Milestone chart

Figure 3

Summary

By using the OMR model as a planning guide, the 549th Engineer Battalion saved much time and developed a well coordinated plan for a practice session using the ARTEP.

The same method was used at the 130th Engineer Brigade headquarters to plan exercises for the brigade's other battalions. Subordinate commanders and S3s were invited to participate in the planning session, and they were instrumental in developing the task lists and milestones.

The OMR model is an excellent planning tool. It encourages staff communication, organization, and involves the entire staff in the planning process. It is effective in planning for events as complex as Reforger exercises or as routine as change of command ceremonies.

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EWOS Study Results

Improving Warrant Officer Professional Development

by the Engineer Warrant Officer Study Team, USAES

During 1983, the U.S. Army Engineer School reviewed the status of training development for all warrant officer career fields served by the School. The comprehensive project identified specific problems in Engineer warrant officer professional development and career utilization.

These problems included:

- Performance discrepancies by Engineer warrant officers
- Changes in doctrine affecting the use of Engineer warrant officers.
- Changes in organizational structures imposed by DIVISION 86 affecting warrant officers.
- The introduction of new equipment system and training devices being developed to support force modernization.
- Changes imposed by Army Training 1990 affecting the current training strategy.
- Common warrant officer training and utilization problems generated by identification of collective job/task analysis.

To determine how Engineer warrant officer professional development officers will be accomplished, the Engineer Warrant Officer Study (EWOS) was initiated on April 18, 1983, by the Engineer School's Directorate of Training and Doctrine and the Engineer Proponency Office.

In order to evaluate all the different warrant officer career fields and additional areas of consideration, the study used the consolidated analysis methodology of Criterion Referenced Instruction, Instructional Systems Development, and the Systems Approach to Training. The study was conducted in three phases: a needs assessment, the compilation of data, and analysis of two boards.

Compilation of Data

The results of the survey during the needs assessment were compiled during the compilation of data phase of the EWOS. Also, additional studies and proposals were gathered that affect on Engineer warrant officer professional development. The additional studies and proposals reviewed included the following:

- *The Commissioning of Warrant Officer Study.*
- *The Grading of Warrant Officer Positions Study.*
- *The Enlisted Personnel Management System Study.*
- *The Regular Military Warrant Officer Compensation Study.*
- *Warrant Officer Senior Course Revision.*
- *Warrant Officer Senior Course Position, ASI 4A Proposal.*
- *E7 to CW2 Proposal.*
- *Increased Requirements for Implementation of DIVISION 86.*
- *Army 21.*
- *Force Modernization.*
- *Army Training 1990.*

Needs Assessment

The needs assessment was conducted to verify the job analysis previously conducted by the Review of Education and Training for Officers (RETO) program. Additionally, the needs assessment validated the initial RETO task listing.

To accomplish the needs assessment, the study team evaluated the tasks performed by feeder enlisted MOSs against the warrant officer task list developed under RETO. A condensed task listing was developed, based on the previously validated task listing by the job incumbents under the RETO program and the feeder enlisted MOSs task listing.

This condensed list was used in a survey developed for warrant officer supervisors. In order to determine the importance of how each task was to be performed, the survey was developed with a two part rating. The first part identified the task by level of performance (NCO, warrant officer, or commissioned officer) and the second part determined the significance of warrant officer performance of each warrant officer task.

Analysis by Boards

The analysis of collected data was performed in two separate boarding actions. The first boarding action was the Specialty Task Board. The board was divided into three specialty boards for each of the major career fields: Utilities Operation and Maintenance—MOS 310A; Engineer Equipment Maintenance—MOS 621A; and Topographic Engineering MOSs 811A, 821A, 833A, and 841A. Each Specialty Task Board included several senior warrant officers from each career field.

The board members reviewed data and verified information collected during the needs assessment. Each board then developed a task listing based on the skill levels identified in the supervisor's survey and job incumbent survey. The Specialty Task Board then developed new descriptions based on the identified skill level requirements. The chairmen from the Specialty Task Boards presented their findings and represented their specialty on the Common Warrant Officer Analysis Board.

The Common Warrant Officer Analysis Board consisted of the

following: a chairman; representatives from the Directorate of Training and Doctrine; proponency, National Guard, and USAR personnel; an education specialist; a training systems specialist; the chairman from each Specialty Task Board; and a facilitator.

The Common Warrant Officer Analysis Board's work was divided into problem analysis, evaluation, and action planning. During the problem analysis phase, the board analyzed all data and input from the Specialty Task Board. In the evaluation phase, the problems were refined into specific findings and recommended actions were developed. The recommended actions were further refined and developed into an action plan.

Based on the EWOS, the findings were identified and grouped under these functional areas:

Role of the Engineer Warrant Officer.
- Commissioned officers do not understand the role or proper utilization of warrant officers.
- Engineer warrant officers are uncorrectly used.

Prerequisites.
- Requirements for appointment are too low.
- Appointment requirements are not enforced through field boarding action.
- There is no proponent technical certification prior to appointment.
- Certification is not required for USAR warrant officers before receiving a new MOS.
- The new EMPS is not providing diversified technical management skills.

Field Boarding Actions.
- No guidance is being submitted to board by proponent.
- A warrant officer is not required to sit on appointment boards to ensure applicants are technically certified.

Warrant Officer Education System.
- There is no specific training in "officer skills."
- There is no technical training available for MOSs 310A, 811A, 821A, 833A, and 841A.
- There is no proponent technical certification at entry level.
- Thre is no standardized or required training for either appointment or professional development/promotion.

Utilization.
- There is no correlation between professional development and assignments.
- Warrant officer assignments are not identified by experience level nor grade.
- Additional Specialty Identifier management is not controlled.

MOS Overload.
- Utilities Operation and Maintenance (MOS 310A) has too many diversified feeder MOSs.
- MOSs 310A and 621A have diversified assignment utilization.
- MOS 310A and 621A overlap technical responsibilities.

Civilian Education.
- More technical training is required to support force modernization.
- There are no fully funded college nor other higher education programs for warrant officers.

On September 30, 1983, the findings and recommendations of the EWOS were briefed to Engineer School commandant. Based on the unique problems identified by the EWOS, the commandant approved the recommendations listed below for further staff work.

Establish blocks of instruction in the Engineer Officer Basic and Advanced Courses on how to best use Engineer warrant officers.

Establish better preappointment requirements.
- Preappointment requirements should be increased to require, as a minimum, graduation from the Primary Technical Course or Basic Technical Course (whichever is available) for each enlisted feeder MOS.
- Develop better local appointment board procedures, which includes proponent involvement.

Establish an Engineer Warrant Officer Education System.
- The education system should include entry level/candidate training; advanced level training; and senior level training. These professional development courses should be required for improved career progression.

Establish Grading by School Qualification.
- Grading by school qualification will correlate professional development with assignment utilization by awarding a skill designation to the MOS code for each MOS based on school qualification.
- The skill designation will be coded in TOE/TDA documents to provide better assignment utilization.

Establish a new MOS—Special Purpose Engineer Equipment Repair Technician.
- The new MOS should eliminate the requirement for maintaining the extensive number of equipment systems now under MOS 310A and 621A.

Consolidate Engineer warrant officers under one code structure.
- Using one code structure should eliminate proponency problems and consolidate all Engineer warrant officers under one Military Occupational Area—Engineer Support Operations.

Establish additional Army Educational Review Board positions at major Army commands (MACOM).
- Additional positions should increase the number of warrant officer advanced degree positions to support technical requirements for force modernization.

These proposals are being staffed and will be presented for approval to the Army staff agencies and MACOMs. If approved, implementation will begin in fiscal year 1985.

These proposals were the result of contributions and cooperation from the U.S. Army Engineer School, tenant activities, MACOMs, and staff agencies. The actions based on recommendations in the Engineer Warrant Officer Study will improve professional development of Engineer warrant officers and help them to better support the Engineer mission worldwide.

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EUROPEAN RANGE MODERNIZATION

Army Engineers Meeting The Challenge

Compiled by 1LT Beverly Barnes

Construction underway on vehicle target pits at Range 42, Grafenwoehr Training Area, Germany.

The 18th Engineer Brigade, USAREUR, and battalions from the 130th and 7th Engineer Brigades, USAREUR, are undertaking the largest troop construction project since World War II at the Grafenwoehr and Wildflecken training areas in Germany. When completed, the project under Colonel (P) Charles E. Williams' command, will provide a modern, extensive training complex for M1 Abrams tank crews and for squads using the M2/M3 Bradley fighting vehicle.

The Project, The Units

The introduction of the M1 Abrams main battle tank and the M2/M3 fighting vehicle into the Army inventory required that training ranges be improved, so that their crews and weapons systems could be adequately challenged. Fourteen ranges at the Grafenwoehr Training Area and the Wildflecken Training Area were identified as needing improvement at a cost of $55.1 million.

From the beginning there were special considerations. The European theater has a relatively short construction season—roughly seven months during which concrete can be placed and heavy equipment can move. An even greater challenge was the need to continue combat readiness training. As a result, range construction time had to be planned so that units on adjacent ranges could keep firing during the project.

Completing the crucial project within the short construction windows available required an engineer task force of unparalleled size. The extensive dud removal and certification process required by German labor unions before civilian workers could enter the impact areas ruled out using civilian contractors. Engineer troops, however, could both clear their work areas and complete range construction tasks. The U.S. Army Europe commander-in-chief, therefore, tasked the 18th Engineer Brigade, the only theater level engineer unit with combat heavy capabilities.

The brigade consists of four combat heavy engineer battalions, a topographic battalion, and a battalion-size civilian service support center of engineer-skilled craftsmen. For the range modernization project, the brigade was augmented by two corps

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combat engineer battalions and two combat support equipment (CSE) companies each year, for an annual strength of approximately 5,000 engineer troops.

In 1983, units participating were the 18th Bridgade's four heavy engineer combat battalions, the 79th, 94th, 249th, and the 293rd; the 649th Engineer Battalion (Topographic) and the 670th Civilian Service Center. Attached to the brigade were the V Corps' 547th Engineer Combat Battalion and the 568th CSE Company, and the VII Corps' 237th Engineer Combat Battalion and 535th CSE Company. Accomplishing the range improvements using troop construction saved millions of dollars compared to the cost of a civilian contract.

Each range has "pop-up" vehicle and personnel targets, moving target systems with remote control target carriers, hull defilade firing positions along the Class 60 course roads, and concrete turnpads at road intersections.

Other new items include electrical sensors that indicate the combat vehicle's location on the range, a new range tower with computerized control systems, a concrete motor park, a cantonment area with two to six billets and a dining facility, a target maintenance building, and a sewage treatment system with a leach field. This scope of work represents 170 kilometers of roads, 75 buildings, 750 culverts, 2,000 targets, and nearly 300 kilometers of buried electrical cable (see Figure 1 for project details).

The task force faced special challenges in the construction area as well as in other areas. Also involved was managing vast amounts of materiel, and special equipment, providing equipment maintenance, operator training, and provisions for support personnel for the soldiers many miles from their home stations.

Construction

The chief challenge of the project was to construct all facilities according to design and with acceptable construction techniques. To accomplish this, a multi-level quality control system was used so that each step of every task was checked three times.

The most important and effective quality control occurred within the platoon at the builder level. Strict quality control measures were stressed at daily battalion meetings and at weekly task force conferences. The battalion operations section consisted of a construction officer or civil engineer and an experienced senior NCO, with a construction supervisor MOS (51H). They conducted daily inspections to make sure that keeping up the construction pace was not emphasized above quality control.

The final quality control level was within the construction element of the task force operations section. The element included two officers; six construction supervisor E7s; construction inspectors; ten surveyors; and two materiel quality specialists. At this level, quality control was given a higher priority than project construction management.

The project quality control effort required two sources for reference and standards. The first was the design and specifications for each facility constructed. Prepared by a civilian architectural firm, these plans were significantly different from those encountered in the United States, since they were based upon German construction codes, called "DINs."

The second reference was a quality

An M1 Abrams tank rolls up to battle position 1 at Grafenwoehr's Range 99.

control annex to the range improvement operations order. This clarified key points, explained certain tests, and helped to tighten construction standards. Published early in the project planning stage, it ensured that planners understood critical standards, and it allowed the battalions to conduct training on construction standards during the winter. A thorough knowledge of both this document and of the project design and specifications was the key to effective quality control.

The 1983 range improvement upgrade project at Grafenwoehr and Wildflecken included a great deal of major construction effort not part of the 1982 program—data cable installation.

The task force installed low voltage and data cable to each target on all the ranges. The power cables required less maintenance because they eliminated batteries. The data cables allowed the Programmable Control Unit (PCU) to communicate instantly with each target, to activate thermal signature and gunfire simulator devices, and to report target operational status. On three of the five ranges, where more than one vehicle could fire simultaneously or where the firing vehicles were out of sight of the control tower personnel, a vehicle sensor system was installed. The system identified vehicle locations to the PCU. This allowed for target exposure control, ensuring that fire was always within the range safety fan, and that vehicles were not accidentally fired upon by other vehicles. The task force installed 261 of these road sensors, using hardware developed for normal traffic sensors.

During the five-month cable installation project, the task force dug over 54 kilometers of trenches and installed over 155 kilometers of high-voltage, low-voltage, and data cable.

Command and Control

Command and control for this huge construction operation presented special challenges to the brigade commander and his staff. Besides being the 18th Engineer Brigade and task force commander, he was also the Karlsrule community commander. Battalion commanders shared similar problems with managing unit operations and still meeting community responsibilities at their home stations.

The management scheme established the deputy brigade commander as the rear detachment commander in Karlsrule for the 18th Engineer Brigade. In addition, a lieutenant colonel became the deputy community commander and handled the community responsibilities.

At Wildflecken, a field grade officer was assigned as range project manager and reported directly to the brigade commander. The brigade's S3 became the deputy task force commander and managed the construction projects of the six battalions at Grafenwoehr and Wildflecken. A communications network gave daily contact between the task force commander and key personnel. To further improve command and control, the task force was provided fixed and rotary wing aircraft.

An unusual command and control situation for task force operations was dealing with the corps reinforcement battalions supporting the project. During the winter, team-building workshops and open-forum conferences were used to create a cohesive team for accomplishing the summer construction activities. Each of the attached units became working members of the task force and cooperative team members in the complex construction effort. After construction began, the commanders continued weekly meetings to discuss progress and problems.

Because of the large interest in the project, a joint visitors' bureau (JVB) was established to coordinate official visits with the units, the 7th Army Training Center, and the training areas. The four-member team handled itineraries, arranged transportation, and secured special clothing (hard hats, wet-weather gear, etc.). The JVB also compiled the project history and kept an extensive photographic file.

Helmets, flack jackets and ground guides were standard safety measures when breaking ground down range.

A full view of the up range area of Range 45, Grafenwoehr.

Logistics

Supporting logistical operations matched the large scale of the project in every respect. Facilities for the task force included over 100 barracks, 20 dining facilities, and 15 acres of motor parks with 11 maintenance buildings. A second set of barracks furniture was required for each task force member. Property disposal offices throughout Europe were screened for beds, mattresses, and metal wall lockers. Resources were collected from as far away as England, saving a considerable amount of tax money.

Food service operations continued at six range construction sites, as well as at six troop billeting locations. At each site, lunch and dinner meals included mobile kitchen trailers, and elaborate feeding tents and picnic tables.

A task force field medical facility was established in a converted mess hall and staffed by the Nurenburg Medical Department Activity (MEDDAC). Task force soldiers were treated quickly, properly and returned to duty as soon as possible. While using the facility avoided overbooking the GTA dispensary, the Wildflecken medical facility provided services for the battalion working at WTA.

Transportation was a key aspect of the range improvement project. Commercial buses were contracted each weekend and transported the task force to and from their home stations. Additionally, 18 German buses were used to transport workers to and from the ranges each day, a distance of 20 miles. Twenty-nine leased, nontactical vehicles provided an additional administrative transportation asset around both range areas.

Clearing the ranges of unexploded ordnance, plus handling over 23 tons of demolition materials, required the support of the 10th Combat Engineer Battalion and of an explosive ordnance demolitions team.

To supplement the task force's assigned equipment, 315 items of USAREUR theater reserve equipment, valued at $750 thousand, were released on loan. These items, ranging from vehicle radios to five-cubic yard scoop loaders, were issued by reserve storage activities from places as far away as Belgium and were transported to Grafenwoehr and Wildflecken by the units to which the equipment was assigned.

The task force used over 25,000 gallons of fuel each week. To alleviate a large part of the transportation burden on the organic fuel tankers, the 7th Support Group provided fuel delivery service directly to each range. Rotating through 13th Supply and Service Battalion companies, five 5,000-gallon tankers were available at Grafenwoehr and Wildflecken.

Maintenance

Unique to the maintenance support system for the Grafenwoehr improvement program were direct support maintenance detachments. Traditionally, direct support maintenance is provided under an area support concept, but the task force operated in an area that could not provide the service. Therefore, USAREUR tasked the VII Corps to provide direct maintenance support of Grafenwoehr and tasked the V Corps to provide similar support at Wildflecken.

At Grafenwoehr, a 76-person maintenance detachment established their shop with a cadre from the 71st Maintenance Battalion. Maintenance platoons were drawn from all of the battalions of the 7th Support Group on a two month, rotating basis. The direct support detachment at Wildflecken consisted of 15 personnel who developed a memorandum of agreement with the 94th Engineer Battalion.

Class IX repair parts for the organizational and direct support

COL (P) Charles E. Williams leads the monthly brigade run.

maintenance operations came from the local Grafenwoehr supply support activity (SSA). With a direct line back to the United States, the SSA was able to shorten the shipping time for parts, which benefited the unit's percent zero balance.

Because equipment use during the construction project resembled wartime use and because there was a responsible repair parts system, the resulting Class IX data presented a perfect opportunity for other studies. All requisitions submitted were given a special project code and at the end of the first year of construction the data was used to support the General Support Supply Base for USAREUR engineer equipment.

During work at Grafenwoehr in 1983, the 249th Engineer Battalion, together with a Department of the Army team, collected sample data to develop a combat prescribed load list for heavy engineer battalions. Results of the study should be available in 1984.

Though well supported with maintenance and repair parts, the task force's organic equipment was not entirely suited to meet the strict project construction standards. As a result, some civilian construction equipment loaned to the task force was purchased off-the-shelf through competitive bidding sponsored by the European Distribution and Accounting Agency of the Military Committee, London (EVDAC). The purchased equipment worked well and included gradealls, special entrenchers, and rollers. Operators were trained to use the equipment, but there were problems because of too few mechanics needed to maintain the additional equipment, and from the inability to requisition repair parts through the supply system.

A maintenance contract with civilian firms was let with the task force maintenance officer as the cargo outturn report (COR). Civilian contractors were reminded of their important role in the project, and challenged to develop a sense of urgency. This succeeded with varying degrees. The repairmen took immense pride in their work and proved quite reliable, but they became frustrated when repair parts were not readily available. The training value of this arrangement was that wartime host nation support would parallel this use of off-the-shelf equipment and civilian repair work.

Fiscal Management

The multimillion dollar project presented a fund management challenge within the 18th Engineer Brigade. The project combined many platoon-sized tasks at each range. Major Construction Army (MCA) funds were provided to finance one or more ranges. Fund management was done by giving each construction battalion a limit for TDY and equipment expenditures. Those amounts were further broken down into project spending ceilings. These limitations were based on the battalion's estimate of the work required, coupled with an experience factor applied by the brigade's engineer plans section.

A joint project between the task force and the U.S. Army Construction Engineering Research Lab (CERL) was a microcomputer research project. This assisted in tracking both the construction and the funding status. A weekly progress report (WPR) documented TDY status and equipment hours charged to the project. The WPR also reflected the man-hours worked on each project subtask. A current status of funds earned, funds remaining and of percentage of construction completed was computed for each battalion.

With this data, the brigade resource management office also coordinated reports to European Division and USAREUR central finance and accounting offices for two fiscal years. The problem would have been simpler had MCA funds been involved, but Operation Maintenance, Army (OMA) mission funds were required to support related indirect project construction costs. Therefore, costs had to be identified as either direct or indirect. Those costs charged to the indirect share had to be allocated to the proper fiscal year, since OMA funds were used as a carrier fund to be reimbursed from MCA. Improperly allocating indirect costs would have been either an overstatement or understatement of other OMA costs in one fiscal year, and the reverse in the ensuing fiscal year. Active fiscal management procedures were initiated to solve these problems.

Training

The range improvement program proved to be a perfect scenario for cross-training soldiers in various engineer skills because conditions closely compared to those experienced in wartime. During project mobilization and demobilization,

over 2,000 pieces of equipment were moved to and from the construction sites. Heavy construction equipment was moved by train with the operators in accompanying carrier cars; lighter vehicles were driven from home stations. This movement offered excellent practice for wartime deployment.

During the project, commanders and staffs were consistently taxed to plan missions and to task leaders to execute those plans. In essence, the battalions and brigade staff conducted a seven-month Army Training Evaluation Program (ARTEP). The need to rotate troops to different tasks made it possible to cross-train equipment operators. Furthermore, the units conducted common skills training and testing, weapons qualification training, and PT testing during their busy schedules. In addition, the compressed construction period and 12 to 15 hour workdays provided the opportunity to work under pressure similar to that of combat.

RANGE IMPROVEMENT PROGRAM SUMMARY

	CY 1982	CY 1983	CY 1984	CY 1985	TOTAL
MCA Costs (Millions)	$14.06	$20.95	$17.45	$2.65	$55.11
Construction					
Gravel roads (Class 30 & 60)	51.0KM	44.7KM	63.1KM	7.3KM	166.1KM
Gravel hardstand	21,000SM	13,300SM	54,040SM	2,100SM	90,430SM
Concrete					
Roads, tankparks & walkways	19,022SM	20,714SM	13,070SM	12,150SM	64,956SM
Culverts	214	217	218	75	724
Defilade firing positions	44	50	100	8	202
Turnpads, ammo pads	30	37	26	9	102
Buildings					
Soule (average size 40' x 60')	16	25	12	6	59
Range towers	6	5	2	1	14
Sewage systems	6	5	2	1	14
Target systems					
Moving targets	4,320M	4,058M	2,820M	700M	11,898M
Vehicle target pits	198	115	129	25	467
Personnel target pits	351	476	562	120	1,509
Data cable trenching	32.75KM	48.40KM	48.21KM	12.00KM	141.36KM
Road sensors	0	259	682	0	941
Chain link fence	746KM	705KM	655KM	1,000M	2,206M

Personnel

Personnel managers faced problems caused by family separation and additional TDY costs. They tried to minimize these problems with various programs and special opportunities.

A morale support program was established which included softball, flag football, golf, and bowling. Also, an organization day for all units provide a welcome break for the task force. The events included all the customary competitions events and a complete barbeque meal.

Religious services were held on weekends, and the brigade chaplain was available regularly for counseling. He also organized local area trips, including visits to the Dachau concentration camp outside Munich and Flossenburg, and trips to the border zone.

Both Grafenwoehr and Wildflecken Training Areas granted permanent party status to task force soldiers, allowing them use of the Class VI stores, post laundries, and check cashing privileges not afforded to training troops. To better give soldiers access to post facilities, a special bus ran daily from 8 a.m. to 10 p.m. from each unit's area to the main post.

To support the soldier it was necessary to maintain personnel and finance sections at his home station to interface with military personnel offices (MILPO) and finance offices. Processing TDY orders and travel vouchers, and handling mail and distribution increased the amount of work performed by an already geographically separated work force. Furthermore, these sections coordinated personnel in and out-processing and handled limited medical and finance appointments with supporting community units spread across a minimum of 200 miles.

Summary

The challenges presented by the range improvement project have been varied and significant. But with skill and determination, the task force faced each problem and found a solution. Finding new ways of solving old problems and implementing new technology has always been the pride of Army Engineers worldwide. The new ranges at the Grafenwoehr and Wildflecken Training Areas will stand as a monument of the peacetime contribution of Corps of Engineers troops in preserving that peace.

1LT Beverly Barnes is assigned to 649th Engineer Bn. (TOPO). She was attached to the 18th Engineer Bde. as the visitors' bureau officer during the 1983 range improvement project. 1LT Barnes has a bachelor's degree in park management from Texas A & M University and an associate's degree in water and wastewater technology from New Mexico State University. She has completed the Engineer Officer Basic and the Mapping, Charting, and Geodesy Officers' Course.

GRAF '82

by LTC Lawrence L. Izzo

"Graf '82" was the first installment of the four-year plan to modernize USAREUR's training ranges and was concerned wholely with the Grafenwoehr (Germany) Training Area. The six ranges constructed were designed to challenge the crews of the M1 Abrams tank and carried a cost of $15 million.

The scope of Graf '82 presented a monumental challenge. More than 30 miles of gravel roads for tank firing courses and target servicing, 17 moving target systems totaling more than 14,500 feet, 549 concrete target pits, and 44 concrete firing positions were constructed.

Seventeen billets, four dining facilities and five range control towers were also built, along with five target maintenance buildings so targets could be maintained without removing them from the range.

All buildings included heat and electricity, and three included a complete sewage system with septic tanks and a leach field. Five 25,000 square feet concrete motor parks were built for tracked vehicles, plus nine gravel parking areas for wheeled vehicles. In support of these facilities, 13,000 feet of fencing, 1,600 feet of concrete roads, and more than 200 culverts with concrete head walls were installed. To provide power to the target systems, over 20 miles of power cable were buried. Troops did all the trenching and a civilian firm laid the cable and did the splicing and continuity checks.

To support the construction effort, the 18th Brigade assumed responsibility for all material handling operations. Task force operations personnel were responsible for receiving, accounting for, and issuing over 1,000 line items of construction materials to 60 different platoon leaders. They managed the programming and delivery of over 450,000 tons of crushed rock (in seven different commodities) and over 15,000 cubic meters of ready-mix concrete. Material operations personnel tracked procurement and delivery on nearly 300 separate contracts during the project and directly coordinated with numerous German civilian firms to ensure timely deliveries.

Another major challenge was the requirement to clear the downrange portion of the training ranges of all dangerous ordnance before construction began. Over a six-week period, the 16th Engineer Battalion (Combat) surface swept all ranges and located about 10,000 items. Over 3,000 of these were too dangerous to move and were blown in place. The areas where construction cuts were planned had to be earth shocked with demolitions to explode any sensitive ordnance hidden underground. The entire operation required over 50 tons of demolitions and was carried out on a tight time schedule.

The engineer troop task force assembled for Graf '82 consisted of seven engineer battalions. The two combat engineer battalions, one each from V and VII Corps, were the 317th of the 130th Engineer Brigade and the 82nd of the 7th Engineer Brigade. Each battalion was reinforced with a combat support equipment company.

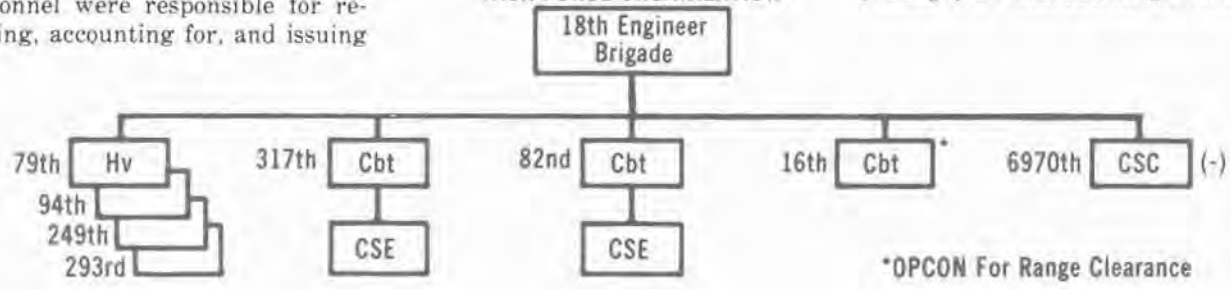
The direct support maintenance element was pieced together from maintenance units throughout Germany. Elements of the 18th Engineer Brigade's German civilian labor force, the 6970th Civilian Support Center, were also attached to install heating and electrical lines and to build control towers. Surveyors from the 18th Brigade's 649th Engineer Battalion (Topographic) reinforced the combat battalion's organic construction surveyors and rounded out the task force.

The 18th Engineer Brigade's management of the project was highly commendable. All six ranges were completed on time. The troop portion of the project was completed for approximately $400,000 under the estimated and budgeted cost. All six ranges were turned over to the Military Committee of the European Distribution and Accounting Agency (in London) without construction deficiencies.

After the project, the 18th Engineer Brigade continued to provide responsive support to the customer, the 7th Army Training Command, by making warranty-type construction corrections. The task force accomplishments during Graf '82 started the significant role engineers are playing in helping to improve the readiness of the Army in Europe.

LTC Larry Izzo was the operations officer for the 18th Engineer Brigade during Graf '82. He now commands the 307th Engineer Bn. (Airborne), 82nd Airborne Div., Ft. Bragg, N.C. A U.S. Military Academy graduate, he has completed airborne and ranger training, the Command and General Staff College, has a master's degree in nuclear engineering from the Massachusetts Institute of Technology and an M.B.A. from Long Island University. He is a registered professional engineer in Virginia and served on the physics department faculty of the U.S. Military Academy.

GRAF'82
TASK FORCE ORGANIZATION



MATERIAL OPERATIONS

by CPT Thomas M. Berger

Among the many problems encountered by the planners of the range improvement program at Grafenwoehr, Germany, was how to request, to store and to issue materials.

Needed for the huge construction project were over 900 different construction materials valued at over $6 million. Besides nuts and bolts, other required items were fluorescent lights and culvert pipes, junction boxes and copper tubing, circulating pumps and shut-off valves, manhole covers and fence poles, 24 Soule building kits, 16,000 cubic meters of concrete, 127 kilometers of electric cable, 62,000 bricks, and 376,000 tons of sand and gravel.

Also required were 12 gradealls, 24 vibratory rollers, 60 plate compactors, 64 circular saws, and 3,500 5-millimeter drill bits, not to mention the hundreds of other types of tools and materials.

But how could a facilities engineer office handle this materials burden? Who was going to take care of receiving, issuing, and storing materials in such vast quantities?

In an agreement with the Directorate of Engineering and Housing (DEH) at Grafenwoehr, the 18th Engineer Brigade established a special team as the agent for the DEH in handling all material actions. Contrary to normal practice, the construction units assumed the responsibility and established a system for receiving, storing, issuing, and accounting for the program's construction materials and tools.

Originally, the material operations team consisted of nine U.S. military personnel and ten civilian support group personnel, but increased to a final strength of 24. They operated a central handling and storage facility in an old German mess hall that was converted into an office and warehouse. Instead of counting potatoes and writing menus in the cook's office, they counted cubic meters of concrete and wrote weekly rock status reports.

In the dining room, plumbing fittings, electrical fixtures, and cans of paint were "served" on written request with 24 hours advance notice. In the old scullery where the master file was located, all receipts and issues for every type of material was recorded on a stockage level card and a running balance was kept. In cold storage were rakes, screwguns, slump tests, and other assorted items. Personnel authorized to receive equipment had cards and signed hand receipts for what they received. Every attempt was made to distribute the tools equally among the units.

In one motor park turned storage yard, no mechanics were seen, but instead there were people stacking lumber, counting conduit, and issuing reinforcing steel. In the other storage area (an old ammunition yard), steel forms were moved by forklift to accommodate landscape dozers and entrenching machines for the winter. All equipment was inspected and serviced before being secured for the season.

In the construction areas, the project officers conveyed material shortage notifications and special needs to the material operations OIC and NCOIC. The material coordinator worked closely with the Army Contracting Agency and civilian firms to ensure that needed items were delivered on time to prevent construction delays. The procurement NCO also purchased various supply items from local stores with imprest funds.

Meeting the immense material requirements of the range improvement program stands as an example of what can be successfully done when a difficult mission is tackled with good planning and team effort.

CPT Thomas M. Berger served with the 79th Engineer Bn. (CBT) (HVY) and was the task force materials officer for the 1983 project. He has a bachelor's degree in electrical engineering from Lafayette College and is a graduate of the Engineer Officer Basic Course and the airborne and ranger schools. CPT Berger is now attending the Engineer Officer Advanced Course.

Engineer Problem

Bridge Design Problem: (Reference: TM 5-312, Chapter 6, or FM 5-34, Chapter 7)
You are designing a semipermanent nonstandard fixed bridge. This two-lane bridge is to have a design class of 100. The stringer spacing will be 5'0" and the available deck material is 4" x 12" and 3" x 10".

QUESTION: Select the best deck design from the following:

a. Laminated: 75 percent using 3" x 10" material.
b. Laminated: 66 2/3 percent using 4" x 12" material.
c. Planked: 2 layers of 4" x 12" material nailed firmly together.
d. Planked: 3 layers of 3" x 10" material nailed firmly together.

Improving your Platoon Inspections

By MAJ Jonathan A. Jacobsen
and MAJ Jefferson J. Irvin

The pressures may be intense for a platoon leader during his or her first major inspection. If the inspection (such as an Annual General Inspection) is announced, it looms in the distance like an awesome storm cloud. As the inspection date approaches, the first sprinkles of command guidance lead to early preinspections. During the final month, reports from units already inspected buffet the platoon leader like giant hailstones.

Unfortunately, careless handling of inspections frequently negates their usefulness as a fair measure of performance. Soldiers being carelessly inspected are unsure of exactly what is required. No time is allotted for inspection preparation. Those inspected receive no feedback. Standards are often unrealistically high.

However, inspections are your most valuable tool as a platoon leader for gauging the chain-of-command's efficiency. The following steps will ensure that your inspections are fair and, therefore, will guarantee that your inspections are effective.

STEP 1:
Assemble Existing Standards

Assemble the training manuals, field manuals, schedule of components and battalion or company SOPs pertaining to the areas you wish to inspect. Read and thoroughly understand these references. You also should study the results of major inspections pertaining to your areas of interest.

After reading the pertinent references, talk to your company commander, first sergeant, or other experts. If you are planning a maintenance inspection, talk to the motor sergeant. Find out what standards they require. Have the experts demonstrate how they would conduct the inspection, particularly regarding organization and layout. Ask the experts for specific deficiencies which occur repeatedly in your areas of interest and write them down.

STEP 2:
Evaluate Existing Standards

Once you have assembled the published standards and those required by your chain-of-command, put the standards through the following tests. Review the standards first by yourself, then with the platoon sergeant and squad leaders who will ultimately have to enforce the standards. Ask yourself the following questions:

Are the standards necessary? Be sure the standards fit the mission. For instance, painting pioneer tools is an excessive standard. If a standard seems unreasonable, discuss it with your commander.

Are the standards high enough? Frequently the standards listed in SOPs or given by commanders are vague outlines defining a minimum performance level. For instance, "clean the tools" does not specifically address the sharpening, oiling, and cleaning required for good tool maintenance.

Are the standards clear and concise? When you inspect your soldiers, you do not want the standards to be debatable or subject to differing interpretations. Quantify. Be explicit. Do not write a standard like "all tools will be marked." Write standards like "metal hand tools from kits will be etched with 'US' and a code number showing to which kit and platoon the tool belongs" or "wooden-handled tools from vehicles will be stenciled in OD paint with 'US' and the vehicle's bumber number."

Are the standards complete? Make your inspection efficient by issuing a list of all standards you can check during your inspection. This question is critical when the inspection is formal and requires extensive troop preparation. Do not have your soldiers lay out their TA50 one day so you can check the gear for accountability, and again two weeks later so you can check the same gear for serviceability.

Check all pertinent items in a layout at the same time. If this is not physically possible, plan to multiply the number of inspectors (you and the platoon sergeant checking different areas) before you multiply the number of inspections.

Do not finalize your standards without first consulting your NCOs, particularly your platoon sergeant. The NCOs should evaluate each standard, just as you did. Resolve any differences. Frequently the result is a group effort. Then, double check your final standards with your commander, and alter them according to his guidance.

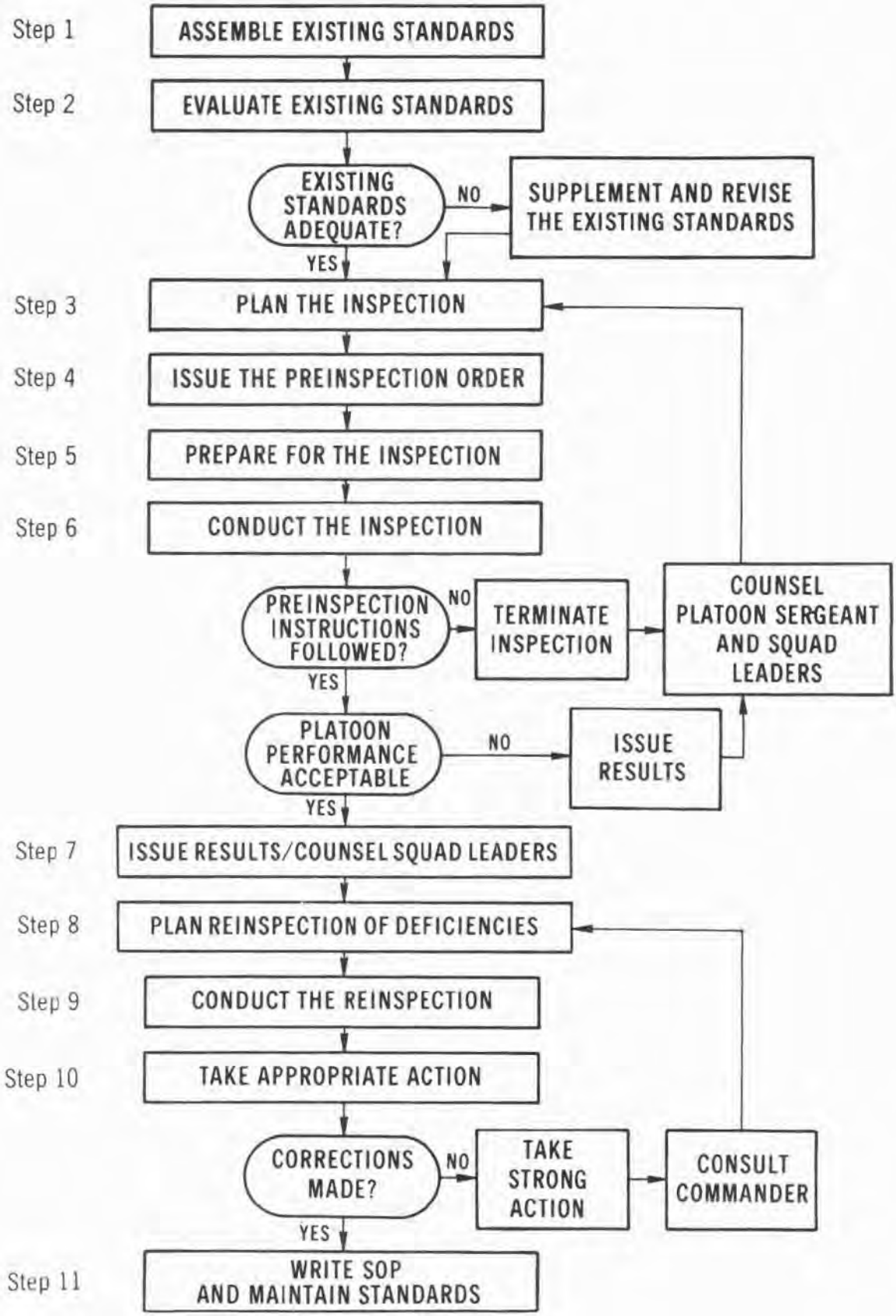
STEP 3:
Plan The Inspection

Your standards now agree with published technical manuals, field manuals, your chain-of-command, and the four questions in Step 2. Next, determine how you are going to perform the inspection.

Will your inspection be announced? If the squad leaders and soldiers are being inspected on routine standards, unannounced inspections are appropriate. If the standards are new or in areas previously ignored or glossed over, start with announced inspections until the basic standards are reached and familiar.

What is the most efficient inspection method? Give instructions to your squad leaders for the inspection which include provisions for:

The Inspection Process



- Consolidating to one location geographically separated items.
- Using layouts based on some logical configuration. Have items laid out in the order listed in the reference you are using as an inspection guide. For instance, tools from kits should be laid out in the order listed in the supply catalog and on kit inventories. A printed drawing of a standardized TA50 layout usually works best.
- Having items to be checked for serviceability ready and near areas where they can be checked. For example, power tools with their cords unwound should be located near outlets.
- Having items such as rifles already disassembled and ready for inspection.

Will your inspection require staggering inspected units? With an expert, practice inspecting a sample unit (truck, TA50 layout, tool box). Time your dry run. Determine if the projected time to inspect the platoon seems excessive. (This is a judgment call. You don't want troops waiting around for hours for an inspection.)

You may either split the standards to be inspected between several inspectors (you, your platoon sergeant, or an expert such as the motor sergeant or supply sergeant) or plan to stagger your inspection of squads at different times or on different days.

How long do your squad leaders need to prepare for your inspection? Determine what blocks of time they require on the training schedule to bring their squads up to standard. These requirements include time for soldier preparation and for both inspection and reinspection by squad leaders. The best source for this information is your squad leaders.

Once you determine the preparation time necessary, go to your commander and negotiate for time on the training schedule, including time for your own inspection and reinspection. Ensure the time blocks you receive do not coincide with major troop diversions such as support details for community or battalion classes.

Does inspection preparation require materials or tools that are hard to get or unavailable? Check with your NCOs. Do they have the paint, the power tools, or the maintenance equipment needed to do the job? Find out where to get the materials and include in your inspection order instructions how to obtain missing items.

Are all references available to squad leaders to make the standards explicitly clear? Make copies of your assembled standards from Step 2. To make a complicated operation more clear, provide a sample inspection/layout at the time you give your inspection instructions.

All the planning in Step 3 must be done with your platoon sergeant and squad leaders. Use their expertise.

STEP 4:
Issue the Preinspection Order

The preinspection order issued to your NCOs should include the following information:

- Specific standards to be achieved (especially regarding the recurring deficiencies which the experts that you consulted said were common). Use a handout, so nothing is "lost in translation."
- The dates and times the squad leaders will have to prepare, inspect, and to reinspect their soldiers.
- The date and time of your inspection, if the inspection is announced.
- The date after which the squads will be expected to be ready for inspection, if the inspection is unannounced.
- Scheduling instructions if inspections are staggered.
- Layout instruction.
- Instructions for obtaining materials used to prepare for the inspection.
- A sample walk-through inspection explaining standards.
- A simple statement that squad leaders' performance ratings are affected by their performance at your inspection.
- A simple statement that all routine business (such as medical appointments or passes) will be routed through the platoon sergeant for approval and should be kept to an absolute minimum on inspection day.

Point out that you expect to be told well before the inspection if there is any problem meeting the announced schedule.

STEP 5:
Prepare For The Inspection

Ensure that your squad leaders receive the preparation time allotted in your order. If the time is stolen for other priorities, delay your inspection.

Stay out of the squad areas during squad inspections, unless a squad leader requests your personal guidance. If your order was explicit and detailed, you are not needed during preparation. In fact, you are impinging on the NCO's job if you meddle.

Prior to actually conducting the inspection, prepare yourself. Make up an easy-to-follow tabulation of standards and items to be checked. You may not have time to inspect all standards so pick representative samples. The tabulation must provide a ready reference of what was checked and how it met standards (or who was not inspected at all) and what deficiencies require reinspection. For this reason, tabulate by name or vehicle bumper number, not by room, squad, or type of vehicle.

Explain the tabulation to a recorder, one of your best troops who is literate. (Your platoon sergeant is better employed helping you to inspect and control squad leaders rather than being your recorder.) Rehearse using the tabulation with your recorder. If your inspection record is garbled, you will have wasted considerable effort.

Do not maintain the record yourself. Your writing distracts those you are inspecting and unnecessarily prolongs the inspection.

Review the standards and rehearse the inspection yourself until you can conduct the inspection as a ritual. Where the list is long, keep a note card of the standards to ensure you cover all those on the tabulation.

STEP 6:
Conduct The Inspection

As you start inspecting each squad,

quickly determine whether your preinspection order was followed. If standards are ignored wholesale, if preinspection instructions were not followed, or if layouts are improper and show negligence, stop the inspection and proceed to the next squad.

Counsel the offending squad leader privately, not in front of his troops. Point out that he was told exactly what to do, given time to do it, and failed to perform. If the squad leader has had previous incidents of negligence or inefficiency, keep a written record of the counselling and take other action as necessary.

Set a time for reinspection, without setting additional on-duty time for preparation. Set the reinspection itself for off-duty time only if the problem has its roots with the soldiers. If the problem is primarily centered on the squad leader, punishing the entire squad is counterproductive. If the entire platoon fails to follow instruction, counsel the platoon sergeant. Then reinspect the entire platoon later.

Double-check recording of the deficiencies during this inspection. Again, garbled recording means you have wasted time.

STEP 7:
Issue Results/Counsel Squad Leaders

Each squad leader should have written down your corrections. Nevertheless, you need to give feedback on the performance of each squad leader and of each squad. Give the squad leader a copy of the annotated deficiences. Counsel and take action as necessary.

STEP 8:
Plan Re-Inspection Of Deficiencies

Many platoon leaders terminate their actions at this point, assuming that the corrections will be made. You must follow up on checking the deficiencies uncovered in the inspection. Delegation of this responsibility significantly weakens the inspection's impact and the perception of your interest in the standards.

If the platoon is still well below the desired standard, return to Step 3 and start the entire sequence over with a hard line on expected performance. If the platoon is beyond the major inspection cycle (only minor corrections were found in the last inspection), do the following:

Double-check to ensure the previous inspections included all personnel and equipment. Invariably the soldier performing special duties or in school is the soldier the chain-of-command ignores. This is probably the soldier with the substandard appearance. Equipment may have been missed because it was lent or at direct support maintenance. If men and equipment were missed in the previous inspections, ensure that they appear at the final inspection.

Give an order for the reinspection of specific deficiencies which is as detailed as the one you gave for the comprehensive inspection. Consider adding the following to your instructions:

- Excusing those who have performed to standard from attending the reinspection. You may give them and the squad leader free time if the entire squad performed well.
- Making more explicit any standards which caused confusion during prior inspections.
- Shortening the time between inspections and reinspection.
- Discussing probable actions for failure to respond to correction.

STEP 9:
Conduct The Re-Inspection

Conduct the re-inspection in the same organized manner as the inspection itself. However, this time you will be inspecting with the previous inspection results in hand instead of the earlier tabulations of standards. Check off the deficiencies that have been corrected.

STEP 10:
Take Appropriate Action

If any of the previously noted deficiencies were not corrected, take strong action. Such action can vary widely; consult your commander for advice and guidance.

Reward those who achieved standards without undue prodding. Again, discuss rewards with your commander.

STEP 11:
Write An SOP

Now that your platoon is at the desired standard, do not assume that level will be maintained without continued effort. Write an SOP to prevent backsliding. The SOP should include:

- The listing of standards from Step 2.
- A regular sequence of unannounced inspections by the chain-of-command ("the platoon leader will inspect at least once a month. . .").
- A record of the platoon's performance to determine platoon rewards and punishments and to track platoon progress.

After the initial flurry of inspections when a new leader takes over, the platoon should be at standard and performing according to SOP in the following areas:

- Vehicle maintenance.
- Tool/tool kit maintenance and accountability.
- Personal appearance.
- Room appearance.
- TA50 maintenance and accountability.
- Weapon maintenance.
- NBC protective equipment maintenance.
- Communications/STANO equipment maintenance and accountability.

This list is obviously incomplete. Solicit additional areas of concern from your commander.

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MAJ Jefferson J. Irvin is an assistant professor in the Engineering Department, U.S. Military Academy. He served as a platoon leader and company commander in the 94th Engineer Bn. (CBT), USAREUR. MAJ Irvin has a bachelor's degree from the U.S. Military Academy and a master's degree from Stanford University.

Success through Respect

by 1LT Louis J. Leto

...the ultimate goal of every platoon leader.

"True respect," whether or not it's agreed upon as Army "doctrine", is the ultimate goal for which every platoon leader should strive. It is a deep rooted relationship which must exist between a leader and his men; without it they will never follow him onto a battlefield.

"True respect" is that bond existing which makes them *actually volunteer* to work weekends. It is that which makes soldiers give 100 percent effort to any mission because they know their platoon leader gives them the same effort for them. It is a respect which must be earned.

A platoon leader starts building this relationship the day he reports for duty. About to assume more responsibilities than he has ever accepted, he desperately needs to make a good first impression with his men as well as with his company commander. He becomes a focal point for all eyes in the company.

"You're always under the spot light," says CPT Charles J. Fiala Jr., commander, Company C, 11th Engineer Battalion (Combat) (Heavy). "Everything you do, everything you say, they're (soldiers) always watching".

The successful platoon leader always exceeds the highest standards he sets for his men. He never accepts substandard performance from himself nor from his troops. He eliminates substandard performers. However, he is fair and just and will help his troops 24 hours a day, seven days a week. His integrity as an officer is paramount and, likewise, he accepts only the truth from his men. He is a total professional.

The 100 percent inventory is the first major test a new platoon leader undergoes. The inventory must be well planned and organized. While the platoon grades the student on how he conducts himself and the inventory, his company commander grades him on supply procedures, ensuring all property is accountable and hand-receipted to user level, and shortage annexes are current and proper resupply action is taken. A platoon leader who conducts a shoddy inventory can cause irreputable damage; it will be much more difficult to earn the "true respect" he needs from his men.

A young, inexperienced platoon leader is usually highly motivated when starting his first troop assignment. The word "can't" is foreign to him; he and his men can do it all.

Although this is an excellent attitude for a new platoon leader, expecially and engineer officer, it can prove to be an even greater weakness if he fails to plan.

A new platoon leader should be well-organized even before reporting to his unit. He should learn all he can about his new unit and become familiar with the TOE.

For example, a second lieutenant going to a combat engineer company should learn everything he can about that type of unit and its missions. He should know about the equipment and manpower he is authorized. He should study supply procedures. He should learn about all available sources of information and know where to find them. He should know the difference between the role of the platoon leader versus the role of the platoon sergeant.

Then with all of this information, the new platoon leader is ready to begin work. That is, he is ready to observe, to take notes, and to ask questions. He is ready to start *earning* respect. In fact, with the exception of conducting his first 100 percent inventory, playing the role of the student is all the new platoon leader does for the first few weeks.

Regardless of how confining this feels to an aggressive, motivated (yet inexperienced) platoon leader, playing the student role is still a requirement if he intends to graduate to a leader. Meanwhile, it is his professor's (platoon sergeant's) job to ensure his student doesn't get too far ahead of the lesson plan.

With his platoon sergeant's guidance, the successful platoon leader takes chances for his troops, even if it means a "counseling session" from company commander. He ensures his troops are recognized for accomplishments before he is recognized. He seeks not to better his image in front of his commander at the expense of his troops. If he volunteers his troops he volunteers himself also; he does not sacrifice his troops without first sacrificing himself.

A platoon leader must learn the significance of this respect. It is his men who determine his success. It is his men who handle the heavy equipment, place the minefields, and dig the tank ditches. If they succeed, the platoon leader succeeds. If they fail, the platoon leader fails. Soldiers will not risk their lives or strive for perfection for a leader they don't respect.

Only through total dedication to duty and to his men will a platoon leader succeed. Only then will a platoon devote themselves to their leader, and only then will the word "can't" be foreign to them. Only then will they know that they and their platoon leader can do it all.

1LT Louis J. Leto is the assistant editor of ENGINEER Magazine. He has a bachelor's degree in journalism from Temple University. He is an Engineer Officer Basic Course graduate and has served as the assistant adjutant of the 11th Engineer Bn. (C) (H) and as a platoon leader with C Co. of the 11th Engineers.

Hotline Q & A

Q. What does Army doctrine say about the ratio of corps level mechanized combat engineer battalions to wheeled engineer battalions in a fully developed corps?

A. The ratio is normally one corps level mechanized combat battalion and two corps level wheeled engineer battalions per division in a fully developed corps.

Q. The hydraulic jacks with the medium girder bridge have reliability problems. Is there any corrective action planned or under study?

A. The problem with the British-made 15-ton jacks is that the hydraulic release valves have a tendency to leak. Studies indicate that operators often fail to close the valve after use, allowing dirt and sand to get into the seals. This results in hydraulic fluid leaking from the jacks. The Army, however, is buying the link reinforcement set for the medium girder bridge. The set includes a 20-ton hydraulic jack to replace the standard 15-ton jack. However, the operators should take the same precautions with the 20-ton jacks in closing the release valves to avoid future problems.

Q. Is there a new paint for camouflaging vehicles and equipment that is resistant to chemical contaminants? Is the camouflage pattern for vehicles changed?

A. The new camouflage paint, Chemical Agent Resistant Coating, is specifically designed to resist all known chemical agents. This paint, however, demands strict controls in the mixing process as well as in personal safety and application. The paint, therefore, is handled at depot level by specially trained personnel. The camouflage pattern is changed from the four-color pattern to a three-color pattern to improve vehicle concealment.

Q. I completed EOBC in September 1981. Does this meet the requirements for attending the Battalion Training Management Systems (BTMS) Course?

A. Anyone who graduated after June 1982 meets the BTMS course requirements. Anyone graduating before this date must attend a BTMS workshop before receiving a certificate of completion.

Engineer CATS Build in Micronesia

by CPT Randy M. Emory

When most people hear about a "cat-team" operation on Ponape, Micronesia, they either joke about one's choice of pets or ask to see Special Forces credentials.

Actually, "cat-team," or CAT (civic action team), is a self-supporting, 13-man team modeled after the small military construction teams used in Southeast Asia in the 1960s. The current version of these teams were formed to assist the economic development of Micronesia. (Micronesia is under jurisdiction of the Department of Interior (DOI) and has been a U.S. Trust Territory since the end of World War II).

The DOI has delegated responsibility for the civic action program to the Navy because of the Navy's traditional Pacific role and because of its experience with Seabee teams (Navy engineers). Army participation in the program is under operational control of the 30th Naval Construction Regiment (NCR), Guam, with Army participants using Navy equipment and logistic systems.

Part of the Army's contribution to the civic action program was CAT 84-2 which spent eight months (March-November 1981) assisting Ponape (Pone-a-pay), a small island 1,100 miles southeast of Guam and 2,600 miles southwest of Hawaii. (The "84" represents the 84th Engineer Battalion, (Combat) (Heavy) in Scholfield Barracks, Hawaii from which the team came; the "dash 2" indicates the second team of a five-year project.)

The team's mission in Ponape was five-fold: to assist Ponape's economic development with horizontal and vertical construction projects; to conduct on-the-job training for Ponapeans in horizontal and vertical construction; to provide medical assistance using the skills of the team's medical corpsman; to improve the relationship between the U.S. military and Ponape; and to maintain a U.S. military presence in Micronesia.

Starting road building operations through the jungles of Ponape.

Picking The Players

Team selection began in December 1980 under Navy guidelines, followed by 10 weeks of training in Hawaii. With 18 pieces of construction and support equipment, but only a 13-person team, it was imperative to cross-train all team members. After completing training, the team reported to the 30th NCR in Guam for additional training in the Navy supply and maintenance system and to receive its mission. Specific equipment training had to be completed after arriving on Ponape during the week-long overlap with team 84-1.

The major tasks for CAT 84-2 were constructing 2,300 feet of road around Ponape; upgrading and maintaining 13 miles of existing road; completing base camp construction begun by CAT 84-1; and securing projects for team 84-3.

But First...

To understand the Ponape projects, it helps to first understand Ponape. The circular, 126-square mile island is underdeveloped. The capital, Kolonia, is the only part of the island with electricity and water facilities. Half of the island is without roads, and the few existing roads are not maintained. The only asphalt roads are in Kolonia. All others, including the team's new road construction project, are roads capped with coral dredged from the island's surrounding reef. Heavy rains, averaging 21.5 inches a month, make road construction and maintenance a difficult task.

Ponapean culture and language is quite different from ours. This led to difficulties in vocational training and in solving problems during the projects. English is not widely spoken, but there is usually someone in a group that speaks English well enough to translate. Everyone in the government speaks English, but some commonly used American terms

are not known by the Ponapeans.

Logistically, very few items were available from the local economy. Resupply came once monthly by Air Force C130s. Items identified by the local government for new projects came by commercial shipping.

Road Projects

The 2,300 feet of new road to be built was designed by the Ponape Transportation Authority (PTA) with specifications similar to our theater of operations (T/O) Class B road, except that the Ponape road would have a 6- to 12-inch coral cap. Construction coral had to be dredged from the island's surrounding reef and placed without being crushed. The team had no crusher, so the coral was smashed by running trucks over the road.

Ponape's soil, a volcanic clay, compounded the problem of the high rainfall. Even worse, the land elevates from the shoreline to a mountain that covers 60 percent of the island; the terrain is obviously very hilly.

Road construction began in April 1981 and immediately there were problems with fill sections. The constant rain and volcanic clay made it impossible to use cut material for fill or to use the D7 bulldozer and other heavy equipment. Dredged coral from the reef was the only effective fill material. One fill section was so large (325 feet long and 21 feet deep) that it could not be completed; an alternate route for the road had to be chosen.

At first, the team's efforts were totally opposed by the PTA commissioner because of right-of-way agreements with land owners. The problem was solved by adjusting the location of the road. The delay was beneficial in one respect, it allowed time to finish dredging enough coral to complete the road.

Since heavy equipment, especially the D7 dozer, was not suited for the environment, the local agriculture station provided an old D6 cable operated dozer with 36-inch wide tracks. The D6 enabled the team to borrow.

During the road project, about 21,000 cubic yards of earth were cut and 4,800 cubic yards of coral placed as fill and cap material. Three culverts were installed, totalling 103 pieces of 2-foot long, 24-inch RCP with rock hardwalls.

The relentless rains were also a constant problem for the other road project, upgrading and maintaining 13 miles of existing road. In fact, it rained at least every four days during deployment, and it rained every day in November.

Vertical Construction

The tremendous rainfall allowed plenty of time to complete base camp construction. The distance from the camp to town, however, meant the team had to provide its own power and potable water.

The rain catchment system designed for the camp proved inadequate for the daily 1,300 gallon demand. The team redesigned the system to take advantage of a small river running 700 feet from the camp by installing 2-inch PVC pipe and erecting five 3,000-gallon water

An old D6 dozer from a Ponapean agriculture station was used for borrowing operations.

bladders. This provided 9,000 gallons of river water and 6,000 gallons of purified water.

Shelters were built to protect from the rain the two 30-kilowatt generators, air compressors, a walk-in refrigerator, water purification equipment, and a welding shop.

Community Relations

Interaction with the Ponapeans, both with projects and socially, was another important aspect of the deployment.

The most vital American-Ponapean contact was through the dispensary at the base camp where the team medic treated over 160 patients per month. The most common diseases for Ponapeans were intestinal parasites and infections in open wounds. In one case, the medic correctly diagnosed an infant's life-threatening skull deformity and helped convince local health officials to send the child to Hawaii for surgery.

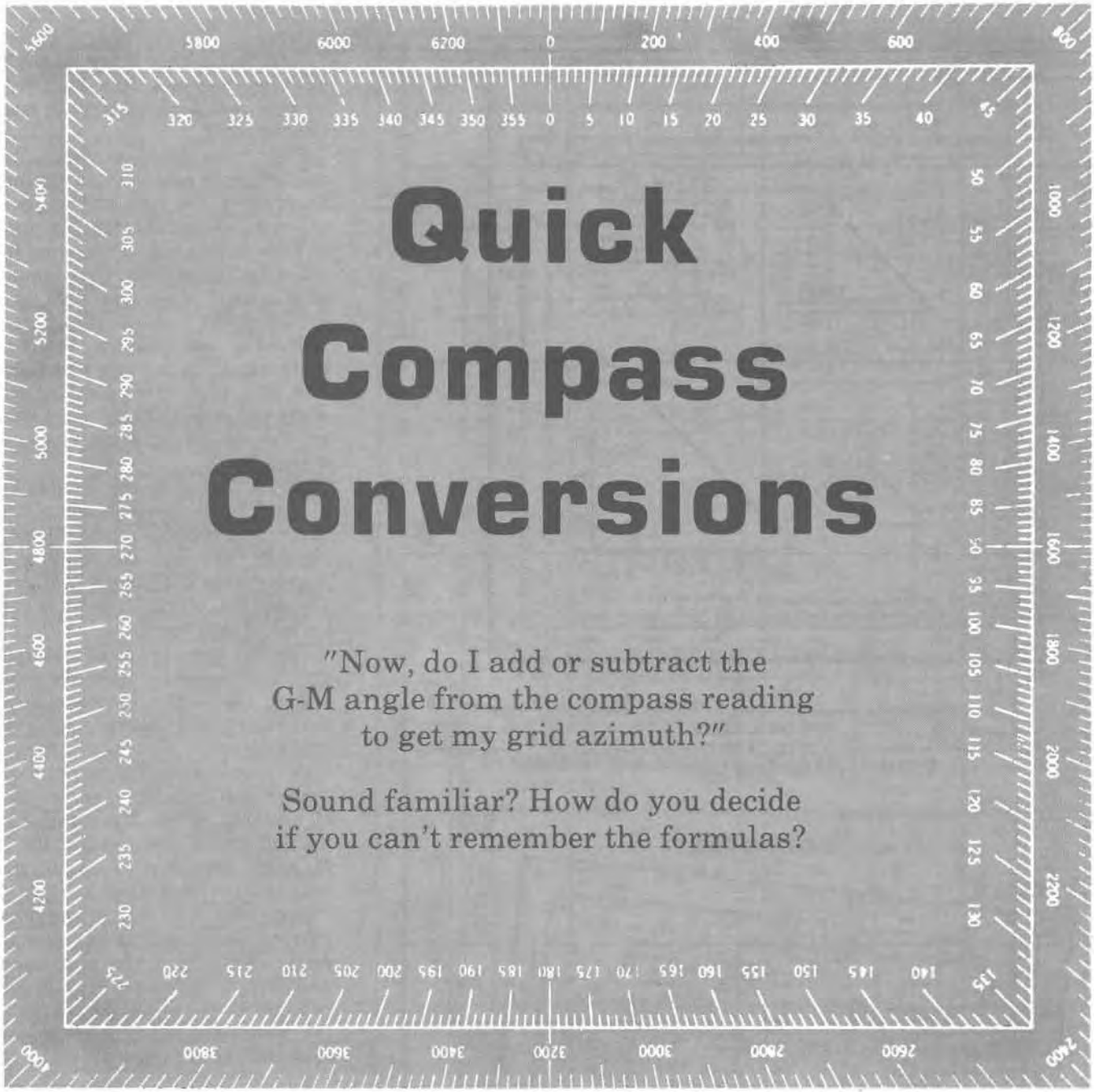
Renovating the local high school track for the Liberation Day celebration, clearing home sites, constructing concrete foot bridges and other projects were also part of the civic action program.

Through the vocational training program the team had contact with the Ponapeans and grew to better understand the native culture. The program also helped both sides overcome language and work habit differences, the biggest barriers encountered. In fact, the Ponapean trainees became a valuable asset as workers and as liaison personnel with the community.

For the 13 men from the 84th Engineers lucky enough to serve on CAT 84-2, the duty in Micronesia was the best of both worlds. They were able to employ their skills and training as military engineers, and they had the opportunity to help the Ponapean people improve their standard of living.

Coral dredging operations in Ponape. The coral was used as fill during road building projects.

Members of CAT 84-2, all from the 84th Engineer Bn., with Ponapean officials (author is on far right).



Quick Compass Conversions

"Now, do I add or subtract the G-M angle from the compass reading to get my grid azimuth?"

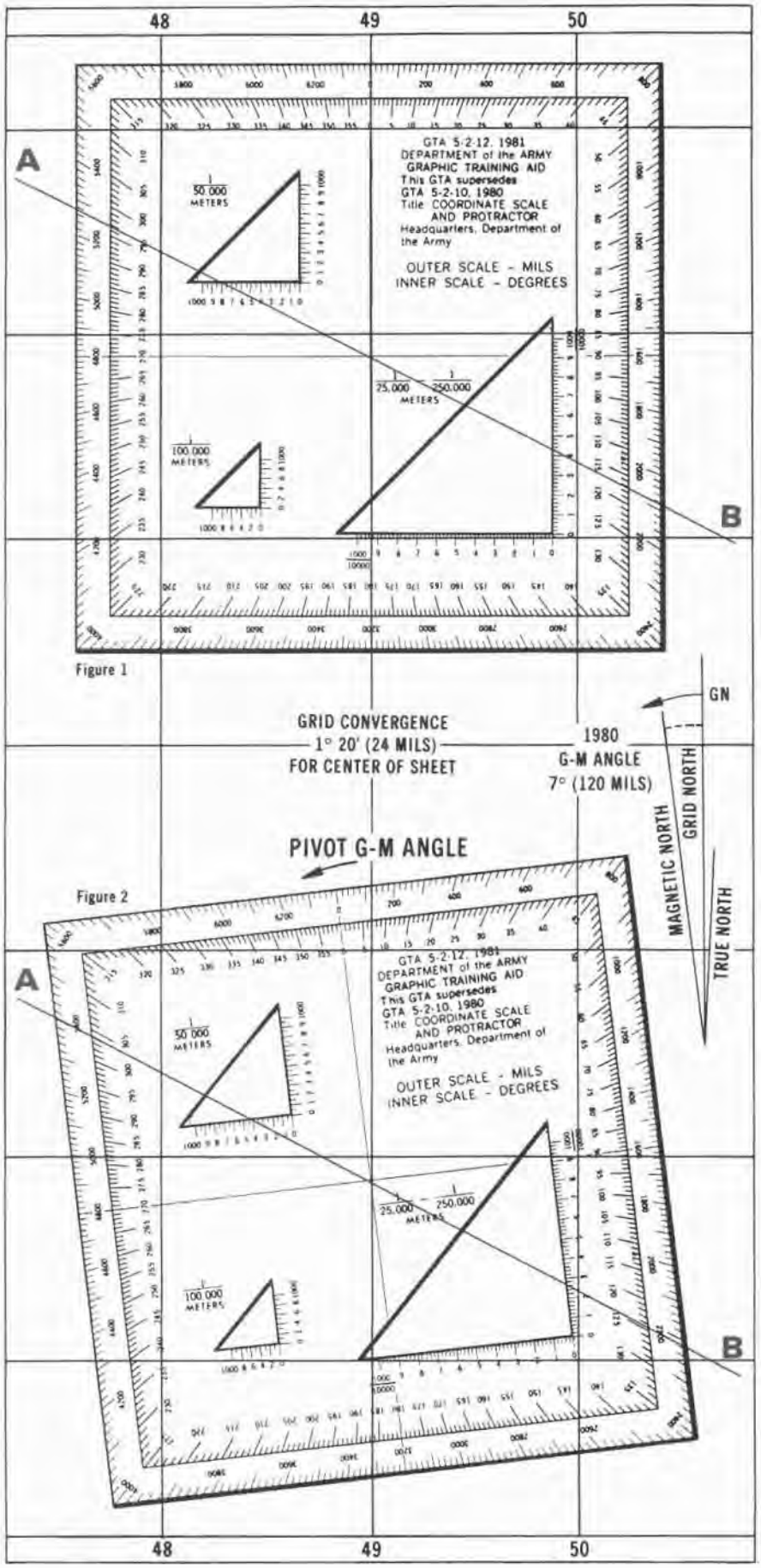
Sound familiar? How do you decide if you can't remember the formulas?

by MAJ John C. Jens

New edition maps printed by the Defense Mapping Agency have the formulas printed with the declination diagram. However, most maps currently in use don't have this aid and will not unless the practice is adopted as an international standard. (German maps are well known examples for not having the formulas.)

So, you still have to memorize the formulas right? Or do you use the diagram method in FM 21-26, *Map Reading*? Not so!

Here is a simple method which anyone can use to get the azimuth you want. The only tools you need are those normally used for map reading: a map with declination diagram, a pencil, a straightedge, and a protractor (any of the current GTA 5-2 series will do).



Since this method is best taught by working examples, let's start with an easy one: "Convert grid to magnetic azimuth."

First, you have to locate the azimuth to be converted on the map by drawing the line with a sharp pencil and a straightedge. You have to draw it long enough to cross the entire protractor/scale. For example, in Figure 1, we'll use 297° grid azimuth (GA).

Second, you position the protractor/scale on a north-south grid line, with the 0° mark pointing grid north and with the center cross hairs on the drawn azimuth line (see Figure 1).

Third, examine the declination diagram to see on which side of grid north that magnetic north is located, right or left, and the number of degrees of the G-M angle. In Figure 1 we see that magnetic north is 7° to the left of grid north.

Fourth, now, imagine that your protractor/scale becomes the magnetized needle of a compass. Since the magnetized needle will seek magnetic north, pivot the protractor/scale (your imagined compass) about the center cross hairs in the direction of magnetic north. The number of degrees pivoted should equal the G-M angle (see Figure 2). In our example, the pivot is left 7°.

Last, the magnetic azimuth on your compass reading can now be read directly from the protractor/scale where the line you drew in step one intersects the degree marks of the protractor. Does your answer read 304°, as in Figure 2?

See, I told you it was simple! Remember the key to this method is to imagine that when the protractor/scale becomes a compass needle, the 0° mark seeks magnetic north. Once you've practiced several times you'll be ready to try something a little more difficult: converting a magnetic to a grid azimuth.

The first step in converting a magnetic to a grid azimuth is to draw a line, any line will do, long enough to pass completely across the protractor/scale. Any grid line can also be substituted for this purpose. The line should then be labeled with the magnetic azimuth (MA) reading. For example, 64° MA as in Figure 3.

Next, position the cross hair of the protractor/scale on the line so that the line passes through the correct degree marking on the protractor. Your protractor is now acting as a compass and it is reading a magnetic azimuth of 64° (see Figure 3).

Third, check the declination diagram to see which side of magnetic north that the grid north lies and also the number of degrees in the G-M angle. Again, checking Figure 1 grid north is 7° to the right of the magnetic north.

Fourth, now imagine that the compass (protractor/scale) is demagnetized and wants to become a grid-reading device. Pivot the 0° mark in the direction of grid north the number of degrees of the G-M angle being sure to keep the cross hairs on the line, in this case, right 7° (see Figure 4).

Finally, you can now read the correct grid azimuth directly off the protractor degree markings (see Figure 4). You should read 57° as in Figure 4. Then, if needed, you can plot the correct grid azimuth at your location on the map.

Since in Step 1 you drew your line long enough to pass through the protractor/scale, another benefit of this method is that back-azimuth can be read directly by intersection without worryng about adding or subtracting 180°. In Figure 4, for example, the magnetic back-azimuth of 64° is 244°, and from Figures 1 and 2, the magnetic back-azimuth of a grid azimuth of 297° is 124°. You should now be able to do those "complex" resection problems with ease.

Orienteering anyone?

MAJ John C. Jens is mapping, charting and geodosy doctrine coordinator, and previously served as a photogeology instructor, at the Defense Mapping School, Ft. Belvoir. He was a terrain team leader and headquarters company commander in the 649th Engineer Bn. (Topographic), and he served as Tucson study manager with the Los Angeles Engineer District. MAJ Jens has a master's degree in geology from the University of Montana and is a registered professional geologist in Virginia.

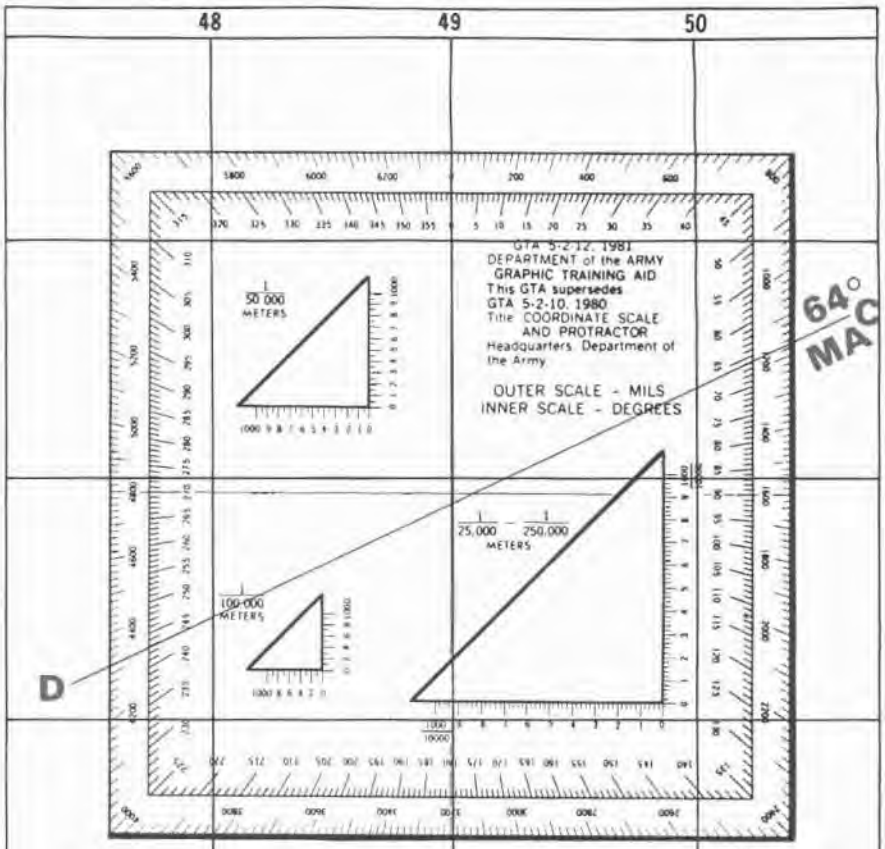
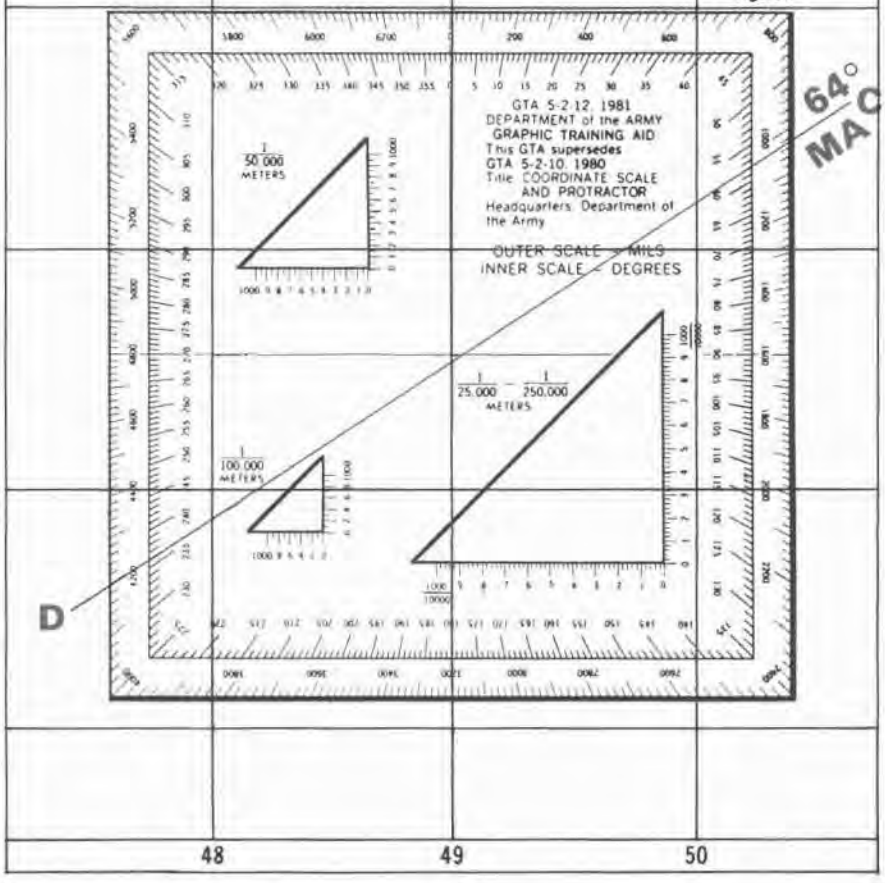


Figure 3

PIVOT G-M ANGLE TO GN FROM FIGURE 2

Figure 4



Post Support:

It can benefit the supporting unit

by CPT John A. Durkin

Using engineer troops for post support is often a lesson in futility for the facility engineer. Most engineering functions on post are contracted to civilian engineering companies, leaving few projects for the military engineer. A program developed at Fort Gordon, however, has demonstrated a way to effectively use combat engineers, while also helping to improve MOS skills and raise SQT scores.

Company D, 92nd Engineer Battalion (Combat) (Heavy) has provided post support to the U.S. Army Signal School and Fort Gordon since 1970. During that time, D Company was assigned only platoon-size projects. These included renovating two-story World War II buildings for Reserve Component billets, constructing a military police dog kennel and post riding stable, and completing numerous erosion control projects.

Program Drawbacks

The projects maintained unit integrity while supervisors and subordinates learned to work as a team. But there were drawbacks. Few projects effectively used all military occupational specialities (MOSs) within the platoon. Also, the installation lost many manhours of support when there was insufficient platoon-size projects available or when materials did not arrive as planned.

For example, during construction of the riding stables, carpenters were needed throughout the project, and electricians were required during the later phases of construction. The problem, however, was how to use plumbers, truck drivers, and other non-related specialities.

Most of the platoon found that they were merely the labor force until the project was well underway. At that point, those who desired cross training as carpenters or electricians could improve their skills, but when it came to SQT testing, some of these soldiers had no recent experience in their primary skill and, therefore, performed poorly during the hands on component.

A Different Approach

In June 1981, the Directorate of Facilities Engineering at Fort Gordon was reorganized. The move was made so that military engineers might participate in post engineering functions by working along with civilian contractors. For maintenance and repair mission purposes, the post was divided into four maintenance zones and a hospital support division. Two military engineering branches were established to service these zones: A special projects branch, which included welding, carpentry, sheetmetal and locksmith shops, and a roads and grounds branch.

The new method of operation was more conducive to individual and unit training for Delta Company. Dividing the responsibilities lended itself to assigning a squad or larger unit to each zone, branch, or activity. This allowed for engineers to work side-by-side with civilian journeymen while still keeping unit integrity.

To test the idea, one squad was assigned to a zone on a trial basis. The squad leader worked directly with the zone foreman, and the squadmembers worked with civilian journeymen. The results were excellent. The soldiers and civilians had nothing but praise for each other.

Construction projects were assigned to the applicable zones and became the responsibility of the zone foreman. Each foreman reviewed and ordered supplies, assisted the project officer when requested, and ultimately accepted the project for the facility engineer. If delays occurred in the project, the squad continued their individual MOS training by assisting a civilian journeyman with routine maintenance and repair projects.

Training Periods

The next step in the new program was to involve the entire company. A 90-day period was established for providing post support followed by 30 days for company training. During the 30-day training period the company moved to the field to complete military tasks and to test readiness.

The 90-day post support period allowed the soldier time to become familiar with the team projects and gave the civilian jouneymen time to help strengthen the soldier's MOS skills. Also, platoon leaders had sufficient time to plan in detail what instruction was to be given during the 30-day field training period. Common skills that needed reinforcing were taught to the entire platoon or company without fear of losing key personnel to post details.

Since the program began, Fort Gordon has been receiving engineer post support and MOSs 51B, C, H, K, R, and 52G, 64C, and 62J SQT scores have increased nearly 20 percent. Also important, company morale appears to be at an all time high.

LTC Martin C. Fisher is the Director of Facilities Engineering, Fort Gordon, Ga. He holds a bachelor's degree in civil engineering from the Virginia Military Institute and a master's degree in civil engineering from Arizona State University. He is a registered professional engineer and a graduate of the Command and General Staff College. He has served in Germany, Vietnam, Indonesia, Cambodia, and Saudi Arabia.

Training Without Straining

Improving strength, ability and endurance will help you pass the Army Physical Readiness Test. And, you can prevent injuries in your training program by "training without straining."

Soldiers should use their training programs to achieve and maintain improved physical fitness. "Physical fitness" is a relative term; we all begin conditioning programs with varying degrees of fitness. Although group training has its benefits, it is also helpful if training is more individualized and adapted to each person's abilities.

Physical fitness is many things to many people. Whatever else it may be, it is generally accepted that fitness includes strength, agility and endurance.

Strength

Many fitness experts feel that to improve strength one must do at least one more repetition of any given exercise than was previously done; i.e., 20 pushups today, at least 21 tomorrow. This approach has left many soldiers unable to pass the Army Physical Readiness Test. It is also a potential source of injury.

Few people would attempt to run a given distance—say, a mile—as fast as possible and then come back on succeeding days believing they could improve their times each day. Attempting maximum effort in any strengthening exercise day after day will often result in NO improvement.

In attempting to improve strength regardless of the exercise in question, use the principle of progressive resistive exercise. The following discussion relates to pushups, but is applicable to any strengthening exercise.

First, determine your maximum effort through a self test. If you cannot do even one pushup, you must initiate the exercise with a lesser degree of difficulty, perhaps by doing wall pushups or pushups from the knees instead of full length pushups done on the toes and hands.

Second, reduce your maximum effort by a half or a fourth. If the maximum repetitions you can do is 20, then start with 10 to 15 repetitions. This will be much easier to do. Rest for two or three minutes, perhaps interjecting a stretching exercise as you rest, and then do a second set of 10 to 15 repetitions. Repeat this procedure through three or four sets initially. You now will have done two or three times more repetitions than you did previously, when you did your maximum number of repetitions just once.

On succeeding days, continue the same number of repetitions and sets until this is no longer difficult. Now you can add additional sets. After accomplishing six or seven sets in one exercise period, you may choose to reduce the number of sets back to three while increasing the number of repetitions by 25 percent.

"The key to any training program is to tune in to the body."

Agility

Agility training, which is basically stretching, is different for each individual. Strict numbers of repetitions need not be applied. Follow these principles:

Stretch preventively those areas which routinely are shortened through activities. For example, runners routinely shorten the extensor muscles of the body like the back and hamstrings of the legs.

Stretch these muscles in a manner convenient to you when you feel a need. Do as many repetitions and hold for as long as necessary to achieve the mobility you desire.

Generally speaking, stretching is less critical in warmer weather when you should exercise more slowly for longer periods; for example, run several miles as opposed to a 100-yard sprint. Exercising in colder temperatures increases the need for added stretching before running or other rigorous exercise.

Endurance

In improving endurance, the heart and lungs are the primary areas of focus. To improve the efficiency of the heart and lungs, you should choose an activity that is accessible and enjoyable, one that will satisfy these three basic factors:

Intensity: The activity must successfully elevate the pulse to 70 percent of maximum. To determine maximum intensity, subtract your age in years from 220 and multiply the result by 70 percent. For example, a 40-year old person would want to work at a pulse of 126 beats per minute. At 70 percent of maximum, you'll find yourself breathing normally and not gasping for air. Most people take the pulse at the radial of the wrist or the carotid on the neck.

Duration: The activity must be carried on non-stop for 15 to 20 minutes or more. Some researchers advocate at least a 30-minute exercise period, but anything less than 15 to 20 minutes appears insufficient to produce a "training" effect. Additional time above 20 minutes will produce added training benefits.

Frequency: To improve endurance you should work out at least every second day. If you train more frequently, your results will be better.

Many activities satisfy these requirements for strength, agility, and endurance. Some suggestions are: fast walking, which is recommended for those previously leading a sedentary life, for at least the first three or four weeks or longer; running; swimming; cycling; cross-country skiing; jumping rope; or rowing.

These are but a few suggestions. Choose something you enjoy. If you choose walking, and you plan to progress to running, consider the following points:

Shoes: There are literally hundreds of good walking and running shoes on the market today. In choosing shoes to suit your needs, consider several factors. That portion of the shoe cupping the heel should be firm, molded and padded. Cushioning can be determined only by trying on the shoes, walking, running in them. The heel should be approximately 1/4 inch higher than the front of the foot. The cushioning effect of good shoes gives one the sensation of floating. The contrast in comfort between these and everyday shoes is like night and day. The shoes should bend with relative ease where the ball of the foot sits. If not, the shoe is too stiff and may lead to discomfort or injury.

Running considerations: Keep the hips beneath the shoulders, and don't lean forward. To accomplish this try taking a shorter stride. Gradually increase the number of steps per minute to as near 180 steps as possible. Avoid steep downhill slopes, at least for the first three weeks. The forces of gravity are multiplied considerably with downhill running on steeper grades. Running downhill requires less effort for the heart and lungs and is therefore unlikely to improve endurance; however, the additional forces of running downhill greatly increase the likelihood of injury, especially in the earlier stages of a conditioning program.

Movement in formation: Putting shorter people in front precludes overstriding and potential injury. Putting the least-conditioned people in front allows the formation to move at a pace all can match. It thus precludes injury from less-conditioned people trying to stay up with the group. This also allows the unit to remain intact and to improve cohesiveness. Spread the ranks when running. If the ranks are too close, all those not in the front rank are forced to run on their toes with a constant braking action to prevent stepping on the person in front of them. This can produce unusual stress and leg injuries.

The key to any training program is to tune in to the body, and apply training stresses in a gradual manner so that the body adapts and gains endurance.

Stress is a fact of life. Whether the stresses are mental or physical, they are not bad inherently. The key is for us to begin where we are and to increase the stresses gradually enough to allow adaptation and improvement in our level of conditioning.

The Balance

by COL (Ret.) Dandridge M. Malone

In the process of developing leaders, there will be one general malfunction. Even with this malfunction the unit will continue to operate, but it won't run smoothly on all cylinders. This malfunction has to do with *balancing.*

Two big factors underlie all we know about Army leadership: accomplishing the mission, and the welfare of the men. Mission and men.

Leaders are always working with these two factors. Whenever and wherever possible, a leader tries to balance them so that both the needs of the mission and the needs of the men are met. But there are times — sometimes in peace, often in war — where the needs of both cannot be met. The balance cannot be kept. A leader must choose one over the other. In these few situations, and the leader must make them few, the mission must come first.

There are those few times when our Army will not, cannot, and should not "be fair." The whole meaning of Army leadership rests on this law: the mission must come first. So does the meaning of "soldier," and "service," and "duty."

In the balancing business, the mission side of the scale requires to put it simply knowing your job in excruciating detail. Without it, an Army leader can never lead for long. Just talk won't work. The troops will know.

The men side of the scale requires the leader to know his soldiers. He must know what's inside of them, what makes them do things or not do things, what turns them on or off, what they can do and what they will do under stress, and when they're afraid, or tired, or cold, or lonely. These are the things he needs to know about his soldiers. They're what tells him how a soldier measures up on the "able and willing" gauge.

You, as a leader, must try to balance between these two requirements — mission needs and men needs. And it is precisely here, in this "balancing" business, where leaders most frequently fail. It is here where young sergeants and young lieutenants have their greatest difficulties and where even old leaders, despite their wisdom, sometimes lose sight of the ultimate purpose of leadership. The problem arises because of the relationship that exists between the soldiers' happiness and satisfaction on the one hand and their productivity and mission accomplishment on the other.

Common sense might tell you that happy, satisfied soldiers will get the job done better. From this, a leader, especially if he's a new sergeant or new lieutenant, might well assume that if he can somehow keep his soldiers happy and satisfied, then they will be more productive, more likely to get the mission accomplished. But the strange chemistry of leadership just doesn't work this way. A thousand scientific studies of leadership, and a thousand lessons of leadership experience, both prove that what seems to be a natural, common-sense assumption is precisely wrong!

In simple terms, mission accomplishment builds morale and esprit far more often than the other way around. When soldiers and units do the things that soldiers and units are supposed to do, that's when morale and esprit are highest. That's why the one best way to build will is to build skill. That's why those new basic training graduates are so fired up about soldiering and about the Army. That's why unit esprit is at its peak when the unit has a good exercise going out in the field.

If soldiers don't know both sides of this leadership scale — the needs of the mission and the needs of the men — in full detail, they'll be forever getting the scale tilted the wrong way. And when that happens, the soldiers' time, or the soldiers' spirit, or the soldiers themselves will be wasted.

There are times, in training, when you may be led astray. You may see cold, wet, muddy troops coming in from a night field exercise at 0200 and say, "Hell, let's let 'em get a hot shower and some sleep; then we'll pull maintenance when it's light enough to see." And there are times just like that in war when a bloody and shot-up company may be stalled in its assault, for the second time, halfway up a hill. You say, "Hell, they just can't do that again. Let's dig 'em in, pound that hill with Red-Leg, and ask battalion for reinforcements." If you love your troops, in the noble way that good leaders do, both these decisions, at the time, may seem to be just common sense. But both are taking the easy way out, and both violate the ultimate purpose of Army leadership.

Now you can, and should, argue this point. But if you're talking about leadership, there's no way you can win. The purpose of leadership is to accomplish a task. And in the final analysis, when the action shifts to the battlefield for which you are now preparing, mission must come first. As you lead, and as you build leaders, this law must be, flat-out, the cornerstone of your foundation.

Reprinted from INFANTRY magazine.

Career Notes

Commissioned Officers' Branch

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

Guide to the OER Support Form:

DA Form 67-8-1 is a highly valuable tool for the rated officer and rating officials. It provides the mechanism for the meshing of organizational, professional and personal goals within units and activities. The tool is especially important where time and distance do not permit close contact between the rated and rating officers (e.g., duty with Reserve Components, remote USACE activities, liaison activities, etc.). In these instances, the rated officer should request a personal interview with his rating official to find agreement on major performance objectives. Mid-course meetings should also be arranged to review progress, re-chart goals or redirect efforts. Several helpful hints on the form follow.

Part IIIa, labeled for "duties and responsibilities," is especially critical for non-troop positions. This paragraph should be written in familiar Army terminology. If your position is an unusual one, compare your duties to those in familiar Army positions. Avoid little-understood abbreviations, especially in technical material.

In developing your major performance objectives (part IIIb), seek a copy of your rater's support form to use as a guide. Your objectives should be attainable, measureable, and written against objective criteria.

The third paragraph of the support form, part IIIc, is where you list your significant contributions. Ensure that your contributions tie-in with your performance objectives. Be objective, yet not humble.

Guide to the OER:

Generally, the weight of selection board decisions is with the DA Form 67-8. The OER is an articulation of the contributions and potential of the rated officer. The report should be written in clear and solid language. Short, action-oriented declarative sentences are best. Repetitive phrases and adjectives can detract from a report's effectiveness. Rating officers need not fill the entire narrative portion of the report to provide a clear understanding of the rated officer's "worth." Once a report is accepted at MILPERCEN for permanent filing, it is very difficult to change. Ensure that what is said and what is checked is warranted. Hindsight is inoperative here.

Tips for Raters

Recheck the job description from Part IIIa of the Support Form (DA Form 67-8-1) and ensure it accurately depicts major duties, is in general Army terms, and where required, compares to common troop positions.

Use the comments portion of Part IVb to explain any anomolies in physical fitness (profile) or military bearing and appearance (such as the results of a pinch test and weight reduction progress to date). Address outstanding or weak competencies and similarly address

Commissioned Officers' Branch (continued)

ethnical traits. The norm is a 1. Give the officer the number he deserves; if he doesn't deserve a 2, 3, 4 or 5, give him a 1.

Use the performance objectives and contributions listed on the Support Form to assist in developing the narrative.

Be logical in commenting on potential for schools and assignments. For example, CSC and battalion command; SSC and brigade-level command. Address leadership potential in the context of command. Problem solving and managerial skills should point to a level of assignment (e.g., unit, division, MACOM, DA).

Tips for Senior Raters

The narrative continues to be the bedrock of this section of the report. Complementary aspects of the senior rater's section of the report are the box check and the senior rater's profile.

Each senior rater needs a profile game plan—a mailbox system if you will—to provide a "mind's eye" point of reference into which officers of each grade can be placed. The vast majority of senior raters continue to spread their box checks. Most appear to be spreading their effective officers across the top four boxes. Senior raters should track their profiles from both an overall and an individual perspective. Losing track of a profile and unknowingly placing an individual lower or higher than in previous reports can have a serious impact on an officer's competitiveness. Profiles should be restarted when conditions or analysis dictate a broadening or contracting of the mailbox system. A phone call to the MILPERCEN Evaluation Systems Officer (AV 221-9659/9570) will restart a profile. Automatic restarting will take place after 100 reports have been rendered for a particular goal.

Senior rates should focus on the potential of the officer being evaluated. Like the rater, this potential should be logically developed and should specify a level of leadership or managerial assignment, and qualifications for additional schooling.

Warrant Officers' Branch

(202) 325-7838/7839, AV 221

MOS 621A Shortage:

The Army has a shortage of Warrant Officers for MOS 621A, *Engineer Equipment Repair Technician.* Qualifications and application procedures are outlined in DA Circular 601-83-2. Warrant Officer Procurement Program - FY 84 dated September 15, 1983.

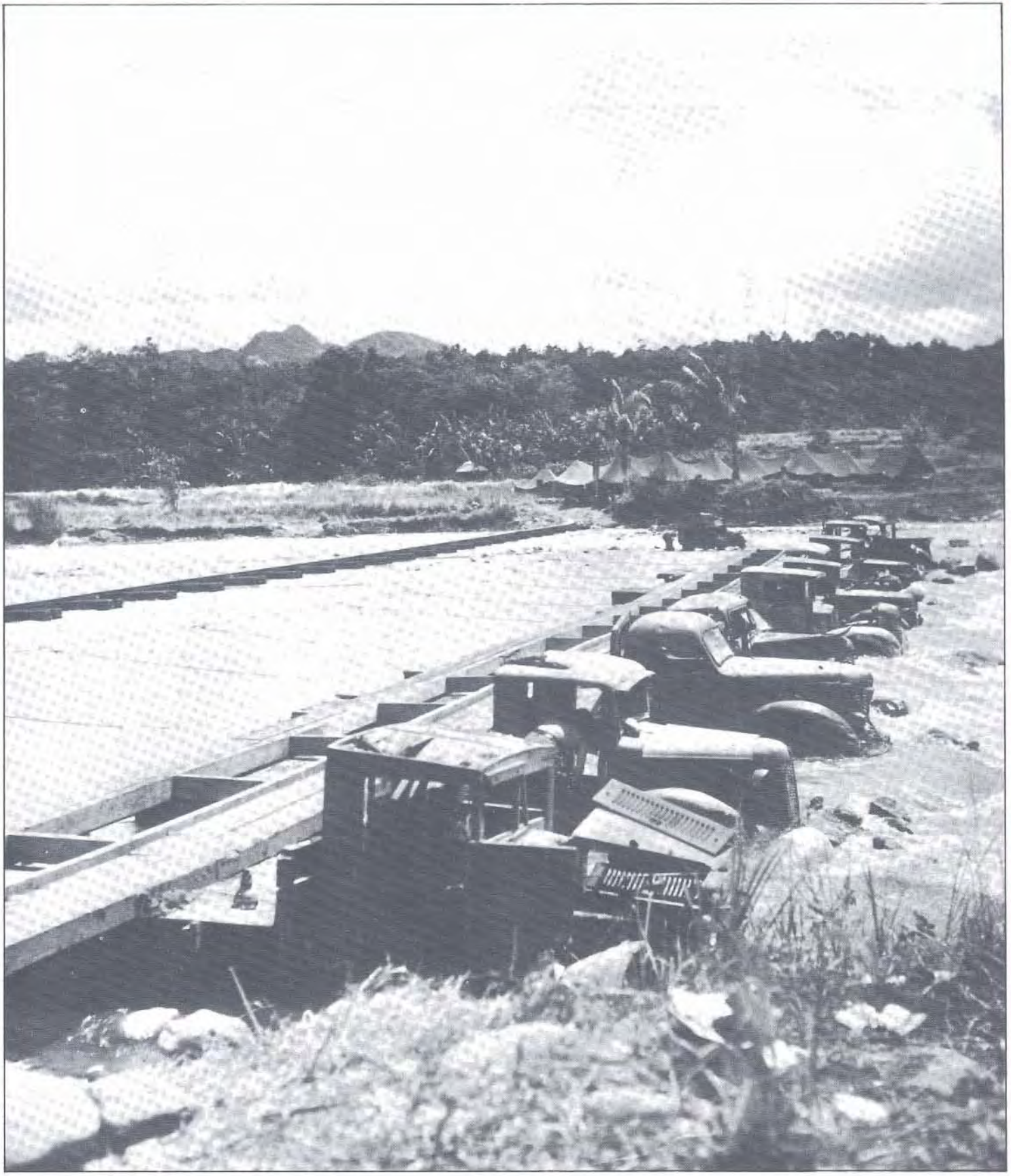
A warrant officer recruiting team from MILPERCEN is scheduled to visit the following installations and overseas areas: Ft. Gordon, May 7-11; Ft. Polk, May 21-25; USAREAU, June 9-30.

Interested qualified personnel who desires to be a warrant officer are encouraged to attend the recruiting teams' briefing, or to contact CW4 Mullins at MILPERCEN, ATTN: DAPC-OPW, 200 Stovall St., Alexandria, VA 22332. Phone: AV 221-7832/7840.

NCO & EM BRANCH

- **Overstrength MOSs**

See News & Notes, page 3.



An improvised wooden treadway bridge is supported by the beds of old trucks placed in the stream. Cables on the upstream side were used to hold the vehicles in place. A floating footbridge is upstream from the vehicle bridge. (Photo taken somewhere in the Pacific during World War II.)