THE ENGINEER

OPMS

OPMS

FALL 1974

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FEATURES

DEPARTMENTS

CHIEF'S BRIEFS

Major General Joseph Gilbert Totten was born in New Haven, Connecticut, August 23, 1788. He was graduated from the US Military Academy, July 1, 1805, and appointed Second Lieutenant, Corps of Engineers. He resigned from the Army on March 31, 1806, to accompany, as secretary, his uncle, Captain Jared Mansfield, who had been appointed by President Jefferson, Surveyor General of Ohio and the Northwest Territory.

Totten re-entered the Corps in 1808, where he remained until his death, April 22, 1864. He was an authority on sea coast fortifications, and as a member of the first Permanent Board of Engineers (established in 1816) he laid down principles of coast defense construction which were followed for more than a century. His service covered three wars, the War of 1812, Mexican War, and the Civil War. He served 26 years as Chief Engineer, 1838-1864, the longest on record.

As Chief of Engineers during the Civil War he supervised the defensive works around Washington. On the day before he died he was brevetted a Major General by Congress "for long, faithful and eminent service".

Edward B. Russell
Curator, US Army Engineer Museum

United States Army Engineer School
Fort Belvoir, Virginia

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ABOUT THE COVER

The advent of the Officer Personnel Management System (OPMS) is symbolically portrayed on the cover of this issue by a playing card. With OPMS, your career will always be dealt a high card and your alternate speciality will always result in a winning hand. How can you sit in on the game? "Ante-up" by reading "OPMS-Anathema of Panacea for Career Development" beginning on page 11. With OPMS, the odds are in your favor.

.PIPELINE.PIPE

RIBBON BRIDGE EQUIPMENT RECEIVES NEW TYPE CLASSIFICATION

A faster method of launching the boat used for the assembly of the Army's new ribbon bridge has been Type Classified as Standard. This means the method used, along with the equipment itself, is considered the most advanced and satisfactory item available to meet current military needs.

Both the new launching method and the ribbon bridge itself were developed and tested by the Military Technology Department at the US Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Virginia.

Essentially a boat cradle assembly, the new method permits the present standard 27 foot bridge erection boat to be launched directly into the water from the ribbon bridge truck transporter in a fraction of the time required using a crane. This enables the boat to keep pace with the 20 feet per minute assembly time of the actual bridge modules which are launched from the transporters directly into the water. Use of the cradle assembly reduces the boat launching or retrieval time from 30 to approximately two minutes. This also means the elimination of a 20 ton crane and the number of personnel reduced from six to three.

The ribbon bridge is now in production under a $10 million contract with Consolidated Diesel Electric Division of CONDEX Corporation, Old Greenwich, Connecticut. Units are expected to be available for field use in the summer of 1975. Cradles are expected to be available concurrent with the bridge units under a contract for 54 of the special boat units awarded to Pacific Car and Foundry Co., Renton, Washington.

PLANS AVAILABLE FROM OCE FOR A TRAINING ENVIRONMENT

Do you have a place for commander's call and company training? A place where all the soldiers in the unit can sit around and be close to equipment, sand tables, speakers, etc.: see a vehicle maintained; a weapon served; equipment repaired; first echelon maintenance pulled; tactical concepts worked out on a sand table?

Are you fighting the weather and noise out under the trees or trying to make the theater, dayroom or messhall do?

If the answer to any of these questions causes you irritation, makes you see red, or revivies bitter memories, then READ ON. The Office, Chief of Engineers may have a dynamic answer to your problem. It's a brand new self help company training facility to satisfy most units' needs.

The Office, Chief of Engineers has contracted to Clark, Nixsen and Owens, Architects and Engineers, to design a 40 ft x 40 ft x 20 ft high structure which will be added to the Army's Functional Component System (AFCS). The structure will accommodate all of the personnel in a company-size unit and will solve many of the unit's training facility problems. This all-weather building is large enough to permit static display of most items of TOE equipment; use multiple sand tables, slide projectors, viewgraphs or film projectors; and allow all the personnel to see and hear what's going on.

The structure is designed to be built in usable phases; that is, foundation and roof first; siding and windows next; followed by a floor and utilities. It can be built by non-engineer units as a dynamic training project with some construction equipment and engineer support, particularly in fabricating and erecting the roof trusses.

If, this building would fill a gap in your unit's training program and you're looking for some adventure in your training, you can obtain a set of plans and bill of materials by contacting the Office of Chief of Engineers, Engineering Design Division, HQDA, ATTN: DAEN-FEE-A, Washington, D.C. 20314.

MINIATURE TORCH DEVELOPED BY MASSTER RESEARCHERS

Accidents and emergencies, such as a car wreck or many combat situations, often require a cutting torch to burn through tangled masses of metal.

Now, researchers at MASSTER (Modern Army Selected Systems Test, Evaluation and Review) are examining a new Miniature Thermal Bar Torch

LINE. PIPELINE.

...hat has a greater cutting power than the familiar oxyacetylene torch.

The new torch was developed by the Land Warfare Laboratory at Aberdeen Proving Grounds, Maryland, and the MASSTER testing is putting the torch through it paces in typical field situations with soldiers from the 2d Armored Division at Fort Hood.

The torch has such a high burn temperature that it can cut through concrete, stainless steel, earthen materials and other items that the oxyacetylene torch cannot penetrate, or has trouble penetrating.

For example, the mini torch can cut through eight inches of armor plating in 39 seconds, which could be significant in rescuing men from a damaged tank or armored personnel ...arrier when time is a critical ...actor.

There are great possibilities that the mini torch could be used in non-explosive demolition roles. It could be an effective tool to replace thermite or other explosives to destroy bridges, vehicles or such things as concrete field fortifications.

The greatest advantage of the mini torch is that is can be handled by one man. It can be parachuted into an area for clandestine operations, and it can be lit and operated on land or in the water without prior preheating or special preparation.

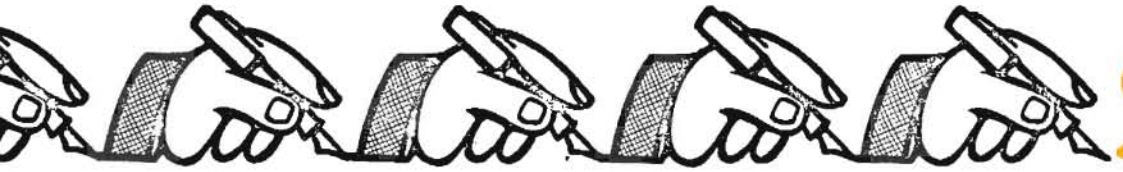
On the other hand, the oxyacetylene torch requires a preheating period prior to operations, it is bulky, unless operated from a truck, it requires at least two men to operate it, and it cannot be ...arachuted into an area in a combat-ready state.

Also, the oxyacetylene torch has an approximate heat range of 6000 degrees, whereas the mini torch can effectively operate high above this range. The mini torch does leave a much rougher cut than oxyacetlene, but this is understandable since it has greater heat level and melts more material faster.

Although the mini torch has innumerable possibilities as a military implement, the developers see it as a needed tool for humane operations.

The torch can operate off any type oxygen container and could be feasibly handled as an emergency rescue tool in such things as car wrecks where victims are trapped inside. Any ambulance, police car, fire truck or rescue vehicle could easily carry one of more of these torches and be prepared for any type of emergency cutting operation.

The MASSTER tests of the torch include timed tests for mobility, speed of operation and assembly. Soldiers from the 1st Battalion, 50th Infantry, of the 2d Armored Division were trained to operate the torch and used it on a variety of materials, including steel I-beams, armor plating, helicopter bodies, concrete and earth.



Stop 16

Sir:

I have read several issues of your magazine and find it to be very informative in many areas; however, I feel the articles seem to avoid the area of new equipment under development.

I believe that if articles in this subject area could be published to inform field soldiers of developing concepts or methods, the Corps would receive comments from the field on proposed changes. These comments could avoid costly modifications to equipment after issue, and would reduce the number of unauthorized modifications which occur in field units (i.e. radio's moved to driver's area of Gamma Goat in troop units).

This would also allow field personnel the opportunity to relate personal experiences in order to provide research

CPT Michael F. Burns
CE

Sir:

I was very pleased to see Eugene McAndrew's article on "An Engineer in the Black Hills". (Spring 74) As a geological engineering student at the S. D. School of Mines and Technology I became very familiar with many of the places mentioned in the article.

However, I disagree with Mr. McAndrew's last paragraph: "Ludlow had a great vision, but the Indians have retained much of their land in the Black Hills." Hardly! Forced out of the holy land, the "Paha-Sapa", the Sioux finally were settled on land that is about as worthless as the Black Hills are beautiful.

Most of the Black Hills is US Forest Service land; what little private land there is is almost universally owned by the white man. About the only Indians one now sees in the Black Hills are one or two amusing the tourists during the summer. The belief that the Indian retains much land in the Black Hills is about as worthless as the treaty that said he would.

In conclusion, Mr. McAndrew's article was excellent save for its ending. If one is to print history, it would be stated as it was . . . not as we would like it to be.

Gary C. Brown
SP4

Specialist Brown:

The conclusion of Mr. McAndrew's article was not his own, rather an added editorial afterthought. You may take some comfort in the fact that your letter was not the only one received challenging the added paragraph.

Sir:

The Spring 1974 edition of THE ENGINEER contains an article by Major McDonald entitled "It Was a Gallant Work" — the story of engineer participation in the Battle of Fredericksburg. In the article Major McDonald explains that General Burnside had available to him: The Engineer Battalion, a Regular Army unit commanded by Lieutenant Charles E. Cross and Volunteer Engineer Brigade commanded by Brigadier General Daniel P. Woodbury.

As the Engineer Battalion is in the lineage of the 1st Engineer Battalion, I read the article with much interest and hope that you and/or Major McDonald might help clarify some data inconsistencies concerning the Engineer Battalion's participation in this campaign.

Our records, here in the 1st Engineer Battalion, show that the Battalion of Engineers (as our data indicates it was called) was commanded by Major James C. Duane from 1861 through 1865, which would have included the period referred to in the article. I would appreciate clarifying the command status of the Battalion during this period so that we can correct our records, if necessary.

Thank you for your assistance.

W. M. SMITH, JR.
LTC, CE

Colonel Smith:

Your letter was turned over to Mr. Edward B. Russell, Curator of the Engineer Museum, for verification. He graciously agreed to check out Major McDonald's facts and furnish you a reply. For our ever inquisitive readers, we will relate that the article, as written by Major McDonald, was correct.

Stop 16 is our "letters to the Editor" Department. We encourage timely, spirited response and constructive criticism about THE ENGINEER and its contents.

ENGINEER INTERVIEW:

With **Captain Overton Day, Captain Roy Whitman, Captain Kenneth Elrick, Captain William Korn, Sergeant First Class Theodore J. Lenegar, Staff Sergeant Earl D. Divelbliss and Staff Sergeant Donald G. Harmel.**

Operation Nimbus Moon (Land) was a joint effort by the United States, Britain, France and Russia to assist the Egyptian Government in clearing the banks of the Suez Canal of mines and other explosive ordnance. This was accomplished in preparation for the reopening of the canal to international navigation.

In the spirit of the first joint United States and Egyptian peace project, a team of engineers from Fort Belvoir, Virginia was sent to the area of Isamailia with the mission to instruct Egyptian soldiers in the training and doctrine of U. S. mine removal.

In an effort to keep readers of THE ENGINEER *magazine up to date, we interviewed that team and got a first hand reaction to their mission and the country of Egypt at large. This is their story:*

ENGINEER: Can you tell our readers just exactly what was the role of the engineers during **OPERATION NIMBUS MOON (LAND)?**

CPT DAY: The engineer mission was to train and advise personnel of the Egyptian Army combat engineers whose mission was to clear minefields from the vicinity of the Suez Canal. We were part of a combined task force of engineer and EOD personnel.

ENGINEER: Who made the determination for your mission?

CPT DAY: Our mission was primarily determined by the Joint Chiefs of Staff after two preliminary planning trips to Egypt. Both of these trips were supervised by Navy Personnel. Nimbus Moon (LAND) was in fact an element of the joint Army-Navy Task Force under Navy command.

ENGINEER: What was the duration of **OPERATION NIMBUS MOON (LAND)?**

CPT DAY: The execution of the operation began 11 April 1974 and was concluded on 24 July 1974.

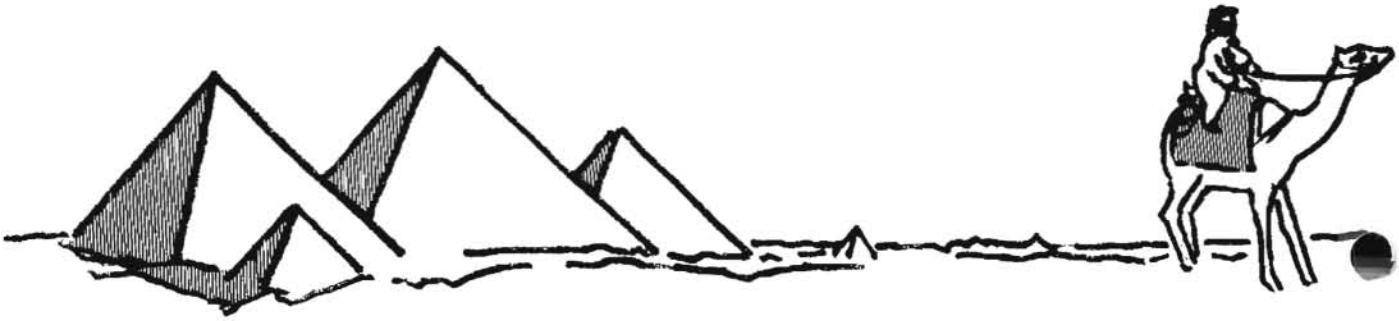
ENGINEER: How many personnel where involved?

CPT DAY: Eight engineer officers, 13 combat engineer NCOs and two maintenance NCOs were initially deployed to Egypt. In May, some personnel returned to the states.

ENGINEER: In what capacity were the engineers utilized?

CPT DAY: We were organized operationally into Battalion Advisory teams. The engineer side of the task force dealt primarily with the 209th Egyptian Engineer Brigade. The brigade consisted of brigade headquarters and four organic battalions. Their mission was to clear minefields the full length of the Suez Canal, approximately a 100 mile stretch in length and a depth of 250 meters. This area pertained to both banks, with the exception of certain built up areas. There the depth was increased to 500 meters. The east shore of the Great and Little Bitter Lakes required no clearance. While the US engineers were organized into four BN Advisory teams, only three of the four Egyptian BNs were utilized on the canal clearance. Each BN advisory team consisted of an engineer captain and two or three engineer E-7 or E-8. The two

Members of the Fort Belvoir Training Team are: Front Row, (left to right), SSGT Earl D. Divelbliss, SSGT Donald G Harmel, SFC Theodore J. Lenegar; Back Row, (left to right) CPT William Korn, CPT Overton Day, CPT Kenneth Elrick and CPT Roy Whitman.



mine detector personnel were utilized for the purpose of conducting actual mine detector maintenance and subsequently training Egyptian personnel for that purpose.

ENGINEER: How were you received by the Egyptians?

CPT KORN: The Egyptians were very warm and friendly. They seemed extremely happy that Americans had come to their country in order to provide assistance. Any rumors that we had heard of the Americans being treated otherwise proved very false.

CPT WHITMAN: I felt that we were not only well received by the Egyptian Army personnel we worked with, but also by the civilian community. In some instances we were even taken into their homes and welcomed as a member of their family.

ENGINEER: Did you encounter any language communications problems?

CPT WHITMAN: Most of the people we worked with spoke and understood English. Keep in mind however, that all our contacts were with the civilian officials of the Suez Canal authority and Egyptian Army Engineer Officers. Most of the enlisted personnel spoke or understood little English. American tourism was a very going concern over there, so most taxi drivers could get you where you wanted to go.

ENGINEER: What was your impression of the Egyptian combat engineers?

CPT KORN: I felt that the Egyptian engineers were more combat experienced than ourselves. Remember, they've been engaged in a war since 1967, so their actual experience is far greater. As far as their use of equipment and materiel, they may not have the capabilities we do, but they still accomplish the job by benefit of sheer numbers. Their troops are utilized more for labor type tasks, whereas a US engineer would utilize some form of sophisticated equipment.

CPT DAY: In fact, the 209th BDE appeared to be a pioneer-type combat engineer unit and not heavy equipment. The Egyptians do have other engineer units that are more tailored to specific missions, however, we had no contact with them.

CPT ELRICK: My over all impression was that their performance on the clearing operation was efficient and effective.

ENGINEER: O.K. Now back to your actual mission. Tell us how you went about establishing an operational concept.

CPT DAY: Our operational concept consisted of three phases. The first phase was that of US engineer conducted training for an Egyptian officer cadre. The second was that same cadre training their own troops, with the US engineers advising and assisting in said training. The third or final phase was that of the US engineers advising actual clearance operations.

CPT WHITMAN: Phase one consisted of three days of training by two separate groups meeting at two different times. Each group received one day of demolition training under Captain Korn, one day of minefield breaching under CPT Elrick and one day of mine detector training, which I was in charge of.

CPT KORN: My phase of demo training was broken down into three areas, nonelectrical priming, electrical priming and detenation cord priming. We hadn't any real feeling as to the Egyptian Officers expertise, so we began with our basic demo procedures. We soon discovered our techniques were similar. They had experience with our TNT, some Italian dynamite, etc., so this was more or less a refresher course for them on our nomenclature and equipment. This expedited the natural training phase.

CPT WHITMAN: My mine detector training began with classroom instruction on the nomenclature of the mine detector, its parts, general operating procedures and how the detector functions. The metal mine detector they had been using was very similar to ours, so the group adapted very quickly. The training progressed to the field where actual detection for unused live mines of various types took place. The Egyptian officers seemed to like our metal mine detector very well because of its sensitivity. I might add we only trained them in the use of the AN-PSS/11 metallic mine detector.

CPT ELRICK: The third day of instruction was designed to show the Egyptian officers the techniques used by US engineers for clearing and breaching minefields. Considering the fact they

had seven years of experience in this task, our procedure was to show them the techniques the US engineers utilized in location and removal. This was demonstrated by use of detectors and probing. In the final analysis, since both our techniques proved quite similar, it was merely a question of comparison and selection.

ENGINEER: The words "classroom training" and "field training" keep occuring. Why the distinction?

CPT KORN: In order to conduct thorough training, it was necessary to expose the student to an indoor and outdoor phase. Indoors he learns the basic applications, outdoors he accomplishes the task. It's that simple. Take demo training, for example. After a brief class on how to prime TNT with a non-electric cap, we'd take the student to a table containing the needed gear and let him go through the procedures we had outlined. Then it was outside to the demo range for follow-through.

CPT WHITMAN: Detection training was the same. Each group, consisting of about twenty-five men, with one US Advisor for every three or four Egyptians, would go through a practical exercise. The US advisor would put the mine detector into operation then break it down. One Egyptian officer would in turn train the other two or three in the same operation.

SGT LENEAR: The system worked well. One group of Egyptian officers and one US advisor working as a team. The Egyptian cadre in turn would train their NCO personnel.

SGT HARMEL: For example, Sgt. Divelbliss and I trained one Egyptian colonel, who was accompanied by an NCO. In the next two days he trained two additional NCOs, with us acting more or less as supervisors. These individuals in turn went to the field and trained personnel from their respective battalions.

ENGINEER: SGT Harmel and SGT Divelbliss. You gave actual training in addition to that given by the US Officers?

SGT DIVELBLISS: Yes, in maintenance of the detector itself. We pointed out such things as the fragility of some of the components, care and cleaning, etc.

ENGINEER: How about your advisory activities? Were you ever in any apparent danger?

SGT LENEGAR: Not that any one was aware of at the time. I believe that the Egyptian officers were constantly looking out for our welfare.

CPT ELRICK: We were specifically told we would not handle any explosives, demolitions or mines at any time during our advisory role. We were there to **advise** and not to participate.

ENGINEER: As advisors to the 209th Brigade, didn't you actually get into the field on a delayed basis?

CPT DAY: The canal clearance began on 12 February while our participation in the actual advising of clearance began on 15 May. Up to this point the brigade had had three full battalions involved in clearance operations. After 15 May the Egyptian clearance effort started to decrease and by the end of June has ceased. Our involvement occured at a time when only significantly difficult clearance projects remained. The bulk of their minefields had been pulled by this time and as of 30 May the brigade had cleared approximately 146,000 mines.

CPT WHITMAN: Subsequent rechecking of mine fields which were already cleared prior to our arrival there was accomplished with our AN-PSS/11 mine detector. This produced additional mines that had been missed.

ENGINEER: Everything sounds like it moved smoothly and efficiently. You were probably furnished precise minefield records.

CPT ELRICK: Not quite. I did encounter several different recording forms the Egyptians had available to them but it was at best a draftsman's sketch of the area of installation. The writing was always in Arabic but I could discern some of the numbers,

possibly the pattern, turning point and soforth.

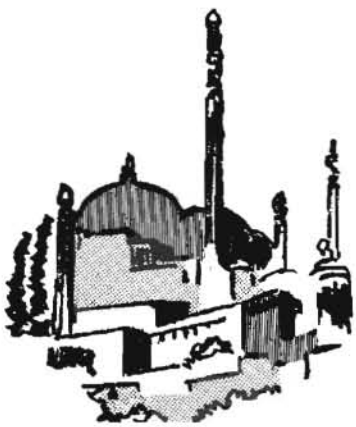
CPT DAY: I want to point out that this was the **only** time actual recording forms were encountered. Generally, the recording consisted of an overlay to scale, the locations of mine fields and some figures that might or might not be the number and types of mines. This was only on their side of the canal I might add. The Israeli side lacked both accurate recording and reconnaissance.

ENGINEER: Captain Elrick, you mentioned minefield patterns. Were there any standard patterns in the operational area?

CPT ELRICK: In every instance that either I or my NCOs encountered the pattern employed was the basic Soviet row mining type pattern. In this pattern, mines are simply spaced in rows four meters on center for anti-tank types and two meters for anti-personnel types. The turning points were in increments of eight meters at a time, in sixteen or twenty-four meters, then the row would angle out at a different azimuth. Picket points marked the beginning of each row. This in turn made removal quite simple.

ENGINEER: That sounds too simple. Anybody encounter anything different?

CPT DAY: No. For lack of a



better word, this "pattern" method seemed to be used with uniform regularity by both the Egyptians and the Israelis along both sides of the Suez canal. In not one instance was the six cluster pattern as known in our doctrine used. We feel this is significant in describing the ease with which the Egyptians were able to remove most minefields.

ENGINEER: What types of mines were encountered along the canal?

CPT DAY: There were actually thirty different types of mines encountered in the canal area. These were divided evenly with the Israelis and the Egyptians using 15 different types each.

ENGINEER: Encounter any sophisticated hardware or real problem areas?

CPT ELRICK: Sophisticated hardware? No. Problem areas? Yes. Along Lake Timpsa, near Ismalia, masses of the Soviet TMN-46 mines were employed in the water using a tilt rod type fuse. The mines were encased in concrete and placed along the shoreline to prevent amphibious landings. Removal was complicated by the growth of water hyacinths in the canal along the shore line which had covered these mines. Since the tilt rod fuse is very sensitive, clearing the plants so the mines could be located visually was exceptional-

ly dangerous. A person moving around in that morass would detonate a mine.

CPT WHITMAN: The Russian PMN non-metalic personnel mine was another problem. Since it only takes a very low pressure to be applied to the pressure plate to detonate, probing is extremely dangerous. Even though it contains metal and can be detected by our metal detectors, its sensitivity makes it difficult to deal with.

CPT DAY: This mine was also used directly on the canal ledge just above the water line. In many cases, fortification work subsequent to the minefield installation or banks sloughing off caused these mines to become buried very deeply in dense soil.

ENGINEER: How was the problem solved?

CPT WHITMAN: In areas of deeply buried mines, the Egyptians would dig adjacent to the rows of mines about a meter deep or more and then use bulk explosives. Everything was used in this hole. Everything from Russian clay TNT, Italian Dynamite and old anti-tank mines that could be recovered. Primed with detcord, the mines would be detonated symphatetically.

ENGINEER: Now that we're on special situations again, were there any instances of

mines being recovered for possible re-use?

SGT LENEGAR: When we arrived at the 31st Egyptian Engineer Battalion, we did notice a few thousand mines stacked at the training area. We were told they were stacked for detonation, but it looked as though they were going to re-use them. However, mines that could not be removed conveniently or that had fuse wells that hampered removal were blown in place.

ENGINEER: Back to the location and detection of mines. What types of equipment did the Egyptians use?

CPT ELRICK: In most cases it was the good ole probe. Some said it was a Soviet innovation, some said Egyptian, but it didn't matter. It was about two meters long and a man could walk through a minefield with it unlike the US probe which has the man down on his stomach or hands and knees. In addition to that, they had a rake about four meters long which they would use in grassy antipersonnel mine fields. The rake would locate the mine and the personnel would either disarm or detonate them as the case might be.

ENGINEER: You've discussed the probes, but what about the electronic detectors that are used by the Egyptians?

CPT WHITMAN: I personally saw some old US metallic mine detectors and was told that they had used some Russian mine detectors prior to our arrival.

ENGINEER: Earlier in this interview you mentioned that you trained the Egyptians in the use of the AN-PSS/11 metallic mine detector exclusively. Was another type of detector taken along? If so, why wasn't it used?

CPT WHITMAN: Yes, the ANPRS-7 non-metallic mine detector. The reason why it wasn't used is simple. When we first received our mine detectors upon arriving in Egypt, we immediately ran checks on them to see if they were operational. Our maintenance people were going over them, calibrating them and ensuring that they were operating on the correct frequency. It was then we discovered that the non-metallic mine detectors would not give us reliable detectibility due to the immense dry soil area.

SGT DIVELBLISS: Sgt Harmel, Cpt Whitman, a couple of other NCOs and myself took it through the mock minefield we had set up to see what depths it would detect. We found it would detect **very few** mines even along the canal shore line. This left us with very little reliable detection.

ENGINEER: It wouldn't work where it was dry and it wouldn't work where it was damp. Did you test it under any other conditions?

SGT HARMEL: We even took it down by the water that edged the mock up field, placed the mines in holes which had water seeping over the mine itself and again the only mines detected by the ANPRS/7 were metal mines, not non-metallic.

ENGINEER: The group concensus says the AN-PRS/7 is less than desirable. Anybody got some positive recommendations?

CPT WHITMAN: It is my opinion that some warning should be sent to the field immediately. The detection ability is not the only limiting characteristic of the detector. It requires a homgenous type soil and cannot be operated in any vegetation, because the mere touch of a blade of grass against the side of the search head gives a false signal. I think the whole unit should be re-evaluated and taken out of the field because of the overwhelming limitations. It is not designed to detect anti-personnel mines and where anti-personnel and anti-tank mines are emplaced together, it could become a real sticky situation. As a combat engineer, I wouldn't ask any troop to enter a minefield with that detector.

ENGINEER: What about the AN-PSS/11 and its proponents?

CPT ELRICK: There is no doubt that the AN-PSS/11 is a tremendous detector for locating metallic objects. The Egyptians thought it was much better than any detector they had worked with. There were some problem areas in a combat zone where the ground had been plowed over and was saturated with metallic objects such as shrapnel and discarded ammunition. You can get all kinds of signals with this baby because it's so sensitive and each signal means the operator has a probe to determine whether he's got a mine or a piece of small metal. In a large scale operation this takes a considerable time to get through a minefield and I think the US Army will have to evaluate its hasty breeching techniques using this detector.

CPT WHITMAN: Even the many so-called non metallic anti-tank mines contain a small amount of metal such as a striker or spring in the fusing system can be detected using the AN-PSS/11.

ENGINEER: That means if an area has been fought over we really have no recourse for detecting mines other than the "good ole probe". Well, maintenance on a probe should be simple enough. How about problems on our detectors?

SGT HARMEL: Very little. Two AN-PSS/11 s had gotten sand inside the handle and the collar

used to tighten the short handle and the extension pole. When the collar was tightened it resulted in some damage, but nothing that couldn't be prevented by supplying a brush along with the detector.

SGT DIVELBLISS: We also had one instance of the search head working the connections of the short and long extension loose and stripping the end of the extension pole.

ENGINEER: Quite a few things have been discussed here, now let's turn our attentions to the benefits derived from the operation.

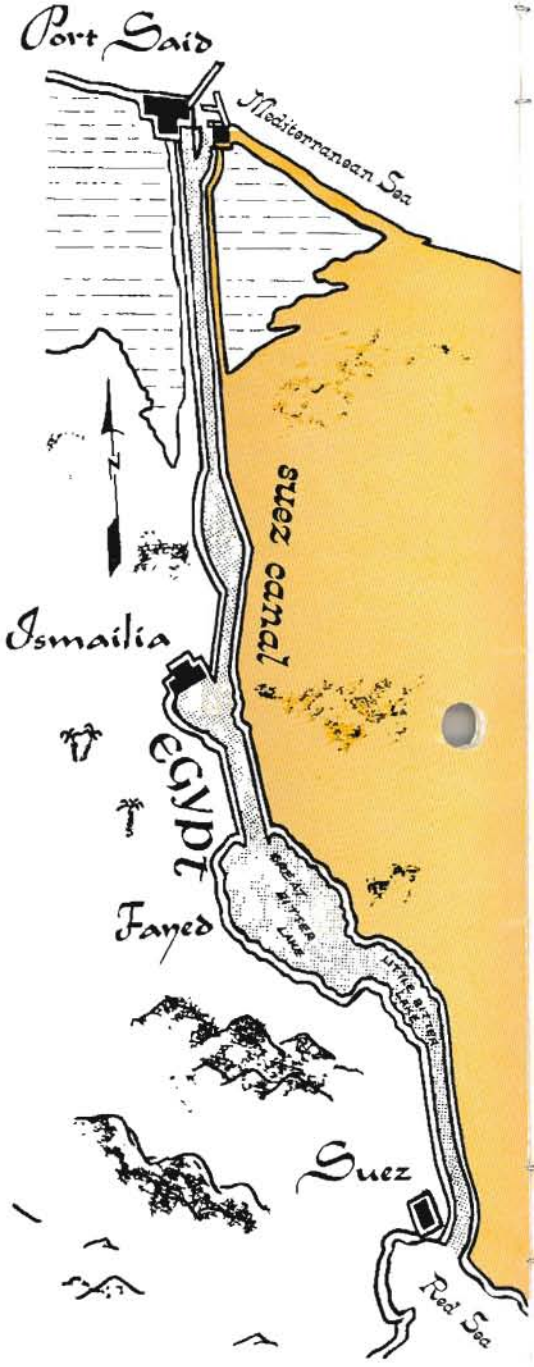
CPT DAY: I feel that doctrinally we have certain problems within our own counter-mine operations. We were exposed to very simple types of mining in the Suez Canal area and very efficient clearing operations. Our own mining doctrine is very complex — complex to the point that I feel we are

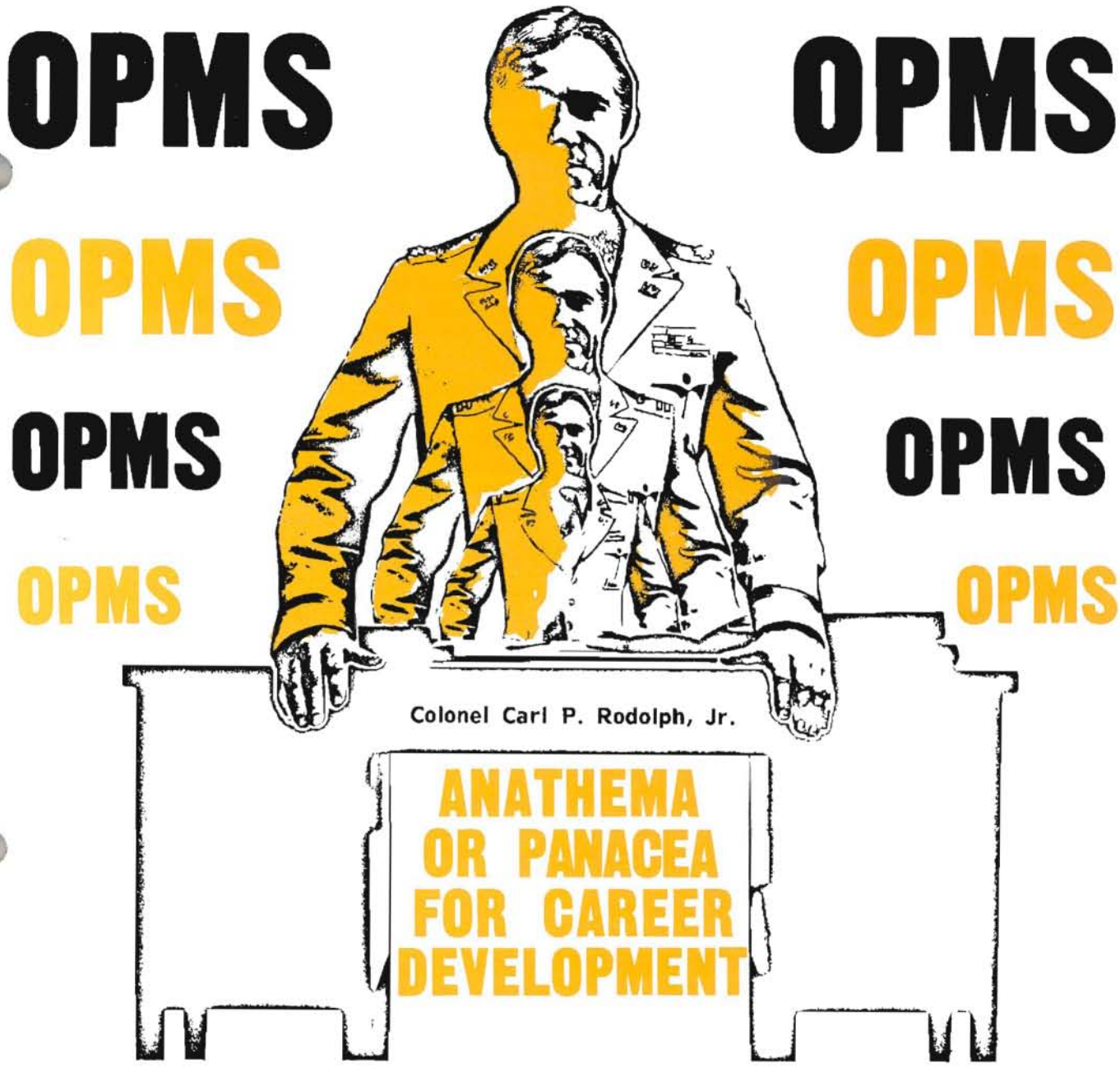
hurting ourselves concerning efficiency. Our doctrine on counter-mine clearance is treated quite vaguely and generally. Everything is based on an ideal situation, which is not a suitable basis upon which the small leader in the field can develop clearance procedures for a specific situation.

CPT WHITMAN: We should also realize mines are not a thing of the past and will be used in ground combat again and again. The US Army should place emphasis on training in this particulas area in the service schools and in field units.

ENGINEER: Aside from the usual camel rides, the food, the belly-dancers and, of course the pyramids, can one of you come up with a concrete example of mutual beneficiality?

CPT WHITMAN: While I was working in Suez, President Amwhar Sadat came to visit Suez City and view the destruction that had occurred there. I had an opportunity to chat with him for a while and passed on to him my personal American flag. He appeared to be very moved by this, and looking at the flag first, then at me said that he would cherish this always. I think that's the way we will all feel about our mission over there in the time to come.





ANATHEMA OR PANACEA FOR CAREER DEVELOPMENT

Colonel Carl P. Rodolph, Jr.

As a result of the withdrawal of U.S. Military Forces from Vietnam and a corresponding reduction in the active force structure, the Army has had the opportunity to reflect upon personnel "lessons learned" and to develop a force structure, consistent with available resources, to be responsive to future military requirements. Since "people" are our most important resource it is logical to expect that personnel career development programs would receive priority attention — and they did! In March of this year DA Pamphlet 600-3, entitled "Officer Professional Development and Utilization", was released to the field for implemention. This document, in effect, established a "road map" for the Officer Personnel Management System (OPMS). OPMS, for the majority of career branches, represents a significant shift from a rather rigid, long existent, traditional value system of personnel management to one in tune with providing officers, trained in proper specialties and skills, to meet current and future Army requirements. Further, OPMS is the most evolutionary change to the Army's Officer Personnel System since 1947 and is a response to a changing requirements and the military environment. OPMS has three main objectives for officer professional development:

- To develop officers in the proper numbers and skills to meet Army requirements and maximize the individual officer's abilities, aptitudes and interests.

• To assign officers based upon Army requirements and within capabilities in consonance with individual competence and desires.

• To improve the overall motivation and professional satisfaction of the officer corps.

There are many factors which prompted the development of OPMS. In recent years the officer corps has decreased in size, the need for specialization and functionalization has increased, the Army has insufficient officers trained in required specialties, command opportunities have decreased, the previous promotion systems have encouraged generalization versus specialization, and professionalism and career satisfaction need to be improved. As previously stated, DA Pamphlet 600-3 promulgated the new officer personnel system, however, because of the voluminous size of the document, rather strong feelings and experiences of many senior officers, and a general suspect of departing from traditional patterns, the officer corps has not yet fully "signed up and climbed on the OPMS band wagon". Undoutedly, many will continue to have strong reservations and will reserve final judgement until results of future selection boards are posted. However, it is important that every officer fully understands that OPMS is being implemented and DA is totally committed to this program. OPMS is now a fact of life!

The questions for the young company grade officer and some majors are: Is OPMS the anathema or panacea for career development? How has it changed from the old system? How will the new system affect me? Should I generalize or should I strive to be a specialist? What alternate specialty is best for Engineers?

These are challenging questions and the type received each day by military personnel officers assigned to Engineer Branch, Officer Personnel Directorate (OPD), Military Personnel Center, HQ, DA. Before launching into OPMS, it would be worthwhile to place the current professional development in perspective. The new DA policy to a great extent formalizes an informal system that has been practiced by Engineer personnel managers for years. Engineer officers have been developed to be highly competitive for both branch material and immaterial assignments to meet Army requirements. Therefore, for the Engineer officer, it represents a continuation of previous efforts. With this background in mind now, let us address "How has the system changed?" and "How does it affect me?". You must develop yourself in depth to serve in two of the Army's specialty areas. This represents a shift from the former policy which fostered the generalist who perhaps became a token specialist. Under the new system everyone must develop in-depth expertise in two specialty areas. Your basic entry specialty is Engineer. Within the Engineer specialty, the primary development is in one or more of the following areas: combat, construction, facilities and topographic engineering. An officer, during his first 8 years of commissioned service, will become qualified in a broad spectrum of jobs within the Engineer specialty. The larger the spectrum and the deeper your expertise into the many facets of military engineering the greater your value as an Engineer. But keep this in mind, of all the qualities required for success in the Engineer specialty, your *ability* to command still dominates.

Following the first 8 years of commissioned service, an Engineer officer will select an alternate specialty and can expect to receive future assignments in both the Engineer specialty and his alternate specialty on an alternating basis. The normal Engineer company grade career development will continue, as in the past. The first eight years will consist of: attendance at the Engineer Basic Officer Course (EOBC), assignment with troops to gain command and staff experience, attendance to Engineer Officer Advanced Course (EOAC), company command, attendance to civil schooling (depending upon academic background, overall manner of performance and DA educational requirements) and assignment to an Engineer functional utilization. It is the Engineer Branch goal to assign all officers to troop units following EOBC graduation to become thoroughly grounded in troop unit operations.

Your alternate specialty is largely your choice consistent with Army requirements. For success, qualities and attributes must match those needed in the specialty you choose. The Army is large and its requirements are diverse but soldierly qualities are and will remain fundamental keys to success. The successful officer will not be the technician who happens to be wearing the uniform, he will be the *soldier* who is well versed in the technicalities of his specialties and who demonstrates his technical capabilities in performance meeting Army requirements.

We just said it, "Army requirements". *Requirements Drive The System.* This is an age old truism and still true under OPMS. The statistics show that beyond the eight years of service nearly 50 percent of the requirement for Engineer officers is outside the "pure" Engineer specialty. So the requirement for you to develop additional skills is real and not contrived.

Which specialty is best for Engineers? This question gets at the heart of the whole matter. The answer is simple. There is no one alternate

specialty for engineers that is better than another, but there is very definitely an alternate specialty that is best suited for you. It is your job to figure out which one that is with the guidance of your personnel manager. As was stated before, the selection of an alternate specialty is dependent upon Army requirements, individual military experience and personal preferences. Normally, field grade officers, particularly Engineers, already have established skills in one or more alternate specialties. This fact was particularly evident during a recent evaluation which culminated in the final designations of alternate specialties for lieutenant colonels. Approximately 80% Engineer lieutenant colonels received their first choice and 98% received no less than their second choice. A recapitulation of these results is delineated below.

ENGINEER LIEUTENANT COLONELS OPMS ALTERNATE SPECIALTY DESIGNATIONS

Specialty	Code	Percent
Research & Development	51	20.0
Operations & Force Development	54	12.7
Foreign Area Officer	48	9.8
Atomic Energy	52	9.2
Education	47	8.5
Personnel Management	41	7.7
Supply Management	92	7.5
Procurement	97	5.9
OR/SA	49	3.5
Maintenance Management	91	3.0
Tactical/Strategic Intelligence	35	2.5
ADP	53	2.3
Comptroller	45	2.2
Construction/Marine Material Mgmt	78	1.3
Logistics Services Management	93	1.0
Aviation Material Management	71	.7
Tank/Ground Mob Mat Management	77	.7
Personnel Administration	42	.5
Information	46	.4
Missile Material Management	73	.2
Munitions Material Management	75	.2
POL Management	81	.2
TOTAL		100.0

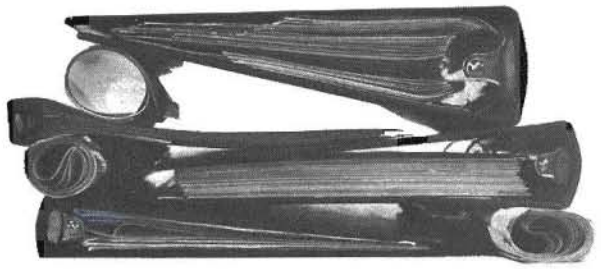
Now that lieutenant colonel designations have been completed, the next DA target group is majors and captains. Records will be reviewed by DA personnel managers to evaluate both education and experience for alternate specialty designation. Although Army requirements always drive the personnel system, individual desires and personal preferences are considered. If there is some doubt concerning your experience or selection, contact Engineer Branch for advice. Additionally, remember the alternate designation is not irrevocable and can be changed after a period of 2 years.

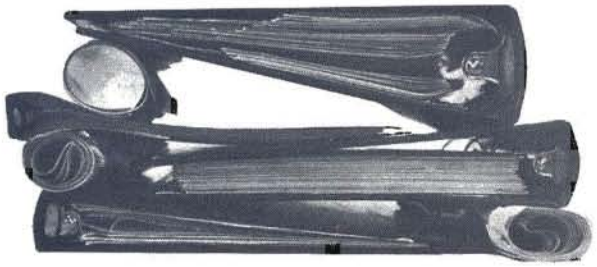
The importance of OPMS is properly reflected in the forwarding statement made by former Army Chief of Staff, General Creighton W. Abrams, when promulgating DA Pamphlet 600-3. He said:

> "The Officer Personnel Management System described in this Pamphlet is the blueprint for the development of the Army's officer corps of the future. This system will provide officers the opportunity to develop the professional skills that the leaders of tomorrow's Army will need. I commend this Pamphlet to your study, but caution you to bear in mind that how well you do in the Army depends not on our system of management but rather on your individual efforts and dedication to service."

The Army's leadership is dedicated to total implementation of OPMS. Assignments currently are being made to satisfy Army requirements in the alternate specialty areas. This effort will be fully implemented once alternate designations have been finalized for both majors and captains during CY 1975. OPMS is an evolutionary professional development program that should provide the achievement of a successful military career. As General Abrams has suggested — each officer must study 600-3 and become familiar with the options. OPMS is neither the anathema nor the panacea for career development. As General Abrams indicated, there is no management system which guarantees success. Each officer must conduct a self analysis, become familiar with Army requirements, consult with personnel managers, evaluate personal goals and select the career progression route which satisfies both Army and individual needs. Once this "blueprint" has been developed, then it should be implemented with nothing less than quality performance.

Colonel Carl P. Rodolph, Jr., is the Chief of Engineer Branch, Officer Personnel Directorate, Military Personnel Center, The Department of The Army. Since being commissioned in 1952, he has served in a variety of command and staff assignments to include construction units in Europe; Vicksburg Engineer District; HQ, 8th US Army, Korea; tours with both ACSI and ACSFOR on the Army staff; and a previous tour in the Engineer Branch, OPD. Colonel Rodolph's Vietnam tours include assignments as engineer, 173d Airborne Brigade (Separate), CDR, 577th Engineer Battalion (Construction) and CDR, 326th Engineer Battalion, 101st Airborne Division (Airmobile). He most recently served as CDR, U.S. Army Engineer School Brigade, Fort Belvoir. Colonel Rodolph is a graduate of the Engineer OAC, the Command and General Staff College and the National War College. His civilian education includes degrees in Industrial Management, Civil Engineering and International Relations. Colonel Rodolph is a registered professional engineer.





THE ENGINEER SOLDIER'S MANUAL

CPT Robert Sperberg

A new type manual is being developed by the U. S. Army Engineer School that will contain all the MOS related information a soldier will need to know to perform his duties. The manual could allow for a whole new set of potential applications including revolutionizing the individual training process. Unfortunately, the program is still plagued by shortcomings that threaten the usefulness of the manual.

The Soldier's Manual is an answer to the TRADOC requirement that each branch of the Army prepare a manual that will address each MOS under their particular control. The requirement arises from the recognized problem that it is not uncommon today to find soldiers unsure of what they are supposed to be able to do, or unable to complete tasks that should be within their capabilities.

The Engineer version of the Soldier's Manual is being prepared at the Engineer School at Fort Belvoir. The School has defined its guideposts for the preparation of the manual to be:

- It will belong to only one soldier. Each soldier will be issued the Soldier's Manual for his particular MOS.
- It will clearly define the soldier's responsibility with regards to his MOS duties.
- It will contain all MOS related information that the soldier will need to perform his duties.

Further, the project group tasked with the preparation of the initial draft of the manual was given special guidance with regards to the overall development of the manual. As a result, the new manual uses only information and terminology

geared to the average educational and experience level of the using soldier. The text is written in the second person so as to give the manual a personal flavor and talk the soldier through the material. Also, all technical information is presented only to the skill level required to make use of the information.

As prepared by the project group, the manual is organized into chapters, with Chapter 1 being the introduction chapter. However, this introduction chapter, besides explaining how to use the manual, will also provide information on what the soldier must do to gain his next promotion. In addition, it will outline his progression from his present rank all the way to Sergeant Major, including all schools and special training required. This is a feature that no other manual has.

Subsequent chapters would contain the information the soldier would need in the performance of his MOS duties. These chapters contain a series of tasks outlining all the required missions a soldier might have to perform within his skill level and MOS. These tasks are broken down into four parts:

- "Task Statement" or what the soldier must be able to do.
- "Condition" which tells the soldier what he needs to complete the task stated above or under what special environmental conditions he must be able to accomplish the mission.
- "Standard" is the degree of proficiency the soldier must demonstrate in the performance of the task.
- "How To Meet The Standard" is the main part of the manual which explains the step-by-step procedures that the soldier must follow to complete the task within the constraints of the conditions and standards set above.

This manual, in its completed format, will certainly improve several areas of individual training currently causing difficulties. For example, all the questions on MOS tests will come from the text of the Soldier's Manual. Since all information for a particular MOS is in the Soldier's Manual, and each soldier has his own copy, there will be an end of the requirement to maintain the large MOS libraries.

The manual's format also provides for a "Record of Performance." This will be a table in the manual with all the tasks listed and a space for the signature of the soldier's supervisor. When this space has been signed, it means the soldier has successfully performed the task required, similar to the Boy Scout merit badge card. This record readily lends itself to two uses. First, it can be used as a promotion guide. When a soldier gets all the tasks for his next skill level signed off, he becomes *eligible* for promotion to that skill level. Second, for union recognition, these scoreboards will demonstrate to unions that certain skills have been mastered. Already some unions have expressed interest in providing apprentice-hour credit towards journeyman certificates for completed performance records in related skills.

Despite the possibilities that the manual has in these and other areas, its application to the active Army has been delayed due to five major problems:

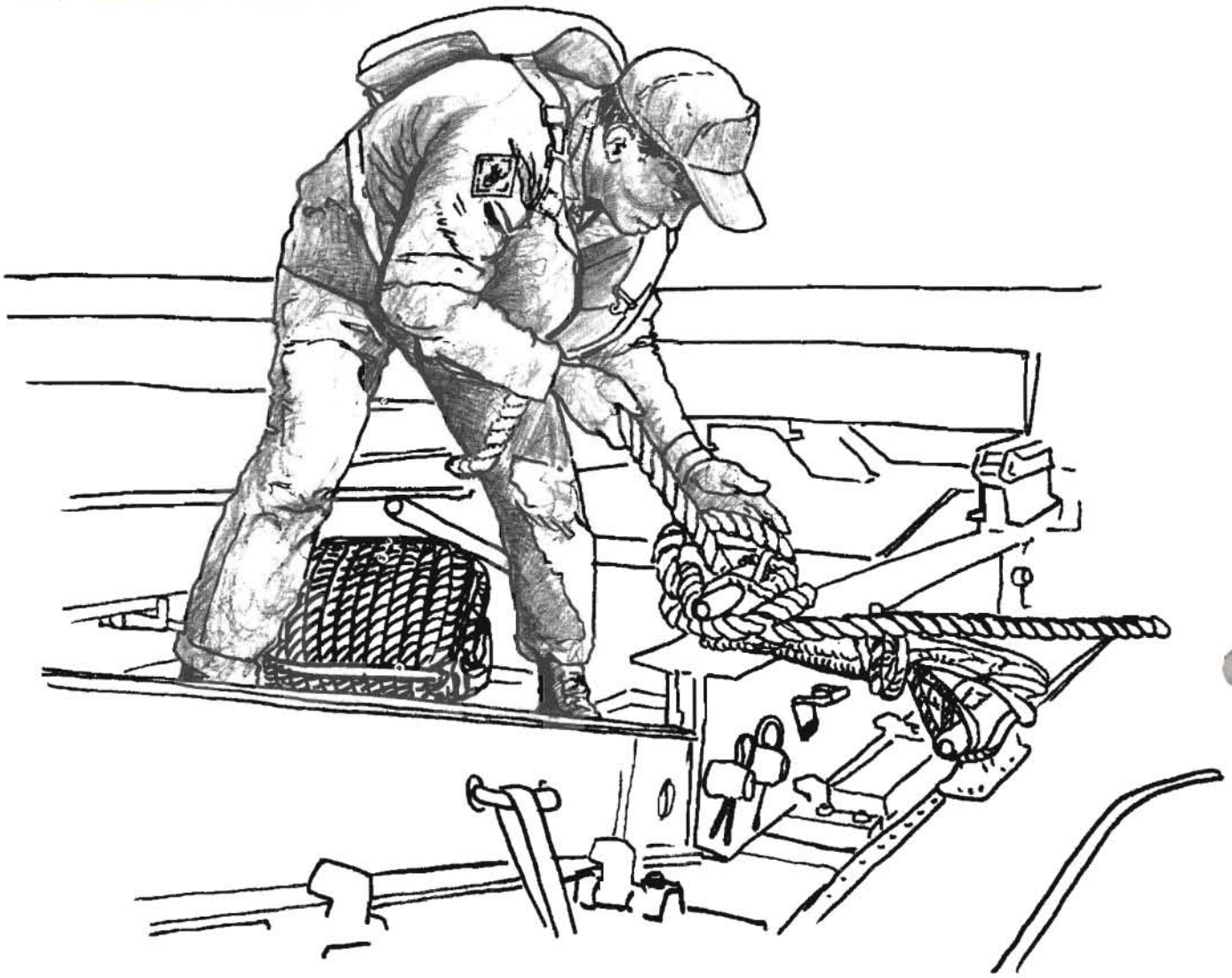
- There is a need for an accurate and realistic job and task analysis for each MOS and skill level. This ensures the reliability and creditability of the manual. The manual must contain all pertinent MOS data, no more, and no less.
- There is a need to determine whether there is an inclusion of either too much or not enough information for each particular task. With too much information, the book is too bulky. With not enough information, we leave the soldier with insufficient data to perform the tasks assigned.
- As a result of the above problems, the size and final organization of the manual is still a matter of debate.
- The job performance record poses some difficult problems, especially finding a method of preventing forgeries of supervisor's signatures.
- There is also some question as to the field usefulness of the manual once it has been issued. Will it be too big? Will the individual soldier use it?

Though these problems are still being studied, it is the opinion of the project group that, after some additional refinements, a manual that not only meets but also exceeds TRADOC requirements will be developed. Should it be accepted by TRADOC, the Engineer Soldier's Manual has the potential of improving the quality of the Corps of Engineers overall. It could become a truly useful and tremendously versatile manual.

Captain Robert J. Sperberg was a project officer with the team from the Training Programs Division, Deputy Commandant for Combat and Training Developments, U.S. Army Engineer School, Fort Belvoir, which prepared the first draft of the new Engineer Soldier's Manual. He has a B.S. degree in civil engineering from the Virginia Military Institute and is an engineer-in-training in Virginia. He recently returned from a tour with the 9th Engineer Battalion (Combat) in Europe. Currently he is attending the (3-74) Engineer Officer Advanced Course and ultimately will be assigned to the Republic of Korea.

RIVER CROSSIN

CPT Benjamin F. Heil, Jr.



It is six o'clock in the morning of the second Sunday in September. You are on the Rhine River near Leeheim, West Germany where during World War II, General Patton crossed his Third Army to continue its advance into the heartland of Germany. The 547th Engineer Battalion (Combat) is commencing construction of an eleven hundred and eighty-five foot class sixty floating bridge on the shore opposite that used by General Patton. The "Bridge Builders" have prepared for this day through extensive training and are set to challenge the modern-day record for closure. The week's training period immediately preceeding the closure attempt has resulted in many corrections and innovations towards reducing construction time. Bridge erection boat control has been determined to be the largest contributing factor to timely closure. A new method of boat control has been selected for use by the commander and staff. The 547th Engineer Battalion is prepared to prove or disprove the concept that the use of a central boat control for all bridge erection boats on a major river crossing operation is effective, efficient, and time saving.

The boat control organization has been extracted from the normal assets of the supporting

G OPERATIONS

and supported units with little, if any, detraction from their ability to accomplish assigned tasks. The headquarters company commander has been designated as the boat commander and has selected a location for his control headquarters that affords him an unobstructed view of two-thirds of the entire construction site to include the complete centerline. Communication nets and personnel have been designated for the boat control element's use. The boat commander has a direct radio link with the construction commander, the battalion operations officer who is located in the tactical operations center. Additionally each boat crew can communicate with the control element or any other boat crew through a separate net. Bridge erection boats have been allocated and will be utilized according to normal tasking. Each of the six construction sites has a single construction boat. Six two-boat teams have been allocated to provide raft delivery. Additional boats have been allocated for centerline, safety, and the commander. None of the assignments to the boat control organization has depreciated the ability of the other construction elements.

The central boat control team concept provides a strong, responsive tool for the construction commander. All of the boat and boat operator assets of the three participating float bridge companies have been pooled, thereby providing a complete team of boats and operators from a situation where there were boats with no operators and operators with no boats. Special teams of maintenance and heavy equipment personnel have been assembled and trained to man the raft delivery crews. In this manner the necessary final closure manpower has been provided without weakening the committed line company strength. All boats remaining uncommitted after the initial allocation have been formed into a reserve and located with the boat commander. This effective and efficient use of available resources detracts little from the operation and, when coupled with the reserve, provides the boat commander with all of the necessary assets to accomplish his mission.

The establishment of a central boat control has provided flexibility and a subsequent strong possibility of time reduction for the crossing operation. Breakdowns of critical boat assets are easily remedied by dispatching other boats from the constituted reserve which is directly available to the boat commander. As six-float rafts are completed at the construction sites, the delivery teams can secure, remove, and dock the rafts away from the construction sites. This system precludes cluttering and congestion around the construction sites, thus facilitating movement and accordingly cutting construction time. Continuous final closure can be assured by proper allocation of available assets by the boat commander. No construction site personnel are required at centerline for raft marriage, thus freeing crews for actual construction work. No delivery teams are idled while waiting for completed rafts at designated construction sites since the boat commander can allocate specific crews to specific sites as rafts near completion. The raft delivery teams have the capability to dock rafts on the far shore prior to the raising of the highline. This insures a continuous and responsive flow of completed rafts at the appropriate time for effective centerline marriage. Centralized control under a strong boat commander facilitates construction and provides timely, responsive boat assets.

It is now 9:25 A.M. and the first vehicle starts to cross the bridge. The 547th Engineer Battalion has completed the bridge in a record three hours and twenty-five minutes, thus continuing its three year domination of Rhine River closure times for Europe. Additionally, the battalion has surpassed its best closure time by forty minutes.

The results are in and conclusive. The only major change between past and present bridging operations has been the use of a centralized boat control. The 547th Engineer Battalion has definitely proved that the use of a central boat control provides effective, flexible and responsive boat assets for major river crossing operations.

Captain Benjamin F. Heil, Jr., is a recent graduate of the Engineer Officer Advanced Course at Fort Belvoir, Virginia. He has commanded companies in Vietnam and West Germany. He participated in three Rhine River closures, the last during September 1973 when he served as the 547th Engineer Battalion Operations Officer. He is presently pursuing a Master of Science Degree in Civil Engineering at the University of California, Berkeley.

LTC Charles L. Shreves

INCENTIVE TRAINING

How much does a combat engineer Private in MOS 12B10 need to know before he joins his unit? The answer will vary with the type, location and mission of units. Most commanders and noncommissioned officers will agree, "Give me a man who understands the basics of combat engineering, knows the school of the soldier, is motivated, and confident of his ability to learn. I will train him for accomplishment of the mission assigned to my unit." This is the challenge for the A.I.T. commander today — PRODUCE SUCH MEN.

A consensous of opinion of the 1st Battalion (Pioneer), 4th Advanced Individual Training Brigade (Engineer) at Fort Leonard Wood, Missouri, was that the Army Subject Schedule 12A10 contained too many boring and repetitive classes. The training appeared to be geared for the average or below average man who was being given his only opportunity to learn something about combat engineering before becoming a replacement in the RVN is no longer an area of assignment. The draft is over. Above average volunteer soldiers do not want to be taught at a pace below their capability to learn. AWOL rates are high, in excess of 10% for most cycles, and at times as high as 20%. Sick call rates sometimes average more than 2 times per man during the 7 week cycle.

When the trainee strength figures went to less than half the programed capacity in the summer of 1973, the 1st Battalion and the Pioneer Training Committee in the 4th Brigade were combined and challenged to write a new proposed training program. During the 28 day period that the 1st Battalion was out of cycle, many of the Drill Sergeants and support personnel worked elsewhere in the Brigade. All the trainees were channeled into the 2d Battalion.

A network analysis was prepared listing all the steps and sequence of the study. The entire 12B10 technical program of instruction was reviewed in detail using the systems engineer "Task Analysis" approach. Many areas presented were not "required knowledge" for the combat engineer from his AIT experience and were eliminated. Many subjects had excessive time devoted to practical exercises which were eliminated. The basic knowledge to be imparted did not change. Repetitive and boring items of instruction were removed. The goal was to produce a well motivated, highly competent soldier who could function as a private or PFC in a field unit.

The program which was developed and tested reduces the length of the course from 204 hours to 112, or from seven weeks to four. In addition, the highly motivated and better educated soldiers are challenged to complete this course in only three weeks by taking classes on Saturdays.

Specific comments concerning changes to each

of the technical subjects taught follow:

a. Engineer Tools: During the practical exercise (PE) portion of this subject, projects such as the construction of buildings, picnic tables, etc., resulted in individuals remaining at the same task for 9 hours, i.e. sawing studs to length. Concentration has been shifted from construction project completion to learning how to use tools, and eliminating the hand tools which are easily learned or already known by 99% of the trainees.

b. Vehicle Operations: The driving time has been reduced by 4½ hours. Eliminated also were techniques of vehicle recovery and dump operations. The original purpose of this training was to qualify a man enroute to RVN to move a vehicle in an emergency situation if the assigned driver were to be killed or wounded. The reduced training still accomplishes this. In order to qualify for this training, an individual must have a Driver's Battery Test score of 85 or higher. Although we had recommended the elimination of this entire block of instructions, USAES requested that it be retained even if at a reduced scope.

c. Landmine Warfare: Deleted was the laying and recording of the minefield, but not the emplacement and removal of mines. A pioneer private in an engineer battalion does not supervise the laying and recording of a minefield. He is a mine carrier, a mine emplacer and a mine remover — these are still being emphasized, and he still receives all the instruction on a standard minefield pattern.

d. Field Fortifications: Eliminated was a practical exercise (PE) in construction of heavy timber cut-and-cover bunkers. Instead, a series of static displays teaches the complete concept. The time was increased on wire obstacles and wire ties because experience has shown that the majority of trainees have difficulty in this area. Anti-vehicular obstacle construction was also eliminated and will be replaced with static displays.

e. Roads and Airfields: An excessively long PE has been reduced. Unit team work is stressed as well as individual effort.

f. Demolitions: Repetitious classroom material has been deleted. Safety standards have not been reduced. Each man still detonates three charges.

g. Rigging: Formulas not essential to MOS 12A10 were removed. The PE in construction of lifting devices was reduced as was the time spent touring the static site.

h. Squad Tactics: Eliminated review of all the items taught in basic combat training. Emphasized reorganization of the engineer squad as infantry, combat formations, control, movement, engineer reconnaissance and ambush patrolling. Also, defensive positions, range cards and supporting fire will be taught during a night bivouac problem. Eliminated daylight and night firing on squad defense range.

i. Non-standard Bridges: The complete bridge instruction remains. Eliminated reinforcement and replacement of the center section of simulated destroyed bridges. A static display easily shows how the same procedures used earlier in construction of the non-standard bridge apply and that repair is just a repetition of what was already learned.

j. Panel Bridges: Eliminated jacking down of the bridge on the far shore and removal of the launching nose. All procedures are taught on the near shore which would otherwise have been repeated on the far shore.

k. River Crossing Operations: The bridge committee evaluating this training recommended that the 27 hours be reduced to 16 to eliminate repetition. During the staff visit to Fort Belvoir, it was requested that it be further reduced to 8 hours and that the M4T6 float bridge PE be eliminated.

Added to the program of instruction upon recommendation of the Department of Doctrine and Training Development at Fort Belvoir were 3 hours of communications and 5 hours of map reading and land navigation, which are no longer taught in BCT but are required knowledge for mobile combat engineers.

After the program had been reduced to four weeks with an opportunity for the highly motivated and better educated to complete it in only three weeks, it was time to develop the next two ingredients that commanders want in a combat engineer — motivation and confidence of his ability to learn.

DEVELOPMENT OF MODULES

Modules were developed, lasting, 1, 2, and 3 weeks in duration,in the 3d, 4th, and 5th Battalions of the 4th Advanced Individual Training Brigade (Engineer). These modules included:

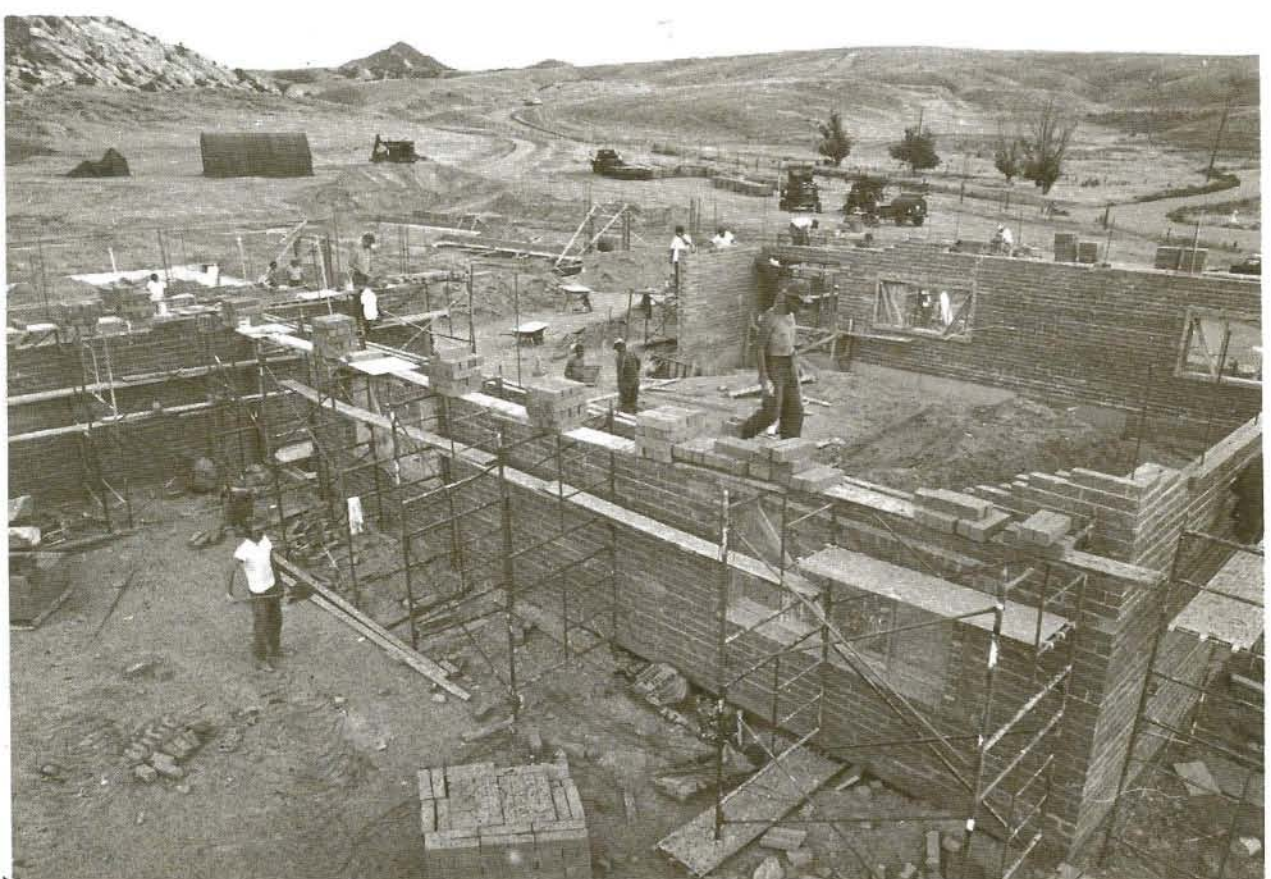
- Crane
- Wheeled tractor
- Quarry operator
- Light vehicle driver
- Material Handling Equipment (Forklifts)
- General Construction Machine Operator
- Grader
- Asphalt Plant Operator
- Electrician
- Plumber
- Water Supply
- Demolitions

The personnel who completed the course in 3 weeks (by working Saturdays) were given first choice of modules for follow-up training. After completion of the proficiency test during the 4th week, the rest of the company was ranked according to test results and overall performance. The man who was the best achiever got first choice of modules. Since there were a limited number of vacancies in each module, motivation to excel was extremely high during the combat engineer training. The men were reluctant to miss a class because it could affect their standing. Barracks orderlies were rotated at noon. Sick call was about one-third the normal rate.

Indicator statistics for the two test companies in the 1st Battalion reveal that motivation of trainees was achieved.

PROFICIENCY TEST

The Proficiency Test administered was the same one given to the graduates of the normal 7 week program. It was administered by the Director of Plans and Training at Fort Leonard Wood — the same personnel who administer the 7



week test. The 15 cycles immediately prior to the test program averaged from 30% to 58% maximum scores. Company A had 50.15% and Company C had 72.4% of their personnel who "maxed" the test.

The enthusiasm displayed by the trainees for this test program was captured on an Educational Television Video Tape with interviews of graduates who completed the course by modified self-paced instruction in 3 weeks.

Some of the Drill Sergeants and Pioneer Committee cadre were skeptical of the program initially. The trainees have completely changed all this by their attitude and motivation, which is far above what was experienced previously. Trainees indicate that the previous program had only taught them military skills. What they really want is a hard skill they can also use outside the Army. With this opportunity to obtain it, and win an additional MOS at the same time, most of the complaints previously registered about pioneer training were eliminated. Additional MOS's obtained during this test program were as crane operators, tractor operators, and water supply specialists. The same tests were administered as are given to their regular A.I.T. 7 or 8 week classes. The extreme motivation displayed by the pioneers in the module phase of this test program astounded the regular trainees as well as their cadre.

The pendulum is swinging. The name of the game is recruit, train and retain. The addition of this incentive training with the opportunity to learn hard skills will greatly assist in this goal. If the pendulum should swing back to draft, train and ship to a combat zone, the standard program now in being can be quickly reestablished. It is just more repetition in the hope of establishing a finer edge to the combat sword. However, the modern volunteer Army must be flexible, challenging and incentive oriented.

It appears that the incentive program with the modified self-pace option for Pioneers will prove to be a huge success and will improve the caliber of the privates sent out as replacements for combat engineer battalions all over the world. The results are still being compiled and the final decision rests with TRADOC. However, the data so far appears to indicate clearly that this program will produce soldiers who understand the basics of combat engineering, know the school of the soldier, are motivated and are confident of their ability to learn any job or mission assigned to them related to their MOS.

LTC Charles L. Shreves is currently the Operations Officer in the Engineer's Office of 7th Corps Headquarters in Stuttgart, Germany. LTC Shreves was the former Battalion Commander, 1st Battalion (PION), 4th AIT Brigade (ENGR) at Fort Leonard Wood, Missouri. In addition to having commanded combat engineer companies in Germany, Korea, and Fort Campbell, Kentucky, LTC Shreves has been a Facilities Engineer and was Deputy District Engineer, Okinawa. LTC Shreves holds a Masters degree from Arizona State University and is a graduate of OCS, the Engineer Officer Advance Course and the C&GSC.

THE ENGINEER CENTER TEAM

ENGINEER STAFF

How many times have you said, "who came up with this idea, why aren't the Engineers talking to each other?" Or maybe you have wondered about such things as the possible use of Commercial Construction Equipment in Engineer units or the requirement for a boom on the CEV? Well, it may come as a surprise to you but the Engineers have been discussing subjects as these and other matters of mutual interest and doctrine for sometime. This was first accomplished at the Engineer Quarterly Conference and later, commencing in 1967, though the Engineer Center Team. Unlike the Quarterly Conference, which functioned primarily as a Senior Officer briefing, the Engineer Center Team emphasizes the pooling of expertise and experience and is a forum for the free exchange of ideas and opinions.

The Center Team was formally established by DA on 18 July 67 in recognition of its potential in strengthening Army doctrinal, educational and training programs. Adoption of the Center Team concept was directed for all service schools having counterpart combat development agencies.

The Engineer School delved further into this concept and the Engineer Center Team was officially formed with the signing of the Joint Coordinating Agreement on October 17, 1967. The Commandant, United States Army Engineer School, (Chairman), the Assistant Commandant, United States Engineer School, Director of Facilities Engineering, OEC, and the Commanding Officer of the United States Army Mobility Equipment Research and Development Center, the President, United States Army Armor-Engineer Board, and the Director, Defense Mapping School are dedicated to the resolution of issues on matters of Engineer interest. In addition to these members, the Commanding General of the United States Army Training Center and Fort Leonard Wood, as well as the Chief, Engineer Division, United States Army Armor Engineer Board are invited to participate or send representatives. The team is not meant to replace routine day to day coordination but is concerned with expediting matters of Engineer interest that support the Army in the accomplishment of its mission. The Engineer Center Team meets the last Thursday of each month with the mission to surface problems and conflicts in areas of Engineer interest. This means that the Center Team works together to arrive at a consensus agreement prior to addressing issues with their respective commands. This effort shows that Engineer matters are being resolved by Engineers.

The inner workings of the Engineer Center Team are not complicated. A Standing Coordinating Committee, made up of junior representatives, strives to expedite resolution of problems at the working level prior to the Center Team meeting. The Standing Coordinating Committee also selects the agenda topics and arranges for presentations by knowledgeable persons.

Since its conception, the Engineer Center Team has discussed a wide variety of topics from pollution control to personnel management. Some of the topics which have been discussed include: Commercial Construction Equipment, Countersurveillance and Camouflage, Geographic Intelligence and Topographic Support System for the Army in the Field — 1975 (GIANT-75) and the Construction Battalion Evaluation, which was a topic in the January, 1971 edition of THE ENGINEER magazine. The Engineer Center Team has also been one of the leading exponents in the exchange of minutes between Center Teams in order to bring about a more efficient overall approach to Army-wide problems and strives to provide a greater impact on methods for solving problems.

Some of the items to be discussed in the future will include: Engineer Support of other services, Combat Engineer Systems Program Review (CESPR), Engineers fighting as Infantry and Individual Unit Training.

So the next time you ask yourself, "who came up with this idea?" There is a good chance it was discussed within the Engineer Center Team one Thursday morning.

LTC Joachim K. W. Zickert

PARTNERSHIP -the German Army Engineers

Working for freedom is a never ending job which requires a united effort of all nations. Such is the role assumed by the North Atlantic Treaty Organization (NATO) nations. But what of these allies? What do they share in common or work to achieve together? A closer look at one of these partners will perhaps imbue a greater understanding of the similarities and differences which exist.

Picture yourself on a bridge site along the Rhine River in Germany. American and German army engineers are constructing a floating bridge. In the mountains, another joint training exercise becomes a mission accomplished. After duty in a US Army club or in a German gasthous, American and German soldiers are enjoying a beer to celebrate the days achievements. These are just a few of the many faces of partnership.

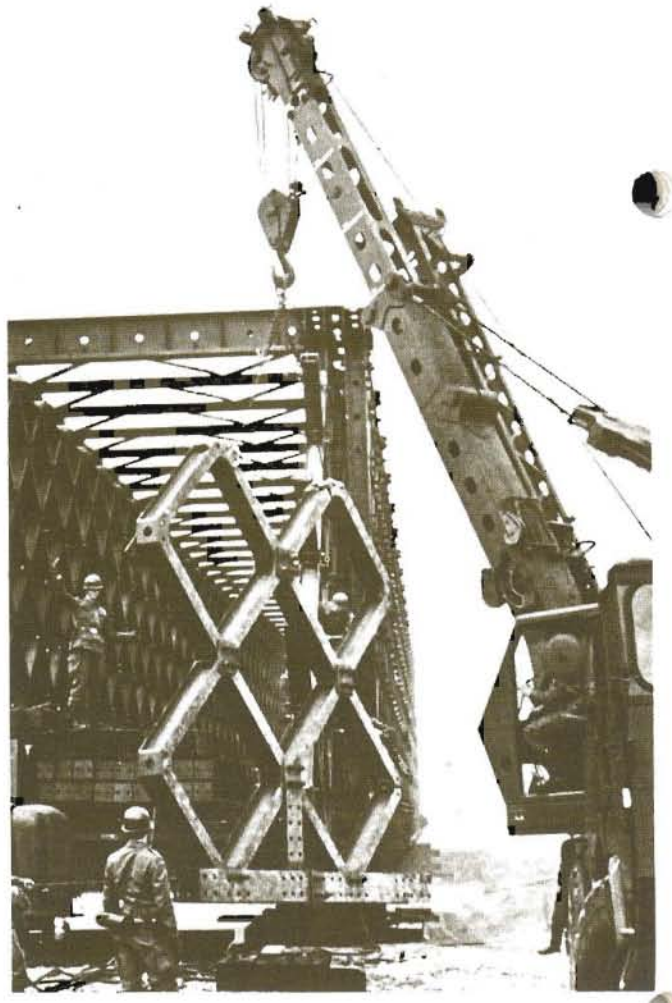
In the years of this partnership, units of both American armies have participated together in training exercises, athletic contests, social events, and have worked together as "sister" units. These units conduct annual maneuvers to monitor and test unit training and readiness as integrated armies under the NATO command. As soldiers of NATO they have discovered how much they have in common as citizens of allied nations of the free world.

But what does the German Army and the German Corps of Engineers look like and how are they organized? Since Germany makes the largest contribution of all the allied nations to the ground forces of NATO, let's take a look.

THE GERMAN ARMY

The Bundeswehr of Federal Defense Forces totals more than 460,000 men. The Army itself numbers over 350,000 troops and is the largest component of the Bundeswehr. The Army's 350,000 men are divided into three corps in which there are 12 divisions; four mechanized infantry, four armored, two light infantry, one mountain division, and one airborne division. Each division is further broken down into three brigades (and special troops) organized into battalions and companies. Some examples of these organizations are:

- A Mechanized Infantry Division (PANZER-GRENADIER) made up of two mechanized infantry brigades and one armored brigade.
- An Armored Division (PANZER) made up of two armored brigades and one mechanized infantry brigade.
- A Light Infantry Division (JAGER) made up of two light infantry brigades and one mechanized infantry brigade. As a combined arms units, each brigade is self-sustaining and capable of fighting on its own for a limited time.
- Brigades. There are four types of brigades. Each is organized differently and tailored to a specific mission. For example, an armored infantry brigade consists of three armored infantry battalions and one armored battalion. Each brigade has their own artillery battalions, one support battalion, one armored engineer company, and special troops of company-size.



THE GERMAN CORPS OF ENGINEERS

The Chief of Engineers and his staff are a part of the Army General Office which is a subcommand of the Chief of Army. Civil works such as flood control and other missions of this type are not provided by the army engineers. They are matters of other government installations.

The active Corps of Engineers has a total strength of:

— 29 battalions
— 7 battalions partly activated
— 43 separate companies

The mission of the German Engineers is briefly as follows:

Facilitate the movements of friendly troops
Impede the movements of the enemy
Raise the combat capability of friendly troops
Reduce the combat capability of the enemy
Support the service troops in logistic tasks
Be responsible for damage control
Fight as infantry in self defense and in critical situations.

To accomplish the above, the German Engineers are organized as follows:

Armored Engineer Companies are organic to

the different types of brigades. Their mission is to support the combat arms in their combat tasks. These companies consist of:

- a company headquarters squad
- three armored engineer platoons with three squads each
- one AVLB platoon (5 AVLB s)
- one heavy equipment and ammunition platoon
- one maintenance platoon

Engineer Battalion (divisional) are division combat support troops. The division Engineer battalion consists of:

- one headquarters support and maintenance company
- three combat engineer companies (the third engineer company is a basic training company during peacetime)
- one heavy equipment and brigade company.

The battalion commander is also the division engineer.

Engineer Battalion (heavy equipped) are corps combat support troops under the direct command of Corps Headquarters. The battalion consists of:

- a headquarters company
- 3 combat engineer companies
- 1 heavy equipment company

This type of engineer battalion contains more and heavier construction equipment than any other type of battalion but is not a construction battalion.

Engineer Battalion (light equipped) another battalion on corps level has:

- one headquarters company
- three combat engineer companies — (primarily designated for barrier missions)

Mobile Assault Bridge Battalion also belongs to the family of corps troops and consists of:

- a headquarters company
- three mobile assualt bridge companies

Each bridge company is equipped with 18 M2-B amphibious bridge and crossing vehicles.

Float Bridge Battalion and Separate Companies.

- 1 headquarters company
- 3 float bridge companies (equipped with the hollow deck bridge MLC 60.)

River Ferry Company consists of 9 river ferries and 3 patrol boats.

Specialized Engineers are organized according to their mission tasks. Examples are as follows:

- Pipeline Battalions and separate companies
- Railroad Companies
- Technical Companies for electric power and water supply.

Another Engineer organization as a part of the Territorial Army are the special barrier teams (Wallmeister). They are attached to the Military districts and their mission is to build and maintain fixed barriers for all NATO troops in Germany.

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CONSTRUCTION MANAGEMENT

CPT Lamar C. Ratcliffe, Jr.

The United States Army Engineer School at Fort Belvoir, Virginia, instructs officers and non-commissioned officers in many subject areas that they can expect to see and use in their military careers. One important subject which sometimes does not receive proper student attention is construction management. This lack of student interest is probably due primarily to one of two factors: the students either consider construction management techniques to be "common sense ideas that are obvious" or question whether or not they are applicable to the military environment.

The author cannot argue the first point because he also believes construction management to be based upon common sense; however, he knows from his personal experience that construction management techniques can be used with great effectiveness on large military troop construction projects. The construction of the heliport facility at Camp Carroll Depot, Korea, demonstrates the proper application of the construction management techniques taught at the Engineer School.

In July 1973, the 802d Engineer Battalion (Construction) received advance notice that it would soon have the mission of constructing a heliport at Camp Carroll Depot. Upon receiving the job directive, the battalion commander and his operations officer visited Camp Carroll Depot to investigate the proposed site for the heliport and complete the preliminary planning. They reviewed the plans and the construction specifications with the commander of Company D and made some

rough estimates of the types and quantities of construction effort required. They quickly determined that the project would include the displacement and subsequent compaction of 100,000 cubic yards of earth fill, construction of a 70 ft wide, 450 ft long runway, placement of three 45 ft by 75 ft concrete parking pads and installation of a 370 ft long underground drainage system. The company commander was confident that his company could handle the entire project if it received additional earthmoving equipment. Based upon the initial calculations and his company commander's confidence, the battalion commander assigned the heliport project to Company D and promised that additional equipment would be provided if required.

Upon receiving his company commander's guidance, the company construction officer developed a detailed plan for the project. He analyzed the scope of work of the project, determined the activities to be accomplished and developed a detailed cost work estimate of the required man-hours, equipment hours and materiel for each activity. Next he used the critical path method (CPM) to determine the critical activities and the required delivery date for each construction material. From his critical path analysis, he scheduled the entire project and obtained the estimated completion date. He also determined that compaction of the earth fill was the critical factor and that the company would need additional compaction equipment to maximize earthmoving efficiency.

While the detailed planning was being completed, the company commander mobilized his available men and equipment resources. First the earthmoving platoon prepared the site for the installation of support facilities and set up a general purpose (GP) medium tent for messing operations. Next the first general construction platoon erected a portacamp to be used as the project office and first aid station. Simultaneously the maintenance section set up a maintenance tent to provide a covered facility for support maintenance. Mobilization was completed when two sheepsfoot rollers, two bulldozers and three 290M wheeled tractors were provided to solve the compaction problem.

When the actual construction began on 4 September 1973, the company commander used directives and control measures to supervise his project. He directed his platoon sergeants to submit daily progress reports which detailed the work accomplished, the construction effort actually required and the materiel used. The company operations sergeant compiled the information from these reports and maintained complete records for the project. He also monitored the expected delivery date and the receipt of each construction material; he informed the company construction officer when materiel problems occurred. From the daily progress reports and the materiel status reports, the construction officer updated his CPM schedule three times a week. This updating gave him a graphic representation of potential problem areas in sufficient time for him to reallocate the available men and equipment resources and thus minimize delay of the estimated completion date. To insure that quality construction was being accomplished safely and efficiently, both the company commander and his construction officer made daily inspections of the project site and made on-the-spot corrections. The end result was a quality construction project which was completed on time.

Management of the heliport construction at Camp Carroll Depot included preliminary planning, detailed planning, site preparation and proper supervision. All four techniques are taught at the Engineer School. Admittedly, they are common sense techniques. In addition, as you have seen, they are applicable to the military environment. The proper use of these construction management techniques resulted in the quality construction of the Camp Carroll Depot heliport.

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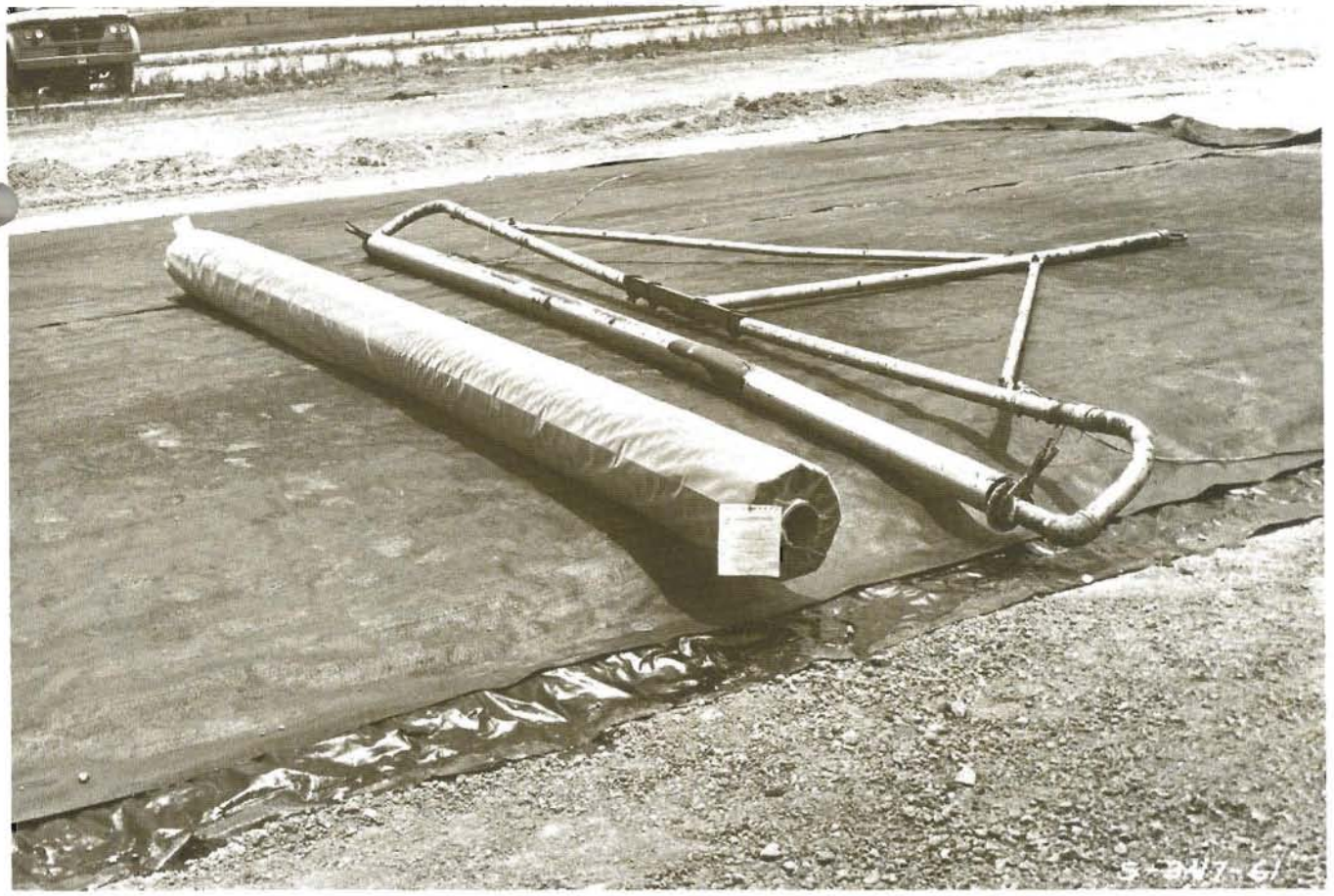
Membrane-Encapsulated Soil Layers

Captain Gordon T. Greeby, Jr.

Men, money, materials, and time — the efficient utilization of these resources is construction management in its purest form. We in the military have not always used our given resources in the most efficient manner. True, time must govern all when constructing in a tactical situation. Un-



fortunately, our preoccupation with construction speed carried over into peacetime operations with crew size, materials used, and money spent relegated to secondary roles.

Our civilian counterparts in the construction industry learned long ago that time is *not* the governing resource. With a large percentage of our labor force engaged in construction, it goes without saying that construction has become big business. And which of the four major resources reigns supreme in any big business? The omnipotent dollar has been crowned the new king.

Today, military construction is big business also. Not surprisingly, the dollar has "muscled in" on time as the governing resource. As Corps of Engineers officers, we are tasked with constructing with fewer men, less materials, and at lower costs. And as one might expect, we have found that in many cases the optimization of the use of men, money, and materials has resulted in shorter project durations.

How has the Corps of Engineers responded to the need for a better product at minimum cost? The development of new military road building techniques is only one of many areas in which progress is being made. Specifically, the U. S. Army Waterways Experiment Station, Vicksburg, Mississippi, has developed construction methods and procedures for the use of membrane-encapsulated soil layers in military road construction. The utilization of membrane-encapsulated soil layers will reportedly speed up road and airfield construction at decreased costs. A more palatable blend of resource utilization cannot be imagined.

Since the 1940's, the Corps of Engineers has employed the California Bearing Ratio (CBR) Method of designing flexible pavement structures. Basically, the CBR value of a soil is a comparative measure of that soil's resistance to failure by shear. The CBR of design combines the results of a load-deformation test with an empirical design chart to determine the thickness of pavement structure layers.

Although nineteen of our fifty states use this method with its numerous variations for design of their asphalt pavement structures, the CBR Method is not immune to criticism. Proponents of other design methods have attacked the CBR Method on two counts. First, it is said that penetration of a piston into a confined soil specimen does not simulate the shear stresses which actually develop in similar soil under a flexible pavement. Second, the soaking of specimens for four days prior to testing is not representative of actual field conditions in most cases. Generally, wet soils yield lower CBR values when tested than when dry. Low CBR values dictate large overburden thicknesses for adequate

stress distribution, as indicated by the empirical design charts. The requirement for large pavement structure thicknesses usually points to high construction and material costs.

Up until this time, it has been customary procedure to select pavement structure materials with high CBR values, i.e., not adversely affected by water. Materials commonly used for this purpose are crushed rock, granular materials from natural deposits, and stabilized in-place soils. However, it is not uncommon to find that such materials do not exist on or near the project site. As such, much time and construction effort must be expended at great cost in obtaining such materials.

The Experiment Station at Vicksburg has demonstrated that in lieu of granular materials, membrance envelopment of *fine-grained* soils can be utilized as the base courses for flexible pavements. It is known that high density fine-grained soils exhibit high strengths if kept dry. The availability of such soils poses no problem — they may be used from cut sections at the construction site. But keeping them dry is another matter. Numerous types of membranes were tested; and although the results of these tests have not been finalized, it appears that a 6 mil-thick polyethylene lower membrane ($0.07/SY), when used in conjunction with a nonwoven polypropylene upper membrane ($0.35/SY), will prove to be the most feasible.

As dry fine-grained soils yield high CBR values, required base course thicknesses are minimal. Traffic tests have shown that a 12-inch lift of soil, when compacted to 95% of AASHO T-180 Method B density will easily support 5-ton dump truck operations for extended periods of time. It can be seen that the use of membrane-encapsulated soil layers represents an economical, as well as rapid, means of constructing military roads in the Theater of Operations.

Today, more than ever before, we as Corps of Engineer officers must be alert to the proper and efficient management of those precious resources with which we have been entrusted — specifically, that omnipotent dollar.

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Major Charles Gardner

TRAINING — *The Elusive Commodity*

The air is hot and stuffy in the smoke filled company classroom as a crusty combat engineer sergeant labors through yet another lesson on bridge demolitions. Two specialist four silently doze in the back row while a PFC and a specialist five engage in a homemade "wargame" near the front. The first sergeant has reported 25 men present for training. The soldiers shuffle restlessly in their seats as Captain Candid, the company commander, slips in the back door to "check training".

Sound familiar? Read on, Captain, because you are the Army's principal training manager.

Mission-oriented training and testing still receive low priority from engineer unit commanders. Training objectives are not being met in many cases. The reasons are clear and basic: (1) lack of a clear definition of training responsibilities and concepts, and (2) the failure of field elements to obtain, review, and use the military training publications now on the market.

This article attempts to focus on the role of the engineer company commander in training his unit, the concept of performance training, and specific sources of information to guide training activities. The development of the notions herein concerning training is based on the following concepts:

- Operations and training are synonomous and inseparable.
- The best training takes place in units.
- The company commander is responsible for the technical and tactical proficiency of his people.

Setting performance as the goal. The civilian and Army training and educational systems are committed to performance training. To know how is not enough. Today's soldier must be able to do. The literature producing people at United States Army Engineer School, Fort Belvoir, Va. (USAES) and other service schools are committed to producing literature on how to conduct performance training and testing. No matter how the system tries, however, it would appear that the Army continues to have a "packaging and marketing" problem, i.e., getting the right literature in the right quantities to the right person. Perhaps the problem in the field is that when one is inundated day after day with official literature of all sorts emanating from all sorts of sources, he becomes less able to skim off those publications primarily dealing with effective training. Some of the most highly effective publications are noted in this article.

It is necessary that all commanders understand what is meant by performance training. For example, suppose a platoon sergeant takes his platoon out for some demolitions training. He has each man in the platoon prime and detonate a quarter-pound block of TNT. Good performance training, right? **Wrong!** Should the commander now assume that the platoon can now emplace explosives for road craters or bridge demolition? About all he can reasonably expect is that each man can now prime and detonate a quarter-pound block of TNT.

Performance training requires some ingenuity. As a place to start, forget the classroom scene. Most soldiers get enough sleep at night. Performance training should occur in the field, but all training in the field cannot properly be described as performance training. If the training must take place outside of the normal operating environment, your approach is suspect. Use your head.

Get in the mood for performance-oriented training by absorbing some of the information in FM 21-6, *Military Training*, dated 1 June 1974. This manual is short, easy to read, and doesn't even look like an FM. Chapter 2 should put you on the track.

Before wasting a lot of time attempting to do all the work yourself, reach for instant relief in the form of the Army Training and Evaluation Program (ARTEP) 5-35 if you are in an Army Engineer Combat Battalion or 5-145 for the Mechanized Divisional Combat Battalion. In a pinch, use them interchangeably. ARTEP's for other engineer units are on the way. The ARTEP provides guidance for scheduling, conducting, supervising, and evaluating unit training. It provides an excellent "laundry list" for evaluating your current training proficiency as well as minimum training objectives in terms of acceptable degrees of proficiency and levels of performance.

Unit Training — the logical alternative. The Army is composed of a large number of individual skills molded into units with designated missions and capabilities. Since we function as a unit, why not train as a unit? Many direct and indirect advantages accrue from unit training. Once again the ARTEP is your handy one stop reference for guidance.

Soldiers report to a unit after completing AIT and developing a basic skill. At best these individuals are at the appropriate level and require practice and additional training to develop added proficiency. The Enlisted Personnel Management System (EPMS) now being structured will require that the unit develop the individual soldier's skills. EPMS is a review of the enlisted MOS structure to provide an improved skill and career progression for qualified enlisted personnel. This system will most likely get the company commander more involved with assisting the individuals in his unit in maintaining technical proficiency.

Unit training encourages total involvement of every member of the unit. Unit training develops leadership. It provides incentives for squad leaders, platoon sergeants, and platoon leaders to gain and maintain proficiency. It allows the commander to evaluate his subordinates in an objective manner.

Finally, unit training is cost effective. In reality, it is simply an efficient way to utilize the training time now available. It would seem reasonable to predict on the basis of past experience that military budget cuts during peacetime will take their toll on the Army's training base. One can reasonably expect a reduction in the number and length of school taught engineer courses at both Fort Belvoir and Leonard Wood. Troops must remain in a unit *and* maintain proficiency. Good performance-oriented, unit training is essential for future readiness.

Role of the engineer company commander. The primary mission of the company commander is to train his unit. His job and the complexity of his mission have changed very little. Many young

company commanders find themselves so enmeshed with administrative functions that the primary mission becomes obscured. This total involvement with administration is poor camouflage for what is likely a serious training deficiency. Mobilize and train those headquarters platoon elements, diversify the workload, and get back to the real mission. FM 25-2 (Test), *Unit Commander's Guide*, dated 29 March 1974 will help you to more efficiently accomplish your administrative functions. Try it!

Lack of adequate time for mission-oriented training continues to be a problem for most engineer units. An analysis of the situation will likely determine that the belief there is not time for training is a self-imposed constraint. Commanders must allocate time for training if they expect combat capability. Minor construction, area beautification, and nice-to-have projects generally do not constitute good training for most engineer units regardless of their political implications. These tasks must be accomplished but recognize their limited training value. Tasks should be performed in a manner which maintains unit integrity where possible. Clustering individuals rather than utilizing an existing squad is likely to be counterproductive from the training viewpoint. Accept these projects as part of the engineer mission and plan around them. Proper planning well in advance is the key. Develop your schedule for training. Block out reasonable periods for projects. Set deadlines and goals for both the training and the projects. Stick to the plan.

Once you have set your sites on a good unit training program, a key step is training analysis. Only the company commander can determine those areas in which a unit **really** needs extensive training. Chapter 2, FM 25-2, is helpful for general guidance; use the ARTEP for specific tasks to be trained. Once you have completed a training or testing cycle you have some notions as to the unit's proficiency.

Another item to support training now under development is the individual counterpart to the ARTEP called the Individual Training and Evaluation Program (ITEP). If approved this document would replace the Army Subject Schedule for each MOS. Both the ITEP's and ASubjScd's produced by USAES are quite detailed and carefully delineate what each soldier should know and be able to do. These documents are invaluable to the MOS holder and the unit commander in the analysis and development of a unit training program and should be a part of the unit's publications library.

There are some indicators of individual proficiency available. Consider the MOS test results for a moment. Each company commander should review and analyze the results reported on the USAEEC Form 10 and the summary profile report. MOS tests are about proficiency, not just extra pay. Perhaps a composite of the MOS test scores for the NCO's and EM in a unit may really be a measure of the proficiency of the unit commander and his training program. Commanders must:

- Understand the purpose and importance of the MOS test.
- Insure that study guides are provided in a timely manner.
- Insure that all required study references are on hand or readily available.
- Provide a quiet area conducive to study.
- Make on-duty study time available.
- Show special interest in very low density MOS's and understand the problems inherent to these individuals.
- Counsel NCO's and EM on the importance and implications of MOS test results. Under EPMS the test results take on added importance.

Assembling a good company library which will adequately support unit and individual training is no small task and requires careful attention to detail, some ingenuity, and many hours of work. Hopefully, one is not starting from scratch. First, which manuals should be on hand? No simple answer here but some good sources for developing your own list are available. Consult the ARTEP and the study guides provided for each MOS in your unit.

Leadership is still the key. Two things are clear to this writer. Good training can occur only when properly planned and executed by an aware and dedicated company commander. Secondly, due to time limitations, the company commander needs knowledge of and ready access to a few key training publications to guide his activities. The trend towards the one-stop training guides and study references such as those mentioned in this article is a significant step forward for commanders in the field. Exercise your leadership abilities through proper training of your unit. Raise your sights and train for performance.

Major Charles E. Gardner is assigned to the Engineer School, Deputy Commandant for Combat and Training Developments. He received a BS from the United States Naval Academy and an MS in Civil Engineering from the University of Illinois. He is a graduate of the Command and General Staff College and a registered professional engineer. He has served with the 10th Engineer Battalion, 3d Infantry Division; MACV Advisory Teams; MACV Construction Directorate; Nuclear Cratering Group; and the Department of Engineering Science, USAES.

DOMESTIC ACTION

CPT Jeffrey A. Wagonhurst

The primary objective of the Domestic Action Program is to instill interaction between the civilian community and the military. If we were to look around our country, we would find that the needs of the civilian community are great. For various reasons it is not always possible for the civilian population to do the work that needs to be done to improve its community. For example, the community may not have the necessary equipment for certain projects, nor the money to purchase or rent the equipment. A shortage of people is also a problem, as it is difficult for working people to take time away from their jobs to participate in community projects. Another difficulty may be that the cost of these projects is too great for a small community to sustain.

The Army has the capabilities, the equipment, the time, and the personnel to apply to these situations. Our country is always one of the first to send aid and assistance to foreign countries in need. We can apply this system to our own smaller communities who are also in need of outside help. The Army is always looking for ways to make itself more intriguing and appetizing to the civilian population. What better way is there to do this than by helping the neighbors of its military installations throughout the United States.

Many soldiers complain that all they do is train and maintain equipment. As a result, they become discouraged and disenchanted with the Army. Participating in civilian community projects, such as constructing a park and recreation area or helping the community in a crisis situation, provides interest and stimulation for the young soldier. He is given the opportunity to meet and to work with people outside of the Army community, thus abandoning the feeling of separation. Also, he has the chance to leave the Army post and to see its surrounding countryside.

To show how interaction between the civilian and military communities can be a worthwhile endeavor, the success of a Domestic Action Project completed by a platoon of men from B Company, 20th Engineer Battalion (Combat), Fort Campbell, Kentucky will be discussed. The city of Cleveland, Tennessee, located approximately forty miles northeast of Chattanooga, was planning to construct a county recreation area consisting of various athletic fields and picnic areas for the people of the community. The Chamber of Commerce realized that they did not have the heavy equipment necessary to do the earthwork for the project. The construction companies in the area were very busy with other important contracts and county work, and they could not release any equipment to do the job. Mr. John Tyler of the Cleveland Chamber of Commerce decided to write to the Commanding General at Fort Campbell to ask for assistance in completing the earthwork for their recreation area. When the Commanding General received the letter, it was forwarded to the C-5 of the installation for evaluation. The C-5 made contact with the Operations Officer of the 20th Engineer Battalion to request that a reconnaissance of the project in Cleveland, Tennessee be made by personnel from the Battalion. An initial recon of the project was made in the spring of 1973, and the project was evaluated by the C-5 based on the information from the initial recon. The project was assigned to the 20th Engineer Battalion (Combat), and the Operations Officer of the Battalion further assigned the project to B Company. In August, the company commander and the project officer flew by helicopter to Cleveland, Tennessee to made a final estimate of the project. After a discussion with personnel from the Cleveland Chamber of Commerce, the dates for the project were set for 1 through 15 October 1973. On 1 October 1973, a platoon, under the command of Lieutenant Sheldon L. Jahn, departed from Fort Campbell, Kentucky for Cleveland, Tennessee. Upon arrival in Cleveland, the platoon was met by Mr. John Tyler of the Chamber of Commerce. After the platoon unloaded their heavy equipment, Mr. Tyler took the men to the motel where they would be living for the next two weeks. The accommodations provided for the men were very pleasant, as each man had a doubled bed to himself and a color television set in each room. The men ate their meals in the motel resturant where they could order what they wanted. All accommodations were provided at the expense of the city of Cleveland.

Work began early on the morning of 2 October, and it was continued everyday for the following

two weeks. The initial task accomplished was the upgrading of the existing drainage by clearing and rerouting the natural stream channel at the project site. An access road to the rear area of the site was cut by removing the top soil, and then it was graded to the approximate grade. Drainage ditches were cut along the length of the access road and tied in with the natural stream. A borrow pit was then upgraded, and the material was stockpiled at a local farmer's farm. This material was hauled to the project site and used to fill around two culverts placed in the stream channel. The two culverts allowed access to the project parking area. Fill was then hauled to this area, and a parking lot 70 x 120 feet square was filled and leveled. At the same time the fill was being hauled in, the first of two Little League baseball fields was being cut and filled to grade. The second Little League field was then cut to grade while the first was smoothed and drainage around the field was established. A third softball field was then cut to grade while the second field was smoothed and the drainage was established. The first two fields measured 160 x 160 feet square each, and the third field measured 320 x 320 feet square. All roads and fields were then regraded, included the existing loop around the grade school which was adjacent to the project site. Separate drainage ditches were cut to aid in draining the open field of the recreation area. The borrow pit site was cleaned up, and the access road to the pit was smoothed. Approximately 15,000 cubic yards of soil were moved during the project. A total of 2,773 man hours and 2,241 equipment hours were expended on the project. The project was completed on 15 October 1973, and the unit returned to Fort Campbell, Kentucky. The lessons learned from the project were very beneficial, and the men got to operate their equipment which contributed a valuable resource to the community.

On any domestic action project conducted by the Army, it is strongly recommended that arrangements are made for some kind of recruiting drive. The 20th Engineer Battalion used several methods in its recruitment efforts. A trailer which displayed pictures and posters about the unit itself and of the opportunities offered by the Army was parked next to the project site. The local newspaper, the *Cleveland Daily Banner*, was contacted upon arrival, and it gave the unit complete support by printing articles with pictures concerning the project. A Chattanooga television station came to the project site and filmed a short news clip which was shown on the local news. However, most important of these efforts in establishing rapport between the civilian and the military communities and in encouraging enlistment was the close, eyeball to eyeball contact the civilian community

received by working hand in hand with the Army.

The Viet Nam war left an uneasy feeling in this country towards the military. Using the Domestic Action Program as a tool, the Army can change the feelings of the civilian communities to that of respect and understanding of the military. Not only will the Army benefit from community relations; they will also be rewarded in that the soldiers will become well trained with their equipment, and they will feel that they are actually taking part in a job that contributes to the country. The Domestic Action Program is necessary to both the Army and the civilian population in order for the people of this country to live and work together as one community.

Captain Jeffrey A. Wagonhurst is presently a member of the Engineer Office Advanced Course at Fort Belvoir, Virginia. He was the Commanding Officer of B Company, 20th Engineer Battalion, Fort Campbell, during the project at Cleveland, Tenn. CPT Wagonhurst also served as the Asst. Group Operations Officer of the 34th Engineer Group in Vietnam.

Although the preceding article may be a few months old, it is typical of the many military engineer projects being done under the Domestic Action Program. We would like to share your experiences with our readers. Please drop us a line.

— The Editors

GEODESIC DOMES

John H. Robertus, CAPT, USMC

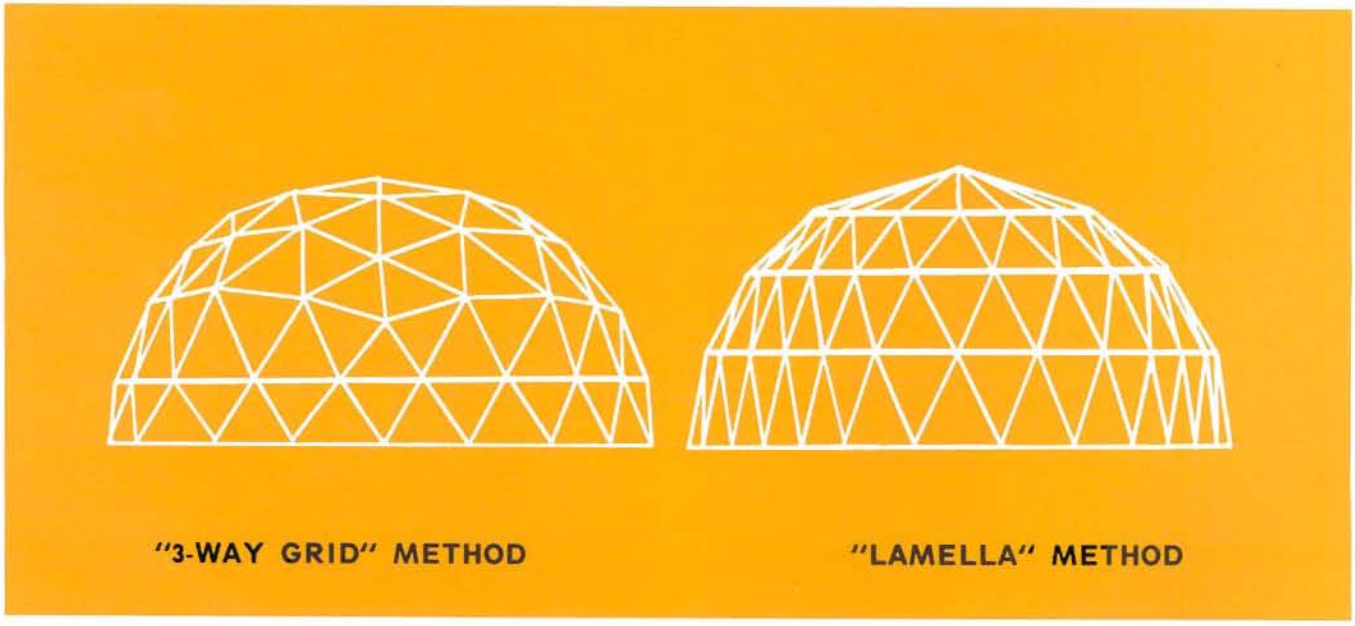
Nature has provided the examples that enabled man to take tremendous steps forward in his engineering quests using domes and arches. The simple stone arch was discovered to be a remarkable device and has offered important construction and engineering advantages to civil and military engineers for centuries. Arch type construction is commonly seen in Quonset huts and larger arched hangers and field houses which are everpresent on most of our military installations today. However, geodesic domes are not as widely accepted as the simple arch. But they should be!

A dome is actually an arch that extends into a circular base instead of the conventional rectangular base of the simple arch. The geodesic dome, if properly understood, is very simple, strong and lightweight. For theater of operation construction, strength and weight are important considerations. Once a geodesic dome is constructed, it requires no intermediate supports and it can be partially disassembled or repaired without collapsing. The structural members, known as struts can be made of wood, pipe, or other suitable rigid material. The struts are fastened together at their ends to form a triangular network that curves into a domelike shape when completed. The particular triangular network desired can be derived with spherical geometry. Two methods are pictured:

The finished dome network can be covered with a variety of materials ranging from temporary tentage to more permanent steel reinforced concrete.

Domes can withstand wind, rain, and extreme temperatures if properly constructed. The United States DEW line system in North America has utilized geodesic domes to house delicate equipment for almost two decades. The Navy has recently constructed large domes in Anarctica to protect men and equipment working in that region. Domes in these environments have withstood extremely cold temperatures and winds up to 220 miles per hour!

With all the facts known about geodesic domes, the current T/O structures should be revised to consider this tested and proven system. The Quonset hut has definitely been a boom to military construction, but its parts must be prefabricated and transported to the erection site dismantled. Then, if all the factory parts are on hand, it can be assembled. Throughout the current inventory of metal structures this is a problem. A metal geodesic structure would have the same problem, except that a dome can be airlifted after assembly from a central location without damaging the structure. This theory has been considered by the Marine Corps for assaults from helicopter landing



ships and subsequent movements inland.

The geodesic dome has four other important advantages that must be carefully examined:

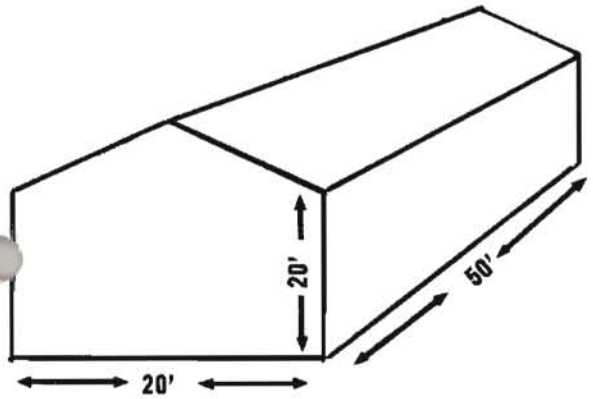
First. A given volume can be enclosed with less surface area using a sphere, than with any other shaped surface; this provides far more space for dollar spent for exterior surfacing.

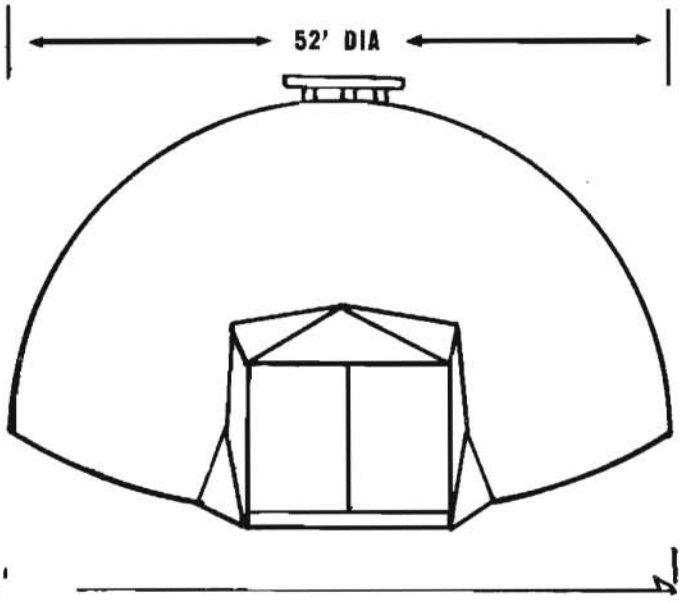
Second. A dome structure transmits loading through compression and tension evenly along the surface to the base; this allows for lighter materials in the structure and a simple foundation design.

Third. A dome can be constructed from small modular components enabling unskilled workmen to quickly accomplish the construction without heavy equipment.

Fourth. A dome affords ideal air circulation and is compatible to centrally located utilities.

Consider the following comparison of a conventional structure and a geodesic dome:





CONVENTIONAL		DOME
4,100 Square Feet	Exterior Surface Area	4,100 Square Feet
1,000 Square Feet	Interior Floor Space	2,100 Square Feet
22,400 Cubic Feet	Interior Volume	36,000 Cubic Feet

Note that with equal amounts of exterior surface material, a 100% larger floor area and a 60% larger volume can be obtained with a dome system. Research indicates that domes exhibit excellent resistance to both air blast or ground shock waves if buried. A geodesic dome ferro-cement bunker may be a possible application for smaller domes. Domes are practical and feasible but may seem to waste space due to the curved shape, however this shape can be altered to meet a variety of requirements such as vertical sidewalls or multi-level storage areas within the structure. The possible configuration of domes or clusters of domes are endless, and all such structures would posses the same basic advantages. The future should see widespread use of domes in the theater of operations construction. Overall considerations of economy, strength, and ease of construction make the geodesic dome design a potentially limitless tool for the military engineer.

There are many wonders of nature that have been tapped for mankinds use. The geodesic dome is simply an extension of the natural forces that enable a soap bubble or an egg shell to keep its shape. Certainly the marvel of the geodesic dome has yet to be fully appreciated. While architects and city planners are envisioning domes to cover out modern cities, our military planners should consider domes for our modern forces in the field.

Captain John H. Robertus is a 1968 graduate of the University of California, at Riverside with a B.A. Degree in Physics. He was commissioned in the Marine Corps in Nov 68 at Quantico, VA and received his military engineer training at Camp LeJeune, NC. He was then assigned to the 11th Engineer Battalion on Okinawa. After two years as an instructor/troop leader in the Second Infantry Training Regiment, Camp Pendleton, California he attended Engineer Officer Advanced Course 1-73 at Fort Belvoir, VA. Upon completion he was assigned as an instructor in the Department of Engineer Science, Structures Branch, USAES where he is presently stationed.

Lighting Freed

Have you ever had a need for light and lots of it? Well the men of the 2d Infantry Division stationed along the DMZ of Korea, "Freedom's Frontier", have learned the value of a good light bulb many times over. The troops had the mission of preventing infiltration by the North Koreans along a 24 KM sector of the Korean DMZ. The accomplishment of this mission was thwarted by rough hilly terrain, bitter cold winters, monsoons, vegetation and personnel shortages. On the positive side was the idea that good fences make good neighbors and the 2d Division had a good fence. The structure, called the Barrier Fence, was six feet high chain link, with three rows of conertina wire along the top. The only problem with the fence was that it was useless unless someone watched it and that is where the 2d Division had difficulty. Guarding the fence in daylight was relatively easy as the sentries could sit on ridge tops and observe in any direction. But at night things were different. The guards now had to be doubled and unlike the daytime, when a sentry had good observation and felt secure, the soldier was alone with the night and its sounds. Besides, sitting in a foxhole looking at a fence all night in some of the world's worst weather does not raise the re-enlistment rate. Many soldiers took up the doubious hobby of counting the holes in the fence; the record was 523,285. When the troops on night duty began putting in 18 to 20 hours a day, 7 days a week, the sense of mission began to stretch thin.

Things finally came to a peak when the North Koreans infiltrated the American sector for 2 surprise raids by actually cutting through the Barrier Fence without being detected. To help the 2d Division, Night Vision Laboratory (NVL) was asked to provide a lighting system for the fence.

In response to the Army's request, NVL agreed to design a remote Area Lighting System (RALS). After an on site inspection and an agreement on the design requirements, a proposal was submitted by Luke Burkstrom, MVL design engineer. His design was accepted and through competative bidding a contract was awarded to the VARO Corporation of Texas. Tests of the system were conducted and VARO was soon in Korea ready for the installation. Speed was to be a real plus on this project.

VARL's arrival in Korea consisted of one man, Al Hussong. Mr. Hussong recruited a ten man Korean crew and soon had the first RALS in operation. With his speed crew and despite a late monsoon season, all nineteen systems were quickly in operation within eleven months from the time of initial request.

The RALS makes one claim that has earned it the engineer's everlasting gratitude; it is **simple.** Simple to install, simple to operate, simple to maintain, and simple to understand. When you are the only engineer in an infantry brigade with eight lighting systems, simplicity is very high on your priority list.

The RALS system consists of the following six major parts: Two standard 10 KW generators, one of which is used for backup; three kw constant current regulators from the US Air Force, to insure long bulb life and to prevent overloading of the generators; one hundred and thirty-eight 12 volt, 35 watt sealed beam headlights, the same as those found in a car using a 12 volt system; one hundred thirty-eight 6.6 amp transformers to isolate each lamp of the series circuit; one hundred forty-seven connector kits to insure weather-tight wire splices; and 15,000 feet, 8 gage stranded wire.

With the lights spaced 30 feet apart, one RALS provided light for 1.26 km of front. Each system

om's Frontiers

CPT Larry L. Austin

has three circuits, each controlled by a constant current regulator. Each of these circuits has 46 lights connected to 46 isolation transformers. So if a problem does develop, it is automatically narrowed to a section of 46 lights.

The design requirements of the system include recognizing an intruder at up to 50 meters with the unaided eye, denying an intruder the ability to see a sentry who is more than 15 meters behind the lights, providing a backscattering of light to aid the sentries in movement and unaided maintenance by the using units.

In the systems first six months of use, it successfully met those requirements. Any intruder that could normally be detected in daylight was also detectable at night within the 50 meter range, even with bad weather and poor terrain, the exception being heavy fog. In addition, light from the system greatly aided night vision devices beyond the 50 meters. Any intruder approaching the fence had to look into a continuous row of headlights, completely denying him observation of the sentries behind the fence. In fact, it was impossible to detect a sentry who was standing directly behind the fence, mid-way between the lights, not a recommended practice for sentries. The reflection of light from the fence made the sentries movement over rough terrain much easier. Once the system was installed, operation and maintenance was performed by the Infantry Battalion stationed on the DMZ. Complete instruction on the system was given to personnel from the battalion in less than one hour including demonstrations on start up and shut down procedures, changing of bulbs, splicing wire, and trouble shooting. The US Army does have a draft TM, DTM 11-5840-351-14, dated February 1971, that gives detailed instruction in installation, operation, organizational maintenance, DS and GS support, shipping data and any other information a using unit would need to know.

Probably the greatest asset of the system to the unit commander is its flexibility. Each light in the system has the ability to be individually aimed both in the horizontal and in the vertical directions. Also the spacing of the lights is up to the installing unit. Many times lights were spaced 15 feet apart to light a ravine or ditch. Modification after installation is also possible, but care must be taken not to add too many lights and overload a circuit.

Even with this simply system, two problems developed. One was the operation and maintenance of the generators and the second was the daily changing of burnt out bulbs. Command concern quickly solved both of those problems. In the first six months of operation, two transformers went out. In both cases the cause was found and replacement made in less than an hour. Later, one of the main circuit wires was, accidentally, shot out. This repair required about ten minutes and a spare connector kit.

The RALS was not the final answer to problems in the 2d Infantry Division's anti-infltration mission in Korea, but was a step toward success. The night sentry could now see to his front and sides, thus making him feel he was a part of a team with help always close at hand. Officers and NCO's moving up and down the fence checking the men found movement easy, with the backscattered light, and the number of firing incidents by nervous sentries was greatly reduced.

To the men of the 2d Infantry Division standing their lonely vigil on Freedom's Frontier, the RALS has helped make a difficult task a little easier.

Captain Larry L. Austin is a graduate of the 2-73 Engineer Officer Advanced Course.

CPT Cecil Greene

When a cartoonist wants to depict a soldier in a funny situation, he often draws a picture of a GI digging a hole in the ground. But the holes now being dug in the ground at the Modern Army Selected Systems Test, Evaluation and Review (MASSTER) are a very serious business. These holes may help other soldiers protect themselves better on future battlefields. The holes and structures are all part of a test being conducted at MASSTER to examine new types of underground bunkers and protective shelters.

There is nothing really new about the requirement for different types of field fortifications. In all previous wars, field fortifications have been emplaced as a necessity by the people and equipment available. Usually, these fortifications are very hastily built and not necessarily structurally sound for they are often constructed for immediate protection only and then abandoned. The need for the future is basically the same. In a future mid-intensity conflict, basically conventional warfare and short of nuclear war, there may not be sufficient time to prepare elaborate defenses. Still, soldiers must have positions from which to fight and defend themselves.

The Army's basic field fortifications structures have changed little since World War II. However, military weapons and tactics have changed considerably in the last 20 years, and the old style bunker system may not lend itself to a highly fluid, mobile situation in future conflicts. This is why there is a need to find out what new concepts and developments are available for the Army to use.

The tests in MASSTER are only a part of a larger, Army-wide examination of field fortifications. The Army program itself involves a mix of

research, conferences and evaluations to determine specific requirements for different situations. Various Army schools and centers throughout the country are now evaluating the adequacy of standard field fortification structures and determining camouflage requirements. Thus, in the tests at MASSTER, the Army is finding out the answers to some basic questions. First, they are evaluating the design, techniques and tactical application of different protective structures. Second, they are determining the requirements for manpower, equipment and time to construct the different structures. Finally, they are discerning how much training is needed before soldiers know how to build the structures correctly.

With these goals in mind, MASSTER personnel will be reviewing both old and new concepts of underground bunkers made of new materials such as fiberglass, aluminum and plastic. Several new ideas relating to the use of bunkers for headquarters command posts will be studied. These ideas range from providing a covered hole in the ground to airlifting prefabricated modules that are then buried in the ground. Other structures involved in the testing include such single things as small box-like cages that are lined with plastic, filled with dirt and then stacked like blocks. Corrugated aluminum sheeting and reinforced plastic is also being used to form thick earth-filled walls for above-ground fortifications.

Several other shelters and fortification kits, such as those being used by the British Army and the US Marine Corps will also be evaluated. These kits work somewhat like the familiar erector set, with interconnecting pieces that allow several sizes or shapes of structures to be built and covered with earth. When the structures are no longer needed, they can be disassembled and transported elsewhere for re-use.

One key consideration in the MASSTER test is the assumption that combat troops will have to be able to build and emplace all the different protective structures because trained engineer troops may not be readily available in a combat situation. Therefore, as part of the MASSTER test, all the structures will be assembled and disassembled at least two times by engineer troops and two times by non-engineer troops. Two groups from Second Armored Division units, the 17th Engineer Battalion and the Second Brigade, will provide personnel for the test.

Evaluation of the different structures in the MASSTER test will be made by more than 100 combat experienced soldiers from MASSTER and other units at Fort Hood, Texas. The evaluators will examine the structures and rate them on suitability, protection provided and several other factors. When this first stage of test and evaluation is completed, the accumulated results will be presented to a group of general officers at Fort Benning, Georgia, sometime in February. After this meeting, more specific attention and testing can be directed toward those shelters and fortifications that show the most promise for development.

So, in the future, soldiers may be glad that the serious business of digging and construction is being done by MASSTER now.

Captain Cecil Green is the Information Officer for Project MASSTER, Fort Hood, Texas.

ISSUES AND ANSWERS:

This article is published as the first in a new department known as "Issues and Answers." It is the hope of THE ENGINEER that it will generate comment and feedback on one of the tools of combat engineer units.

Some of the issues arising are:

1. Should crews of the CEV/AVLB be combat engineers or armor crewman specially trained to operate blades, boom, demolition guns and bridges?

2. Do crews of CEV/AVLB get an opportunity to practice with combined arms teams?

3. Do crews of CEV/AVLB get an opportunity to train using TC 17-14 frequently in order to be proficient in combat.

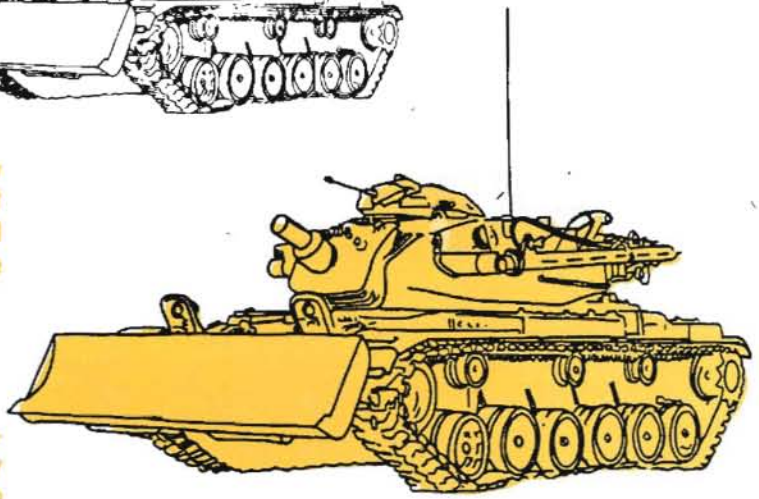
4. Do engineer unit commanders know the techniques of maintenance of combat vehicles?

5. Should CEVs be consolidated in one engineer unit similar to AVLB in the Bridge Company, then employed where the combined arms commander wants to influence the action?

6. Could the Army provide a better career for soldiers in MOS 12F, Combat Engineer Tracked Vehicle Crewman, by including them in MOS 11E, Armor Crewman, and providing additional skill training in the unit?

7. Does Army training literature sufficiently explain the doctrine, tactics, and techniques for employment of CEVs?

These are the issues. Do you as an engineer in the field have the answers? We would like to hear from you. Contact: THE ENGINEER Magazine, Bldg 269, Fort Belvoir, Virginia 22060.



LT Joseph H. Hottes

Although in sandy soil the combat engineer vehicle (CEV) can knock over trees that are several feet in diameter with only a slight grunt, and while the bark of its demolition gun can seemingly reduce anything to rubble, the CEV, like any military system, has its limitations. The purpose of this article is to focus on some of these limitations so that engineers can investigate these problem areas or users can consider them as they plan for the employment of this vehicle.

As envisioned in FM 5-1, the CEV is intended to assist the combat arms in a hostile environment by allowing its crew to perform pioneer tasks while being protected by armor. During a coordinated attack, CEVs will be with the assaulting elements. This use is highly likely in attacks on fortified or built-up areas. In the movement to contact, one could expect to find CEVs in the advance guard. The CEV, with its crew of four — commander, gunner, loader, and driver, has four tools to use to accomplish its mission — a demolition gun, dozer blade, winch, and boom.

The demolition gun will play a key role in reducing field fortifications. TC 17-14 notes the

Limitations of the CEV

crew must be able to "rapidly and accurately" engage targets, yet they must estimate the range to a target since no range finder or similar device is available. Cant, which is caused when one track is higher than the other, results in range and deflection error. No equipment is provided so that the crew may reasonably estimate the effect of this situation. Target acquisition is partially the gunner's responsibility. The field of view from his position is so severely limited that other crew members must guide him to the target. Troops operating near a firing CEV should know fragments from the exploding round can travel up to 1000 meters in any direction from the point of impact, and the maximum effective range for planning purposes is only 750 meters. The actual maximum effective range, however, is probably somewhat greater than 750 meters.

Since the crew's visual access to the dozer blade's immediate work area is somewhat restricted, feedback on the effects of its operation and guidance on its utilization are best provided from troops located outside the CEV. Individuals operating outside the vehicle must assist in the employment of the boom or winch. If the boom or winch is used, dismounted troops or crew members are potentially exposed to hostile fire. The headlights are not recessed, and trees can easily knock them off while the CEV is clearing abatis. Since movement of the CEV over dry ground throws a steady stream of dust over the vehicle, goggles are a must. Communication with the crew by way of the phone system on the rear of the vehicle is difficult due to the noise the vehicle makes and the lack of sufficient means for alerting the crew to incoming calls.

According to doctrine, the CEV should not be employed as a tank. However, detailed advice concerning its employment is not given in FM 5-1. For example, FM 5-1 notes that other armored vehicles must protect the CEV against antitank fire, but the manual does not explain how a CEV is to maneuver with tanks. Even though school training for the CEV commander is available, according to ATP 5-25, all crew members, including the commander, may be unit trained. Proficiency in MOS 12F requires that the individual be knowledgeable in the operation of both CEVs and armored vehicle launched bridges (AVLB). Most units that have a CEV do not have an AVLB and vice versa. Therefore arrangements must be made to share equipment if the men are to receive training on both vehicles. Crews firing for familiarization are to fire only four target practice rounds per crew member. Although a target practice round or subcaliber round will most likely cost less than a HEP-T round, none are presently in the Army inventory.

The CEV may have its limitations, but it increases the likelihood combat engineers will be able to accomplish their mission. Recognizing the limitations of any item of equipment is an important step in evaluating its effectiveness.

LT Joseph H. Hottes is presently a platoon leader with Co C, 682d Engr Bn. He received his MS from Iowa State University. LT Hottes has served with the Iowa National Guard since 1967 and as a commissioned officer since 1969. He is a graduate of the Engineer Officer Basic Course and recently graduated from 2-74 Engineer Officer Advanced Course.

BRIDGING

NEW PAMPHLET BEING DISTRIBUTED TO ENLISTED PERSONNEL

A PERSONAL COPY OF new DA Pamphlet 624-1 (**Your Pathway to Success: The Enlisted Promotion System**) will be distributed to all Army enlisted members this fall.

The pamphlet — prepared by MILPERCEN's Enlisted Personnel Directorate — is designed to provide the soldier and his supervisor with a comprehensive, easy-to-follow approach to how the enlisted promotion system works and how it is supported at the various levels, from the unit on up to Department of the Army.

MILPERCEN's enlisted career managers consider the document important enough to distribute a personal copy to every soldier on active duty, especially at this time when the volunteer Army is attracting increasing numbers of career-minded men and women who want to know all they can about advancement in the ranks and what they must do to get promoted.

Divided into four sections, the new pamphlet addresses both the individual soldier's responsibility and the Army's efforts to maintain an equitable and steady system of advancement within the enlisted ranks.

The first section contains general information and stresses the Army's reliance on a wide range of factors when considering the soldier for promotion the "whole person concept." It also lists simple steps that the individual can take to improve his chances for promotion and describes the military and civilian educational opportunities available to servicemen. These include training and testing in his Military Occupational Specialty (MOS) and the Non-commissioned Officers Education System (NCOES), and Army-assisted degree completion programs for civil schooling.

Section Two details each level of the current promotion system — Decentralized (initiated by the Unit Commander for Grades E-2 to E-4), Semi-Centralized (made in Grades E-5 and E-6 by Field Commanders and DA, working together) and Centralized Promotions (coordinated for Grades E-7 through E-9 at DA level). Included are the requirements and factors of work on each level of the Promotion system and a summary of the centralized promotion board procedures.

Section Three familiarizes the soldier with the installations which support the Enlisted Promotion System. Functions of the U.S. Army's Military Personnel Center (MILPERCEN), in Alexandria, Virginia, and the Enlisted Evaluation Center (EEC) and Enlisted Records Center (ERC), both located at Fort Benjamin Harrison, Indiana, are described in detail. The soldier is also provided with specific information on his official military personnel file and instructions on which of the three agencies to contact should he need to resolve personnel-related matters.

The fourth section contains appendices to the main body of the pamphlet; lists related Army Regulations, Circulars, and Pamphlets to be consulted for further information; and includes actual reprints of the Promotion Points Worksheet and Letters of Instruction to both the E-9 and Advanced NCOES Selection Boards.

Field units will be able to requisition individual copies for all unit members via pinpoint distribution. A world-wide message containing requisitioning instructions for DA Pamphlet 624-1 will be released as soon as the pamphlets have been printed and are ready for distribution.

Females may participate in nine additional MOS s, bringing the total of 437 of 479 enlisted MOS's now available to WAC personnel.

Additional details appear in DA message DAPC-PM 141200Z May 74.

THE GAP

NEW HANDBOOK PREPARED BY MILPERCEN ENLISTED DIRECTORS

THE NEW "HANDBOOK FOR PREPARING SOLDIERS TO MOVE OVERSEAS" has been distributed to all CONUS installation/activities requesting port calls. The handbook was prepared by the Enlisted Personnel Directors, US Army Military Personnel Center, to assist the administrative personnel responsible for POR processing by providing a single reference guide for use in determining eligibility for oversea assignment.

All information contained in the guide is current as of Aug. 1, 1974.

OPMS SPECIALTIES ADDED TO OFFICER MASTER FILES

THE PRIMARY OPMS SPECIALTIES for lieutenant colonels were added to the Officer Master File maintained at the US Army Military Personnel Center effective Aug. 15. Each record in the file now shows the LTC's primary specialty; alternate specialties are programed for inclusion by mid-October.

PERSONNEL ASSISTANCE POINTS TO BE ESTABLISHED

SOLDIERS ENROUTE TO OR returning from oversea assignments will get better attention once the Army Personnel Centers (Fort Dix, Fort Jackson and Oakland Army Base) and the Returnee-Reassignment Stations (Travis AFB, McGuire AFB and Charleston AFB) are reorganized and converted into US Army Military Personnel Center (MILPERCEN) Personnel Assistance Points. Conversion of these currently independent centers and stations to Personnel Assistance Points will begin on or about October 1.

The reorganization/redesignation of these points into field operation activities of MILPERCEN will give soldiers a direct point of contact with MILPERCEN while they are traveling to or from oversea duty stations. The offices will be open 24 hours a day, seven days a week, and staffed with "extremely well qualified people," according to MAJ George Fasching, Chief, Personnel Movements Branch, MILPERCEN.

"About 30,000 soldiers pass through these terminals each month; until the idea of Personnel Assistance Points evolved, they had no way of contacting us on a timely basis, just as we at MILPERCEN had no real way of contacting them while they were enroute. We have designed the Personnel Assistance Points to counteract this problem — to give the soldiers direct contact with MILPERCEN while they are in a travel status."

The Personnel Assistance Point officials will not only have the authority to coordinate directly with enlisted assignment managers and compassionate review and policy offices at MILPERCEN; they will be able to verify assignment, administratively amend orders, extend emergency leave and terminate it when the soldier reports in, help with compassionate problems and offer personal advice to those in a travel status.

Prior to the development of the Personnel Assistance Point, if a soldier had a personnel problem, he was attached to the nearest installation, and waited until that problem was resolved through channels. By being located where the soldier needs it most, the Personnel Assistance Points will be better able to assist him in moving oversea or returning stateside with a minimum of delay.

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Additional Comments: