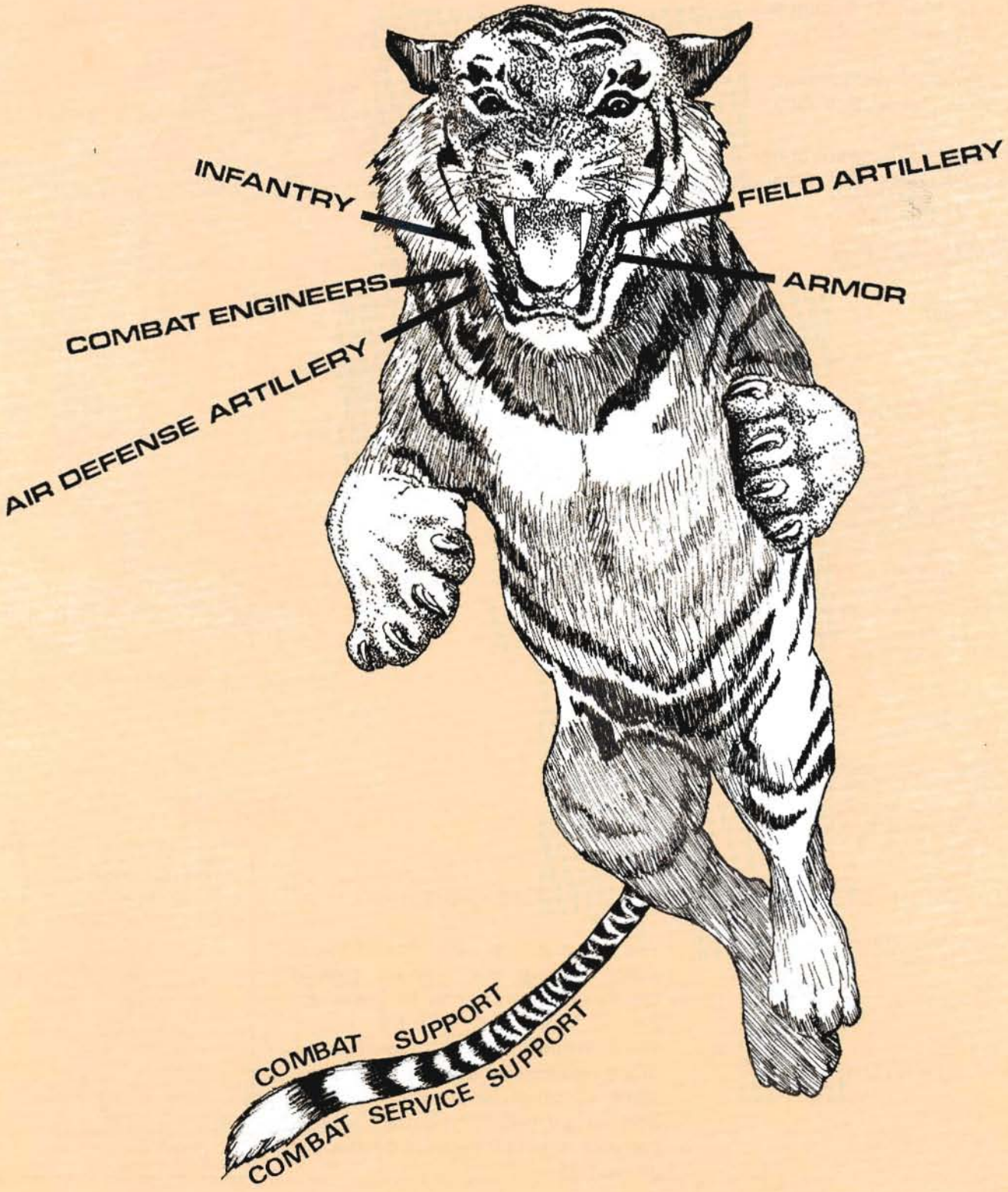
engineer

FALL 1979



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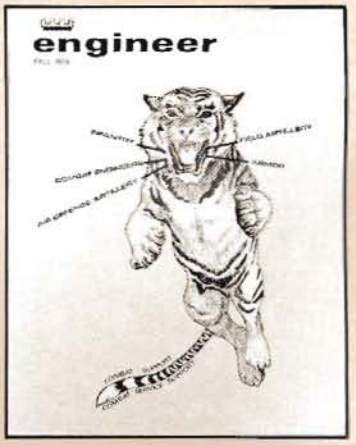
THE COVER

The concept of the "tooth-to-tail ratio" among our military ground forces is illustrated by PFC Barbara Stultz. Engineers, Infantry, Armor, Field Artillery, and Air Defense Artillery represent the teeth of the tiger, while all other forces have either a combat support or combat service support role, represented by the tail of the tiger.



engineer

VOLUME 9 FALL 1979 NUMBER 2

FEATURES

page 15

page 25

page 30

DEPARTMENTS

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News & Notes

TOP DRILL SERGEANT

Sergeant First Class Stanley Kolchins demonstrates the proper technique of performing "inspection arms" to a pair of female trainees. From among 500 drill sergeants assigned to Fort Leonard Wood, Kolchins has been selected as that installation's Drill Sergeant of the Year, thus qualifying him for DS of the Army competition. He is the senior drill sergeant of Company D, 5th Battalion, 3rd Basic Training Brigade.

GIVE AND TAKE

An annual exchange program between U.S. and British military forces this year involved the **13th Engineer Battalion**, 7th Infantry Division, and the 11th Field Squadron, 38th Engineer Regiment, Ripon, England. While members of Company B, 13th Engineers trained in Ripon, members of the 11th Field Squadron were training with the 13th Engineers at Fort Ord, Fort Hunter Liggett, and Camp Roberts, CA. Training at the U.S. sites included mine field deployment, obstacle emplacement, M4T6 bridge construction, orienteering and rappelling, advanced demolitions, and weapons qualification.

DMS RELOCATION

The results of a study to determine the feasibility of relocating the Defense Mapping School (DMS) are expected to be released this fall. DMS is a "modified tenant activity" of the U.S. Army Engineer Center and Fort Belvoir.

The study was necessary because Bagley Hall, home of the DMS, has deteriorated to the point that replacement within the next three years is essential. **Colonel John J. Meara** was chairman of the study group.

TANK TRAILS UPGRADED

Soldiers of the **563rd Engineer Battalion** have upgraded 26 miles of tank trails in the Grafenwoehr Training Area. Using more than 100 pieces of heavy equipment, including dozers, scrapers, graders, dump trucks, and bucket loaders, the 563rd engineers performed the work during a Combat Engineer Major Training Area Program 22 April - 22 June.

MG James A. Johnson

KEY REASSIGNMENTS

Major General James A. Johnson assumed the duties of Deputy Chief of Engineers on June 1. He is a former commandant of The Engineer School and served as the Corps' North Atlantic Division Engineer for two years prior to his recent reassignment . . . New division engineers include **Brigadier General Henry J. Hatch,** Pacific Ocean Division, and **Colonel Max B. Scheider,** New England Division . . . **Colonel Ted E. Bishop** took over as Director of the Army's Coastal Engineering Research Center in late April . . . **Major General Elvin R. "Vald" Heiberg III** is the new Director of Civil Works, U.S. Army Corps of Engineers.

ARNG UNIT HONORED

For its role in the cleanup operations following the disastrous Johnstown Flood of 1977, the Johnstown based **876th Engineer Battalion** has become the first Pennsylvania Army National Guard unit to receive the prestigious Governor's Unit Citation. Companies A (from Johnstown), B (Punxautawney), C (Hazleton), and D (Finleyville), plus battalion headquarters, assisted Johnstown residents in the aftermath of the flood which swept through a nine-county area on July 20, 1977, after thunderstorms dumped more than 10 inches of rain within a few hours. Personnel of the 876th rescued stranded victims, housed the homeless, and protected personal property from looters. With heavy equipment, they helped clear streams, remove debris, move earth, locate casualties, and construct temporary roads and bridges. The Governor's Unit Citation was created in 1974 to honor outstanding Pennsylvania Army Guard units, but the 876th was the first unit to receive the award.

FORMER CHIEF DIES

Lieutenant General (Ret) William C. Gribble, Jr., 62, a former Army Chief of Engineers, died of cancer June 2 at DeWitt Army Hospital, Fort Belvoir, VA. While serving as director of reactor development with the old Atomic Energy Commission in the mid 1950s, he developed the technical specifications for the Army's first nuclear power plant, which is located at Fort Belvoir. Lt. Gen. Gribble was director of the Army Nuclear Power Program in the early 1960s. He later was the Army's deputy chief of research and development and then deputy chief of staff for force development. He commanded Fort Belvoir and the Army Engineer Center and School for two years before becoming chief of Army research and development in 1971. In 1973, he became Chief of Army Engineers, a post he held until retiring in 1976.

RECRUITERS NEEDED

Qualified and motivated NCOs in grades up to E-7 are needed to fill two-year ADT jobs in the USAR recruiting force. Commanders are urged to encourage their top NCOs to apply for the positions to insure unit support of USAREC's recruiting mission. Readiness and strength maintenance depends on getting more good recruiters on board.

MINE DETECTOR SYSTEM

A $2.3 million contract for engineering development of the Vehicle Mounted Road Mine Detector System (VMRMDS) has been awarded to Cubic Corporation. Eight units will be produced for testing under the initial contract, with the first system set to arrive at the U.S. Army Mobility Equipment Research and Development Command (MERADCOM) in January. VMRMDS represents a major technological breakthrough because it is the only system that can reliably detect both metallic and plastic antitank/antivehicular land mines with a very low false alarm rate. The VMRMDS can clear a path up to 11 feet wide at eight miles an hour over unpaved roads or flat, sparsely vegetated terrain.

Letters to the Editor

MGB CONTROVERSY

In his article in the Winter 1978-79 edition of THE ENGINEER, Major Harvey G. Ramsey sets out a comparison between Bailey Bridge and Medium Girder Bridge, which leads to a conclusion that inherent limitations of MGB mitigate against its extensive employment on the battlefield. It is felt that this conclusion is reached partly because the full capabilities of MGB are not appreciated and because current procurement plans do not permit the deployment of sufficient bridges or any of the supplementary sets which greatly extend its flexibility.

The full flexibility of MGB is well set out in an article in the March-April 1979 issue of The Military Engineer written by Derek L. Knight, who for several years headed the MGB design team at the Military Vehicles and Engineering Establishment (Christchurch). This article clearly shows that procurement of additional MGB equipment could offer the U.S. Army many advantages and would overcome many of the disadvantages listed by Major Ramsey.

Major Ramsey's article is certainly a most valuable one, which highlights the overall problem of bridging, but it takes a somewhat pessimistic and short term view. Many of the problems can be solved very quickly by the provision of an adequate range of MGB.

LTC (Ret) C. Hartington
Sales Manager
Military Products Division
Fairey Engineering Limited

MAB CAPABILITY

In the article, "The Main River Crossing," Spring 1979 edition, it stated that "Prior to exercise Certain

Shield, the ability of the MAB to handle a high volume of continuous traffic was questionable." This is incorrect. During V Corps exercise Laramie Golden Arrow in June 1973, a MAB bridge was constructed on the Rhine River and was in continuous operation for six hours (0600-1200 hours). Conditions, if not precisely similar, were equally challenging. If my memory does not fail me, the width of the river at the bridge location was 1100 feet and 42 MAB units were needed to construct the bridge. The first MAB hit the water at 0100 hours and the actual bridge construction took one hour and 40 minutes. (Due to the German specified river closure time, the bridge construction had to be halted for three hours and 20 minutes.) This bridge was also constructed under radio silence and blackout conditions. My company—E Company, 23rd Engineer Battalion—and two others—E Companies of the 10th and 12th Engineer Battalions—were needed to construct the bridge. THE ENGINEER Magazine, in late 1973 or early 1974, published an article on this exercise by CPT Bittamore, the commander of E Company, 12th Engineer Battalion at the time of the exercise.

CPT Robert E. Jalette
University of Virginia

ENGINEER INGENUITY

Uniform insignia manufacturers recently began producing Engineer buttons for the mess jackets. This action, in being responsive to this age-old desire of Corps of Engineer officers to outfit their uniforms with the proper buttons, created a new dilemma. The uniform regulation requires all buttons to match. Engineer buttons are not, to my knowledge, available for the shoulder knots. The Engineer cap buttons are the same size but the posts are a different size than those in the shoulder knots. The button screw posts have different diameters, which prevents interchange of the post and button, and the cap button, with post, is too short for the shoulder post. I would like to share my solution to this dilemma with your readers.

I modified my shoulder knots slightly in order to conform to the regulation. I used two cap button devices per shoulder knot in order to comply. I forced a cap button under the knot in between the braid and backing of the knot which will permit screwing the post onto the button. This button is used to affix the shoulder knot to the jacket. I then forced the backing post of the Engineer cap button between the shoulder knot and cap button device previously placed under the knot. This permits screwing the Engineer button on the shoulder knot where it will be visible. The exposed Engineer button is then more or less permanently affixed to the shoulder knot. This solution should help other Engineer officers end years of frustration until Engineer shoulder knot buttons are made available.

LTC Leonard Hasse, Jr.
Fort Belvoir, VA

Engineer Problem

You are the battalion S-3 of the 863rd Engineer Battalion in direct support of the IX Corps. Several motorized rifle divisions have broken through friendly defenses in the Corps' western sector. Friendly forces have conducted a retrograde operation across the Eagle River to the east, while the 20th Armored Cavalry Squadron acted as a covering force on the far bank.

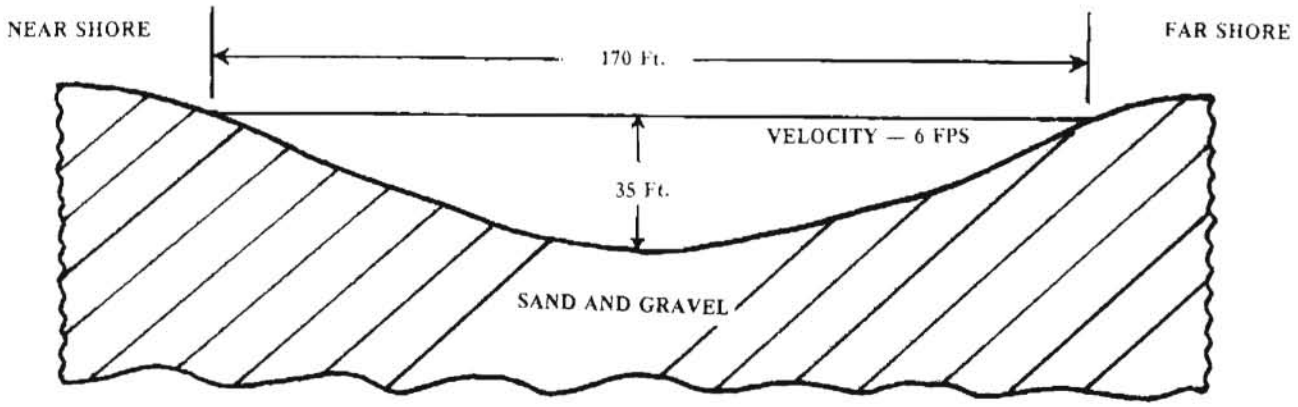
Unfortunately, the Brudenheim Bridge, intended as a withdrawal route for the covering force, has been destroyed by enemy tactical air support. The 20th is stranded on the far bank of the river while in contact with enemy forces. The covering force must be extracted before being decisively engaged by superior enemy forces.

The battalion commander has given you the mission to devise a plan of rescue for the 20th as quickly and effectively as possible. The commander wants your plan within two hours.

From friendly reconnaissance of possible river crossing sites, intelligence reports, and your inspection of available maps, you select a river crossing site with the following pertinent data:

—River width at crossing site is 170 feet
—River depth (maximum) is 35 feet
—Far bank height is approximately 4.5 feet
—Near bank height is approximately 3.5 feet
—Stream velocity is six feet per second
—River bed composition is sand and gravel

Cross Section of Eagle River at Crossing Site



Since a rafting operation would be too time consuming and sufficient Mobile Assault Bridge components are not immediately available, the Ribbon Bridge is the most feasible alternative. Besides, your troops are well-trained in Ribbon Bridging. Bridge construction and crossing will be conducted at night, despite near freezing temperatures (35°F), to maximize security and secrecy. A bridge erection boat (BEB) temporary anchorage system will be used to reduce bridge erection time. Assume no preparation time for assembly site.

You have just 35 minutes to calculate time, troop, and equipment requirements before briefing your commander. Crossing and disassembly times can be calculated later. FM 5-34 is your reference for calculations.

See THE SCHOOL SOLUTION, page 44.

1979 Readership Survey Results

As promised, the results of the 1979 Readership Survey are herein presented, along with some guarded editorial comments concerning their significance. Although this and similar surveys are subject to various interpretations by statistical experts, a few general conclusions are possible that most experts would accept.

Approximately 7,500 copies of the Winter edition of THE ENGINEER, containing the Readership Survey, were distributed to active Army engineer units/activities, the Reserve Components, training and education centers, facilities engineers, and numerous other activities and agencies worldwide.

As of 1 May, the cutoff date for purposes of evaluation and analysis, approximately 350 completed surveys had been returned, thus assuring at least a 90 percent confidence level. In other words, chances are nine out of ten that if we eventually receive another 350 returns, the results will be very similar, if not identical.

Without further elaboration, here are the questions and responses to each.

I. What is your present military status?

Response	No.	Percent
Active Army	186	55.0
USAR	70	20.7
National Guard	65	19.2
Retired	3	0.8
DAC	14	4.1

EDITOR'S COMMENT: These figures generally correlate to the magazine distribution pattern.

II. What is your present grade?

Response	Act. Army	Res. Comp.	% of Total
Company Grade Officer	62	38	30.3
Field Grade Officer	76	42	35.4
Warrant Officer	3	4	2.0
Junior Enlisted	12	10	6.8
Senior Enlisted	32	41	22.0

EDITOR'S COMMENT: Approximately two-thirds of the magazine readership is officer personnel, despite the fact that enlisted personnel outnumber officers within the Army and the Corps of Engineers. We're not sure why more enlisted personnel do not read the magazine, but we want to encourage commanders at all levels to insure that all of their troops have an opportunity to read it. If commanders feel their units are not receiving a sufficient quantity of magazines, they should request additional copies.

III. What is your present assignment?

Response	No.	Percent
Combat Engr. Unit	124	36.5
Bridging Unit	9	2.6
Topographic Unit	10	2.9
Construction unit	34	10.0
Facilities Engr.	20	5.8
Staff Section	22	6.4
School (ROTC, Service school, etc.)	57	16.8
Other	63	18.5

EDITOR'S COMMENT: The question was poorly worded, since there are no construction units, as such, and since readers who marked "school" may be assigned to the staff and faculty of the Engineer School, or they may be students attending one school or another. The only logical conclusion, then, is that many of our readers are assigned to combat engineer units. But, by the same token, many are assigned to other units/activities.

IV. How much formal education do you have?

Response	No.	Percent
Less than High School graduate	2	0.5
High School graduate or GED	46	13.6
Some college	56	16.5
Undergraduate degree	104	30.7
Graduate degree	130	38.4

V. How do you receive THE ENGINEER Magazine?

Response	No.	Percent
Personal Subscription	19	5.5
Unit/Office copy	295	86.7
Dayroom	7	2.0
Library	2	0.5
Other	17	5.0

EDITOR'S COMMENT: Most of our readers have access to a unit/office copy of the magazine, but we were surprised and disappointed that only two percent of respondents mentioned dayroom copies. It raises doubt that sufficient copies of the magazine are placed in dayroom racks where a majority of our junior enlisted troops should have the opportunity to read it.

VI. How much of the magazine do you usually read?

Response	No.	Percent
All of it, from cover to cover	122	36.2
Most of it	190	56.3
Less than half of it	25	7.4
Seldom read any of it	0	0.0

VII. What material do you enjoy most *in THE ENGINEER?*

Response	Act. Army	Res. Comp.	Total
Feature Articles	28.9%	25.1%	28.0%
News & Notes	18.3	15.8	17.4
Officer Career Info	18.5	7.8	13.1
Tactical Problem	8.9	13.7	10.8
Reserve Components	4.3	17.0	10.0
Enlisted Career Info	8.7	5.4	7.0
Letters to the Editor	5.7	7.1	6.5
NCO Channels	5.7	6.3	5.9
Other	0.3	1.4	0.8

EDITOR'S COMMENT: Based on the grade structure of our readership, we expected better response to "Enlisted Career Info" and "NCO Channels."

VIII. Rate the following magazine characteristics by placing a number beside each (1=outstanding, 2=average, 3=poor).

Response	Average Rating
Reading ease	1.4
Layout and design	1.5
Photos and illustrations	1.6

EDITOR'S COMMENT: We agree that the magazine needs improvement in the area of photos and illustrations, but in most cases, we must rely on contributors for both the quantity and quality of photos and artwork.

IX. Overall, how do you rate the information presented in THE ENGINEER?

Response	Percent of Total
Highly useful	43.2
Moderately useful	53.2
Slightly useful	3.2
Useless	0.0

EDITOR'S COMMENT: A most gratifying response. Obviously, the magazine performs a useful function. We hope to make it even more useful in the future.

X. How do you rate THE ENGINEER in comparison with similar military publications?

Response	Percent
Better than most I've seen	49.7
About the same as others	42.3
Not as good as others I've seen	7.9

EDITOR'S COMMENT: These responses indicate that we're making progress in efforts to upgrade the magazine content and design.

XI. Would you like to see more space devoted to:

Response	Percent of Total
Equipment	20.8
Tactics	17.5
Foreign Armies and equipment	16.7
Career management info	12.9
General military subjects	12.1
History	9.6
Photos and art	5.0
Humor	2.5
Other	2.5

EDITOR'S COMMENT: Perhaps the most useful question in the entire survey. We will strive to devote more space to those subjects that attract the most interest.

XII. After reading THE ENGINEER, do you:

Response	No.	Percent of Total
Pass it on to someone else	198	59.8
Keep it for reference	126	38.0
Throw it away	7	2.1

EDITOR'S COMMENT: Since distribution of the magazine is currently limited to a ratio of one magazine per eight members of the entire Army engineer family, these responses were somewhat disappointing. Give others an opportunity to read the magazine before filing it away or throwing it in the trash can.

XIII. Would you be interested in contributing to THE ENGINEER?

Response	Percent of Total
Feature material	33.4
Short news items	29.7
Letters to the Editor	13.3
Photos or illustrations	19.2
Other	4.1

EDITOR'S COMMENT: If you have something interesting and useful to contribute, don't wait for a personal invitation. There can be no monetary reward for your time and effort, just the satisfaction of getting your thoughts and ideas into print and, perhaps, a pat on the back from your commander.

The final question on the survey was not a question at all, but simply a request for additional comments. Roughly one-third of those who completed the survey penciled in a suggestion, idea, constructive criticism, praise, etc. Some of the comments were published in the Spring edition of the magazine.

There is no way we can respond to all of the comments, but rest assued that all have been read and studied with an open mind and that many of your ideas and suggestions have already been acted upon, while others are under consideration for action.

A final word about the survey: Those readers who responded to the survey have taken an active role in establishing the editorial policy of their professional journal and we encourage their continued active participation. Readers who failed to respond for one reason or another may still do so, in any format desired. Pencil and scratch paper will do just fine.

ENGINEER

Magazine is now available by subscription. Requests for personal subscriptions should be forwarded to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, along with check or money order payable to the Superintendent of Documents. Subscription rates are $5.50 per year domestic (including FPO and APO) addresses and $6.90 for foreign addresses. Individual copies are available at $3.25 domestic and $4.10 foreign.

Challenges to Engineer Doctrine

by MAJ Stephen E. Draper

U.S. ARMY tactical doctrine has increased the importance of the Engineer in support of combat operations, resulting in the emergence of new Engineer doctrine.

Innovations of the new tactics are based on the age-old partnership of fire and maneuver within the context of new weapons systems. The new weapons and the new tactics have envolved from the increasing imbalance between NATO and Warsaw Pact conventional forces. In Europe, NATO forces are outnumbred 2.6 to 1 in tanks and 2 to 1 in aircraft, and since Warsaw Pact forces can choose the time and place of attack, combat ratios as great as 8 to 1 could favor the enemy in the area of the main attack.

An analysis of our new doctrine is necessary to describe the requirements for winning in such an environment.

The doctrine of the Active Defense is based on three facts of the modern battlefield. First, the new generation of weapons systems has dramatically increased the defender's combat power and his ability to accurately deliver that power. If an enemy tank can be seen for a period of less than one minute, it can be hit with some sort of weapon. Once hit, the probability of a mobility "kill" is incredibly high, on the order of 90 percent.

Second, the growing imbalance between NATO forces and those of the Warsaw Pact may require NATO to fight against odds as great as 8 to 1.

Third, future war in Europe is expected to be brief, with the enemy attempting to destroy NATO's ability to fight quickly, thus forcing political settlement rather than a protracted or nuclear war.

SINCE WE do not have enough combat power to place sufficient combat power forward and also to maintain a strong reserve, the Active Defense concept of the new tactics calls for maximum forward deployment with minimum reserves. The intent is to slow the enemy advance. The scarcity of resources requires that sectors be occupied in a manner that accepts risk in all areas except likely avenues of approach.

The enemy emphasizes momentum and is tank-oriented. The Active Defense seeks to disrupt enemy armor thrusts, slow him to a crawl, and provide enough time for reinforcement from CONUS. The bottom line is to kill tanks, and to kill them well forward on the battlefield.

The new tactical doctrine is based on the following six maxims:

(1) We must understand the enemy;

(2) We must obtain accurate and timely battlefield intelligence, including information on terrain, weather, and climate as well as enemy order of battle;

(3) We must concentrate our forces at the critical times and places and be willing to accept risk in other less critical areas;

(4) We must fight as a combined arms team;

(5) We must exploit inherent advantages of the defender;

(6) We must use fire and maneuver to slow the enemy advance.

Two new technical systems make the Active Defense feasible. One is the family of anti-armor missiles and the other is the family of scatterable mines (FASCAM).

The most important of the anti-armor missiles is the TOW. It is described as ". . . a vehicle-mounted or crew portable, heavy anti-tank assault weapon . . . tube launched, wire-command link guided missile . . . capable of defeating any known vehicle on the battlefield . . ."

The TOW is complemented by the family of scatterable mines as a tank-killing system. These mines can be rapidly emplaced and programmed to self-destruct after a specified time period. FASCAM consists of six different systems, described briefly below.

(1) The Helicopter Delivered Mine System, M-56, employing the M-34 HE mine. Up to 160 mines are carried by each UH-1H helicopter.

(2) The Artillery Delivered Anti-Personnel Mine System (ADAM), employing the M-67 or M-76 mine. A large number of mines are carried by each 155-mm projectile.

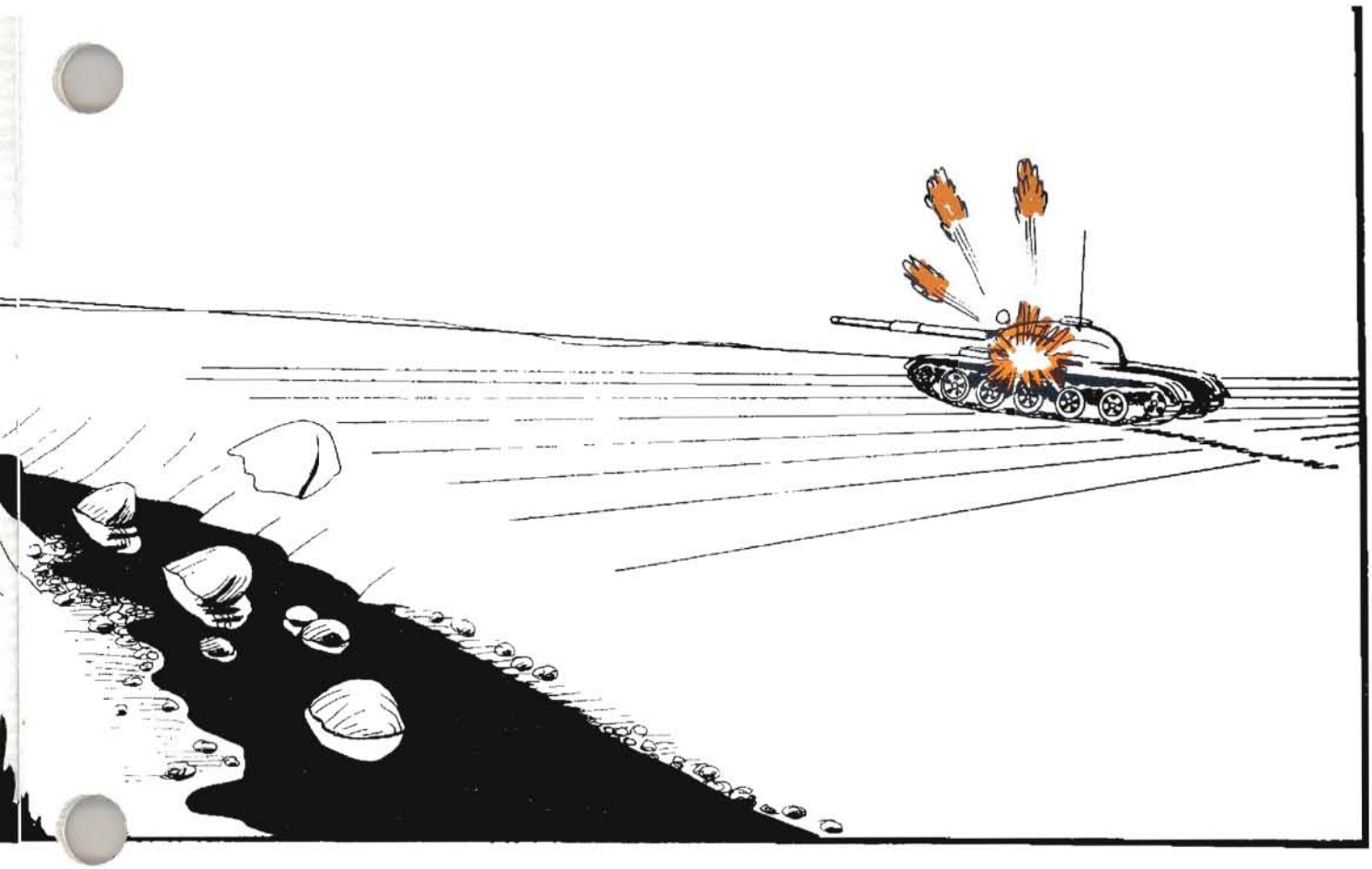
(3) The Artillery Delivered Anti-Tank Mine System (ADATM), employing the XM-70 or XM-73 AT mines and delivered by 155-mm projectile.

(4) The Ground Emplaced Mine Scattering System, employing the XM-75 AT mine and the XM-74 AP mine. Mines are delivered by the XM-128 mine dispenser, which will scatter mines in one of several preplanned patterns.

(5) The "Gator" Mine System employs BLU 91/B AT and BLU 92/B AP mines which are delivered by high-performance Air Force, Navy, and Marine Corps aircraft.

(6) The Modular Pack Mine System (MOPMS), employing AT and AP mines similar to the GEMSS system. The mines are tube-launched from a factory-set, disposable ejection tube.

Of the six scatterable mine systems mentioned, only the Helicopter Delivered Mine System has



been fielded. Fielding of the other five systems is expected in the early 1980s.

General conclusions may be drawn from the application of our new technology to a realistic combat scenario. The first conclusion is that the major constraint to TOW tank kills is the large time periods required between the firing of rounds to allow for tracking.

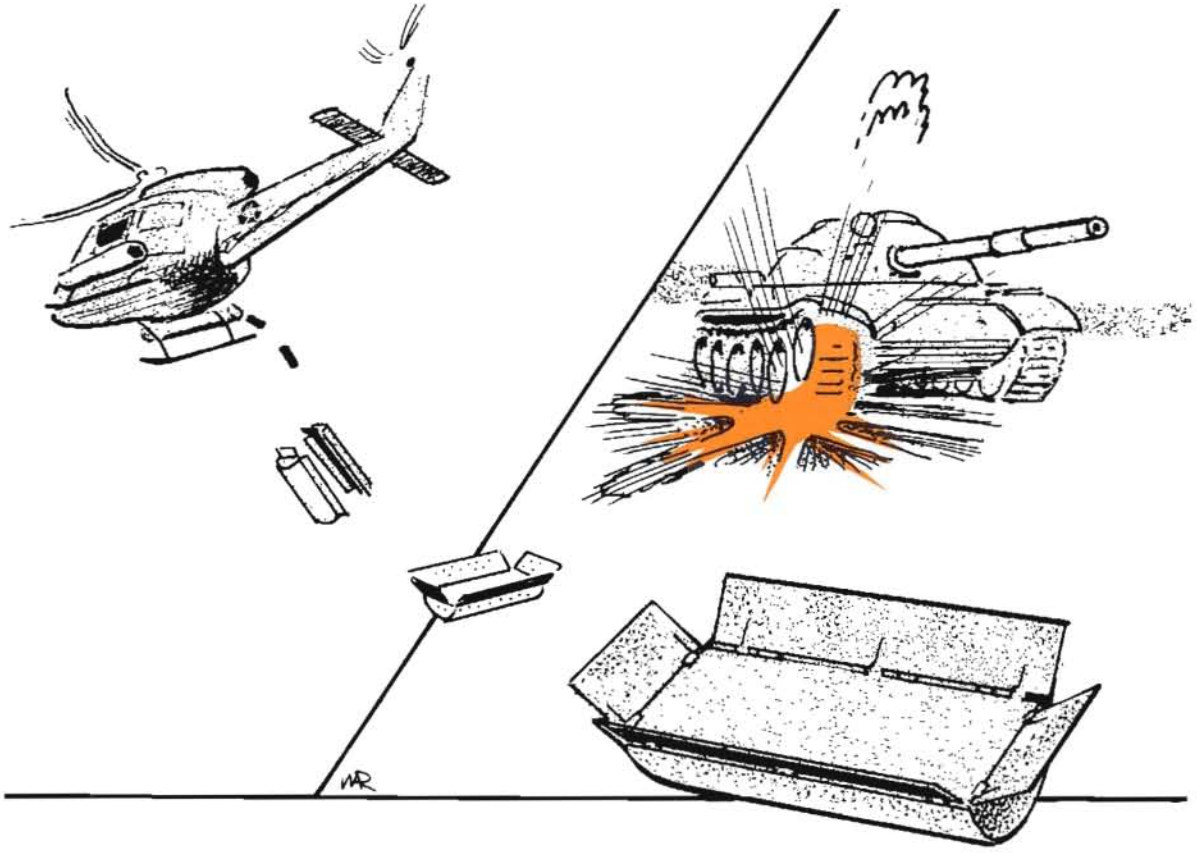
THE SECOND conclusion is that any increase in the total number of kills is directly related to mobility and countermobility. By decreasing the amount of time required to move between TOW positions, more rounds can be fired in any given time period. By decreasing the enemy's approach speed, more rounds can be fired in the same time period. Mobility and countermobility are the keys to optimum TOW weapons use.

Decreasing the enemy's mobility has traditionally been an engineer task, and it is accomplished by the creation of obstacles. In a "bowling alley" situation, the TOW squad's projected kills can be almost doubled by cutting the approach speed in half. In the case of a task force under suppressive fire, decreasing the enemy's speed of approach by one-half would increase projected kills substantially.

The most effective way to decrease enemy approach speed is to create effective obstacles. The ability to provide effective obstacles at the right place at the right time will soon be possible with FASCAM, which gives the ability to rapidly emplace preplanned minefields or fire immediate obstacles as the enemy situation develops.

The probability of success can also be enhanced by applying more combat power at a given location. Two TOW squads working as a team have almost twice the chance of success against an armored approach as one TOW squad working alone. The shifting of combat resources to critical sectors cannot rely solely on existing lateral transportation arteries. Engineer effort must also be directed to this task.

The engineer must be concerned with three



critical tasks. First, he must enhance friendly mobility and inhibit enemy mobility. Second, he must increase the effect of friendly firepower and decrease the effects of enemy firepower. The effectiveness of friendly firepower is increased by careful placement of obstacles within a designated killing zone, along with the placement of obstacles that channel the enemy to that zone. Enemy firepower effectiveness can be reduced by the construction of covered routes between positions and by fortification of those positions.

Third, the engineer must be prepared to fight as infantry, thus freeing maneuver forces to conduct an Active Defense. The higher densities of combat power must be placed where the greatest threat exists. At critical points in the battle, such as when maneuver brigades have been backed up to their rear boundaries, engineer units might be used to replace maneuver units in risk areas so that more combat power can be applied against the enemy's main attack.

ENHANCEMENT of friendly mobility can be achieved on two levels. On the micro-level, construction of covered routes between weapons positions within a battle zone and construction of routes of movement to new battle zones are an obvious means of increasing combat power for the company and battalion. On the macro-level, avenues of maneuver to allow rapid lateral shifting of combat power between brigades will directly enhance success at critical times in the battle.

These routes should have the following characteristics:

—They should be as short as possible within the constraints of the requirement for 300 meters between positions, allowing for minimum travel time between positions.

—They should allow the maximum possible speed for the tank, APC, or truck. This will require, in some areas, grubbing, grading, and some rudimentary base work to provide better traction.

—They should be covered and concealed, taking advantage of terrain masking, etc.

—They should be constructed in such a manner as to facilitate the "overwatch" tactics used by armored/mechanized forces.

The construction of avenues of lateral reinforcement is an extemely important engineer task, second only to the creation of obstacles. The division commander will initially allocate combat power to counter the major threat. Therefore, those sectors with the greatest possibility of enemy attack will be assigned the greatest combat power.

Other areas will have a smaller density. The enemy will most likely attack in a configuration that makes the initial allocation sub-optimum. Lateral shifting of maneuver units will be needed to achieve optimization. This can be done only if the avenues are prepared so they are passable,

easily maintained, and covered from enemy air observation.

The enemy must be slowed and channelized into killing zones that allow maximum effectiveness of weapons systems. Obstacles of every sort must be placed so that, upon reaching them, his momentum is reduced and he chooses the route that leads to the killing zone. Once he is in that zone, he must be slowed further and held for short periods to allow our anti-armor weapons the time to fire as many rounds as possible. The obstacles must be placed so that the enemy vehicle remains in view of the friendly weapons for as long as possible.

FRIENDLY ANTI-ARMOR weapons must bear an increasing burden of enemy fire suppression as the battle progresses. These weapons systems will require some sort of protection from counter-fire. The minimum essential protection is a position that allows exposure of only main gun or firing platform. A position with overhead cover is desireable.

Additional protective positions will have to be constructed that are not directly related to maneuver units, however. These will also require engineer resources. While the maneuver units can provide their own protective positions to some extent, it will be entirely up to the engineer to provide positions for a variety of command posts, artillery emplacements, aviation assets, communications sites, and various logistical units and equipment parks needed by the division.

All of the above require the engineer's attention and should be the first priority. There are, however, other tasks that must be accomplished and these will require engineer assets. Such tasks will include supporting river crossings, water supply, rear area damage control, and rear area security.

To accomplish these tasks, a limited amount of divisional engineer resources exist. It is obvious that the divisional commander must optimize these rsources just as he must optimize combat power.

Current doctrine places an engineer company in direct support to a maneuver brigade (FM 5-100). Further distribution, such as the practice of placing one engineer platoon in direct support of each maneuver battalion task force, has a tendency to be wasteful. The need for engineer resources is situation-dependent and varies with the expected threat, the terrain configuration, the defensive unit's organization, etc. Usually, the platoon is located with the supported battalion for the period of the battle, and there it stays, even if no work is required or if only a portion of the platoon's assets are used.

The resource allocation problem in Europe is critical. Given 48 hours warning, the current divisional engineer organization permits each brigade to receive the following:

—36 "standard" minefields (100m X 50m)
—1200 meters of "standard" anti-tank ditch (3m X 2m)
—60 small bridges destroyed or 60 road craters
—36 "vehicle pits" for anti-tank weapons positions
—90 Abatis or other obstacles.

The fourth company of the battalion will most likely be assigned to the covering force to provide the same sort of services, with more emphasis placed on the construction of covered withdrawal routes. Thus, the Corps engineer battalion must provide the division with lateral avenues of reinforcement as well as the engineer work needed by the artillery, aviation unit, DISCOM, etc. This battalion can construct approximately 14 kilometers of new road if it does nothing else in the 48-hour period. With all other demands being filled, the end result is that lateral transportation work will be minimal.

IN CONCLUSION, more effective use of our engineer units is possible if they are allocated on a task basis rather than on a unit basis. At the very least, engineer resources should be allocated in the same percentages that the threat presents. Better yet, engineers might be allocated in terms of the needs of the three areas discussed above—friendly mobility enhancement, enemy mobility reduction, and protective fortifications.

From the point of view of the division commander, the overriding concern will be to restructure combat power in the most effective way once enemy intentions are known. By using engineers to enhance the ability to rapidly shift combat power to critical areas, the commander is able to optimize available combat power.

From the point of view of the brigade commander, the optimum use of engineers lies in the preparation of movement routes and routes of lateral reinforcement that allow a balancing of combat power against the enemy threat.

From the point of view of battalion and company commanders, engineers can best be used in the role of countermobility. They will be interested in channelizing enemy vehicles into killing zones and slowing enemy movement within those zones.

The new concept of habitually placing at least one Corps engineer battalion OPCON to each division can help alleviate the problem of scare engineer resources. If, by TO&E mission assignment, the Corps battalion is made responsible for all engineer tasks behind the brigade rear boundaries, the divisional battalion can be solely tasked and trained for the three major acitvities for which the Active Defense calls.

By TO&E, the Corps battalion should be responsible for MSRs, water supply, communication sites, aircraft landing areas, and all those requirements not associated with direct application of combat power. The divisional battalion would be responsible, by TO&E, only for the tasks specifically involved with friendly mobility enhancement, enemy mobility reduction, and maneuver unit survival. This would require some basic organizational changes within each battalion, as well as some basic TO&E equipment changes (such as adding more D-7s, front-end loaders, and augurs) in order to provide full effectiveness.

AN ALTERNATIVE would be to provide an engineer company team to each brigade. This company would be solely directed at those mobility tasks inherent to the brigade and its battalions. The type and number of subunits attached to the team would be based on the brigade's mission and the threat presented, much like a maneuver company support team. It would be provided with the equipment necessary to support the brigade with obstacle construction, fortifications, and minimal road construction capability.

The reduced divisional battalion could then be solely concerned with accomplishing division-level tasks without competition from brigade requirements. This alternative would, of course, be in keeping with the fact that it is a brigade commander's war, but it would be inefficient from a training and management standpoint.

The concepts of how engineers are used once the battle begins can be changed to provide the division with more effective use of its combat power. As the division commander moves part of his force from one sector to another, he must somehow allow for "holes" created.

There is a point in the battle in which engineers would provide maximum optimization, not by creating obstacles to the rear, but by converting to infantry and covering "risk" sectors. This point certainly exists when a brigade is backed up to its rear boundary by a strong enemy thrust. Then the engineers can be used optimally by replacing a unit in a "risk" area so the maneuver unit can be shifted to reinforce the battered brigade. It should be noted that, with minimal antitank weapons augmentation, the engineer unit can provide excellent defense in an urban area.

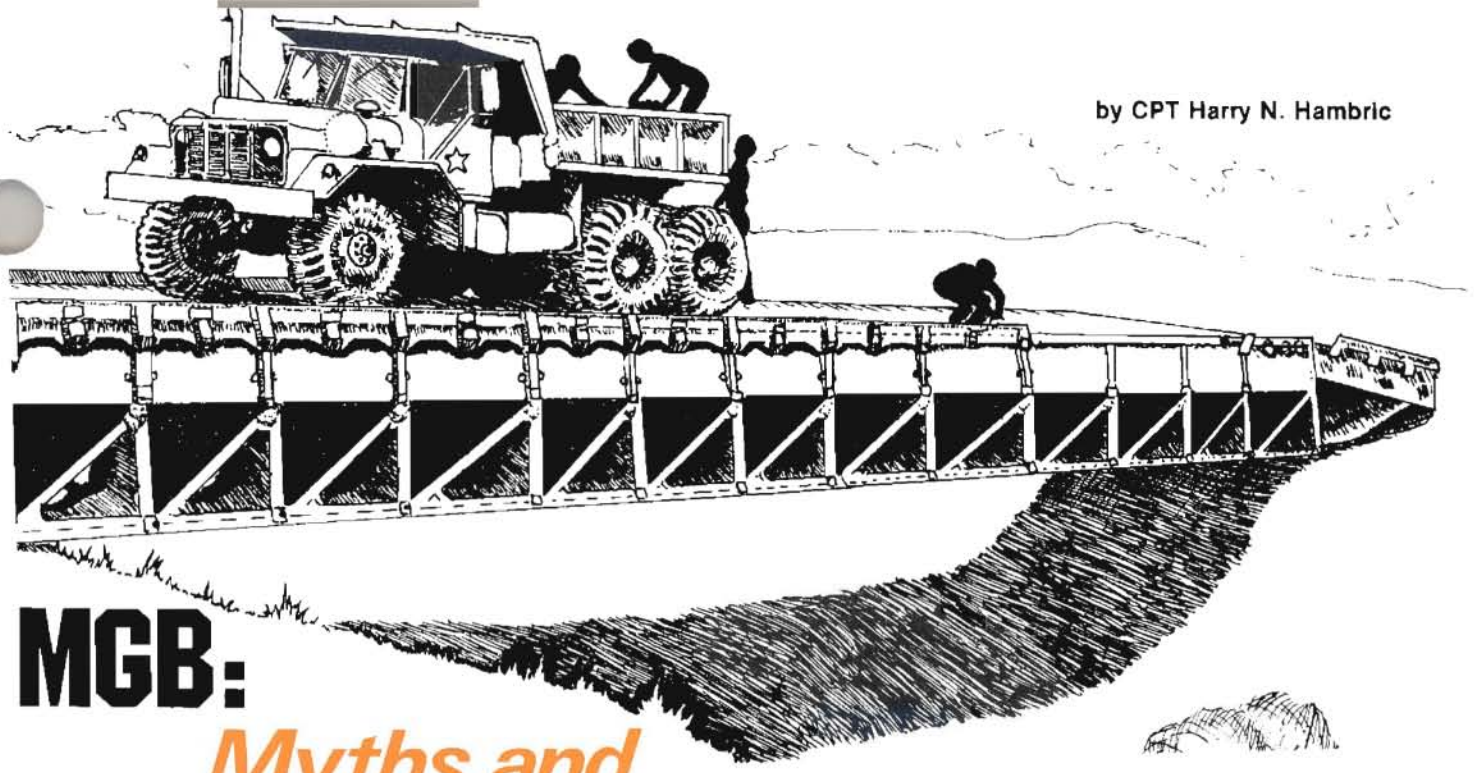
TO SUMMARIZE, just as tactical doctrine has changed drastically, so must engineer doctrine. Engineers cannot be used on the battlefield of the future as they were used in World War II and Vietnam. The threat demands that the resource be used as effectively as possible or decisive defeat is probable.

It is interesting to note that the Russians perceive the engineer resource with increasing importance. There exists today, in the Soviet Army, a Mobile Obstacle Detachment which operates with the antitank reserve. Its purpose, according to A.A. Siderenko, "is to set up minefields on identified axes of counter attacks by enemy tanks and to destroy objectives (bridges, road junctions, defiles, etc.) to the front and flanks of the deployed antitank reserve . . . The presence of a Mobile Obstacle Detachment permits rapid mining in the course of combat . . . Mining the terrain delays the advance of the enemy tanks and thus creates conditions for their effective destruction by the fire of the antitank reserve." This would be an excellent description of the brigade engineer combat team.

One concept that has been reviewed for the heavy division structure is the reduction of the engineer battalion to three companies. It was shown to be a step in the wrong direction and is no longer being considered. Notwithstanding the fact that the German Army had only three companies per division in World War II, modern technology and the Active Defense demand more.

The trend from 1746 through Vietnam has been to direct engineer efforts away from combat roles towards combat service support roles. That trend must be reversed. No longer will conventional war allow us the time to build-up and reinforce. The effort can no longer be on the MSRs and logistics "tail." It must be directed at maximizing combat power at the outset. The concepts of how engineers are used must be changed to emphasize those tasks that directly affect fire and maneuver of our forward units.

Major Draper is currently assigned to the 78th Engineer Battalion (C), USAREUR. He wrote this article while attending the Command and General Staff College.



by CPT Harry N. Hambric

MGB: Myths and Misunderstandings

In recent months, numerous questions have appeared concerning the feasibility and capability of the Medium Girder Bridge (MGB), in comparison to other U.S. dry gap tactical and assault bridging. In an effort to clear up as many of these myths and misunderstandings as possible, I have compiled the following "Myths and Truths" chart.

MYTH NO. 1

The MGB is limited to a maximum of MLC 60 loads.

TRUTH

Studies conducted by the Marine and Bridge Laboratory, Mobility Equipment Research and Development Command (MERADCOM), indicate that the MGB can safely cross loads heavier than MLC 60 on a vehicle-by-vehicle basis. MERADCOM and its equivalent agency in England are coordinating efforts to determine the relationship between bridge lengths and the maximum safe load of specific vehicles that each length can sustain. Current data reveal that the MLC 78 HET loaded with a M-60 tank will be able to cross double story MGBs with gaps up to 94 feet wide and single story MGBs with gaps up to 30 feet wide.

MYTH NO. 2

MLC 60 length is limited to 103 feet, with no capability within existing equipment to reinforce.

TRUTH

MGBs up to 163 feet (49 meters) in length can be reinforced to MLC 60 with the U.S. cable reinforcement set (upon its arrival, 1980-81). However, it has been determined that, very likely, single span MGBs may be installed over a pier. Data concerning exact lengths and procedures for installing single span MGBs in this manner were not available for inclusion in this article. Further testing of the concept will be forthcoming in the near future, and data forwarded to using units.

MYTH NO. 3

Limited life of the MGB may affect training and operation readiness of the bridge.

TRUTH

The aluminum alloy has a well-defined fatigue life of 10,000 Class 60 crossings. The fatigue life of the bridge is not affected by training builds unless crossed by Class 60 or heavier loads. The launching components (rollers, launching nose, etc.) will be affected by training builds, but this is the case with any other bridge launching system as well. Fair wear and tear, or accidents (improper procedures) may produce worn or damaged components, but careful handling and use of established procedures will limit damage and wear to very minor degrees. The chances of a tactical bridge sustaining even 1,000 MLC 60 crossings in a combat zone without being detected (and put out of action) are slim, indeed. Ten thousand crossing cycles would appear to be more than sufficient.

NOTE: The same MGB sets were subjected to developmental and operational tests, not only on the MGB, but on the erection set, the United Kingdom pier and span junction sets, and the U.S. cable reinforcement set. The two sets have never experienced any type of catastrophic failure. Approximately 12,000 Class 60 crossings, plus several deliberate static loads approaching 90 tons, did not cause failures. To obtain loading conditions where the "10,000 MLC 60" criteria may cause failure, the components would have to be in the same location for every MLC 60 crossing. This is not likely due to disassembly and relocation, as well as mixing, of components.

MYTH NO. 4

Limited replacement parts will affect readiness and/or combat operations.

TRUTH

The U.S. has purchased only 34 sets of MGB and 17 erection sets. All MGB units in the Army, except one, will have four MGBs and two erection sets. Each bridge and erection set has a minimum of one spare for each of the major components, more than one spare for items considered to be subject to high mortality. Each unit will have sufficient spare parts to replace up to two complete ends of bridge, four interior bays, and any damaged erection component without interfering with the capability of the set. High mortality components have been identified and are being prestocked in depots in addition to spares already included in bridge sets.

MYTH NO. 5

The flexibility of MGB has been referred to as rigid, while the Bailey is classified as highly flexible.

TRUTH

When used as a bridge (the intended purpose), the MGB is far more flexible than the Bailey. Numerous methods exist for jacking the bridge onto/off its rollers; little, if any, site preparation is required; up to 1:10 transverse slopes and 1:10 longitudinal slopes are available; numerous methods exist for expediting launch and de-launch; because of its light weight and quick, easy assembly, new and better ways to employ the MGB should be developed through field experience.

MYTH NO. 6

The cost of MGB is prohibitive.

TRUTH

The MGB is expensive, costing approximately $3,800 per foot, compared with an acquisition cost for the Bailey Bridge of $270 per foot 20 to 30 years ago. Even considering inflation, the difference is significant. But considering the savings in time, personnel, and equipment on the future battlefield, the MGB is expected to pay for itself. The MGB is a bridge which can be launched almost as fast during blackout conditions, in adverse weather, in fog, or in smoke as it can be launched on a clear day. A 103-foot MLC MGB can be launched in less than two hours, and de-launched and disassembled in the same period of time.

MYTH NO. 7

MGB used in the forward part of the main battle area has been referred to as ludicrous.

TRUTH

I am sure that no engineer with common sense would want to build a bridge in the forward portion of any battlefield, but it would be difficult to assure me that (if I were the commander of an MGB company) I would never be called upon to complement other forms of assault bridging if the situation required it. Until the late 1980s, MGB will be our fastest bridging system for gaps greater than 60 feet. I would certainly want to get in, and get out as fast as I could. MGB will be well worth its cost in time of war.

It has been suggested that perhaps MGB and Bailey Bridge assets should be consolidated in composite MGB/Bailey Bridge companies. I hope that this does not happen. There is no doubt that MGB and Bailey must complement each other, and I certainly agree that taking advantage of each system's strong points will provide optimum utilization of bridging assets.

I strongly feel that, even if a company could maintain the readiness and training required to field two different types of bridge, the command and control of elements located in brigade areas of operation, as well as back in the Corps LOC, would prove to be an almost impossible task for the unit.

Leave the TO&Es as they are, and continue to allow the two bridges to complement each other, rather than compete with each other.

The information provided above is by no means complete, nor is it all inclusive. I have only touched the surface of several areas concerning MGB which seem to be misunderstood. I hope some of the misconcepts and misunderstandings have been cleared up.

The MGB is here! We must approach it with an open mind and a positive manner. The fact that there are so few sets of MGB in our inventory (34) means that we must optimize their use. Testing of the MGB has proven beyond any doubt that it can do the job, and even now there are numerous studies and proposals for using it to an even greater advantage.

The MGB, like the Bailey, began as a simple bridge, but through input from research and development agencies, as well as field users, more and more uses will be found until, perhaps some day, we can give it the same label that the Bailey has worn for so many years—"in a class of its own."

Captain Hambric is presently assigned to the U.S. Army Mobility Equipment Research and Development Command as Research and Development Coordinator for the Bridge and Structures Division, Marine and Bridge Laboratory. He has been involved with the Medium Girder Bridge program since 1976 and is considered the Army's leading authority on MGB operations.

Contingency Missions

a prerequisite for effective reserve components training

by COL Everett R. Thomas

CURRENT emphasis in training is on preparedness to win the first battle of the next war against numerically superior Warsaw Pact forces attacking across Central Europe. Required to support combined arms task forces will be more combat engineer units than have ever been employed in U.S. history. Since 70 percent of combat engineer units in the Total Army are Reseve Components, the readiness posture of these units is critical to victory on the battlefield.

However, due to time restrictions, high personnel turnover, the lack of training facilities, wide dispersal of engineer units, and a lack of technical expertise, many Reserve Component (RC) engineer organizations are ill-prepared for early deployment to the European battlefield.

Army training philosophy dictates that units master all Army Training and Evaluation Program (ARTEP) tasks and that individuals perform all Soldiers Manual tasks for their Military Occupational Speciality. But, RC engineer battalions are, in fact, training on a limited number of ARTEP tasks, and individuals are mastering very few Soldiers Manual tasks. The result is a host of poorly trained engineer units which will require extensive post-mobilization training before deployment to any contingency area.

Presently, only engineer groups and higher headquarters have contingency missions. Since battalions are the focal point of training management, they should be assigned specific contingency missions as a basis for training. Only then can battalion commanders assign realistic individual and collective training priorities.

As described in Training Circular 21-5-7, the restrictions placed on our Reserve Components have a pronounced effect on their ability to follow the Army's "training in units" concept. Of these restrictions, time has the greatest impact. The commander has just 38 days each year to insure that individuals are job-qualified, and that squads and larger units are functioning as responsive, integrated teams.

IN ADDITION to mission-essential training, each organization must also recruit, perform community service projects, maintain equipment, prepare for annual General Inspections and Command Inspections, conduct civil disturbance training, and satisfy an increasing number of administrative requirements. There is insufficient time to meet these requirements, to train on more than 100 battalion and lower level ARTEP tasks, and to qualify on all the Soldiers Manual tasks.

A second factor affecting training is the high annual turnover in personnel. Many units are experiencing rates in excess of 33 percent, some as high as 50 percent. The addition of new soldiers to be trained and the need to develop small unit teamwork lost by the rotation of leaders has placed added burdens on the commander. Also, constant changing of key personnel contributes to a loss of continuity in training programs. High turnover has a substantial negative impact on RC readiness.

Lack of training areas close to Reserve Components engineer units is a third restriction. To train realistically, engineers must construct an obstacle, install a minefield, dig an antitank ditch, and detonate a charge at the training site. Presently, most units must travel great distances to find a weekend training site or must defer these activities to the two weeks of Annual Training.

SIMULATION games, sub-caliber devices, and equipment models help alleviate the problem, but their use results in a loss of realism. By holding the commander responsible for a limited number of ARTEP tasks, he can develop training facilities locally and recommend an appropriate Annual Training location.

Another geographical restriction to training is the wide dispersal of RC engineer units. Not only are companies separated from one another by many miles, but companies, themselves, are frequently split into two or more different locations. Commanders waste precious time traveling from one unit to another. Platoons must convoy to distant locations for company field training exercises, only to turn around and return home after just a few hours of training. Great distances between units, then, is another factor affecting RC readiness.

A fifth and very serious detriment to mission-related training is the lack of technical expertise among both officers and noncommissioned officers. The principal causes of the deficiency are a lack of time for individual training and the constant redesignation of units from one branch of service to another. It is not unusual to find officers or NCOs who have served in three or more branches. Although many dedicated reservists devote their own time to branch qualification, they cannot keep up with rapidly changing doctrine and with the ever-increasing technical demands on engineer unit leaders.

The restrictions of time, personnel turnover, lack of training facilities, wide unit dispersal, and lack of technical expertise force the commander to carefully identify his missions before determining which ARTEP tasks to include in his training program. It is imperative that RC combat engineer battalions be included in contingency planning by assigning areas of operation, anticipated missions, and a unit to support.

ONCE HE HAS a contingency mission, the commander can tailor his command post and field training exercises to the characteristics of the contingency area. Engineers and the supported unit can exchange standing operating procedures, maps, and terrain studies. The contingency mission forms the basis for a critical ARTEP task list, which, in turn, becomes the foundation of the yearly training program. Subsequently, the commander can determine from the ARTEP task list which combat engineer Soldiers Manual tasks are most critical to accomplishing ARTEP tasks and he can devise meaningful individual training programs.

Under present conditions, Reserve Components engineer battalions are required to perform too many individual and unit tasks. By the exclusion of these units from contingency planning, commanders are forced to speculate on which tasks are most critical. A solution to the dilemma is to give each battalion a mission to train toward.

The end result will be a combat ready unit capable of early deployment to one specific locale, rather than a poorly trained battalion requiring extensive post-mobilization training before deploying anywhere.

As General Bernard W. Rogers, Army Chief of Staff, stated two years ago, "The mission of today's Total Army is to maintain a state of readiness which provides an effective deterrent to aggression and which assures our ability to fight and win should deterrence fail."

Lieutenant Colonel Everett R. Thomas was the Engineer Team Chief, Readiness Group, Fort Knox when he wrote this article as a requirement of the Command and General Staff College correspondence course.

The "Fightin Fifth"

in

REFORGER 79

by MAJ Ronald D. Laux

REFORGER 79 for the Fifth Engineer Battalion began with a "duffel bag drag" during the early morning hours of 12 January 1979. The day began with an organized outprocess consisting of thirteen points where personnel filled out mail cards and baggage tags, weighed baggage, received briefings, and bid farewell to their friends and families.

The first flight departed at 2230 hours 13 January from Scott Air Force Base in 30-MPH winds and a -23° wind chill factor. The second flight departed under slightly worse conditions at 0230 hours 14 January and subsequent flights departed on schedlule. After refueling at McGuire Air Force Base, the journey resumed and 13 hours later the "Fightin Fifth" had landed at Ramstein Air Force Base, Germany.

As part of the REFORGER exercise, the 5th Engineer Battalion was scheduled to move to Miesau, where it would draw its entire supply of trucks, equipment, tools, tents, etc., in a nighttime issue from the 6th Combat Equipment Company (CEGE). It turned out to be one of the greatest challenges the battalion has ever faced. Working outside in severe weather conditions, jump-starting and repairing a high percentage of dump trucks, and moving all equipment to an unused snow-covered autobahn strip shared by five other units would have caused a less disciplined unit to succumb. But personnel of the Fifth Battalion met the

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EDITOR'S NOTE: This article does not attempt to present a complete overview of REFORGER 79, nor of a particular FTX. Rather, it is intended merely as a first-hand description of one CONUS-based engineer unit's participation in an almost unique Winter exercise. Hopefully, other units will benefit from the 5th Engineer Battalion's experience and lessons learned.

challenge head on, stuck together, and accomplished the task despite little or no sleep since their departure from CONUS.

The battalion was required to inventory and issue the consolidated property to each company within the next 72 hours. This was no simple task! The battalion S-4, who was the proud new owner of $6 million in equipment, had to redistribute it. The task could be accomplished only by finding an area large enough to off-load an entire engineer battalion and reissue in company quantities.

A reconnaissance was made and the Air Force's 86th Tactical Fighter Wing provided assistance in the form of a large open area next to the taxiway at Ramstein Air Force Base. Having never seen an entire combat engineer battalion spread out, the Air Force soon realized that the equipment could not remain in place with jet fighters preparing for takeoff within 100 feet of our dozers and trucks.

ONCE AGAIN the battalion was required to relocate before final inventories and property issues could be completed. On 22 January, the battalion received movement orders to begin its long road march to the exercise area. The two-day road march to Illesheim (the Major Unit Assembly Area) went well with only a small percentage of equipment requiring recovery. Excellent support was provided in route by the 21st Support Command military police and the 5th Maintenance Company.

At Illesheim, a base camp was erected and considerable maintenance effort was applied to all equipment to ensure its readiness for FTX "Certain Sentinel." At this point, the Fightin Fifth had its first opportunity to fully equip for combat. The five Milvans and the mobile TOC which were ship-

Ready and waiting at Scott Air Force Base hanger

Boarding C-141 at Scott for departure to Germany

ped from Texas in mid-December were unloaded at the MUAA. Delays due to storms and off-loading of the 2d Brigade, 1st Cavalry Division, further delayed receipt of the battalion NAP (Not Authorized Preposition) equipment until after the MUAA.

Essential items such as tow bars, which were not issued from POMCUS stocks, were not available immediately upon arrival in Germany and this severely hampered recovery during movement to the MUAA. Radios, batteries, field desks, repair parts, SSSC items, locks, and tools were among the other items being shipped in the Milvans. At one point in time, a personal reconnaissance was made by the battalion commander, S-3, and S-4 to locate the Milvans at the railhead.

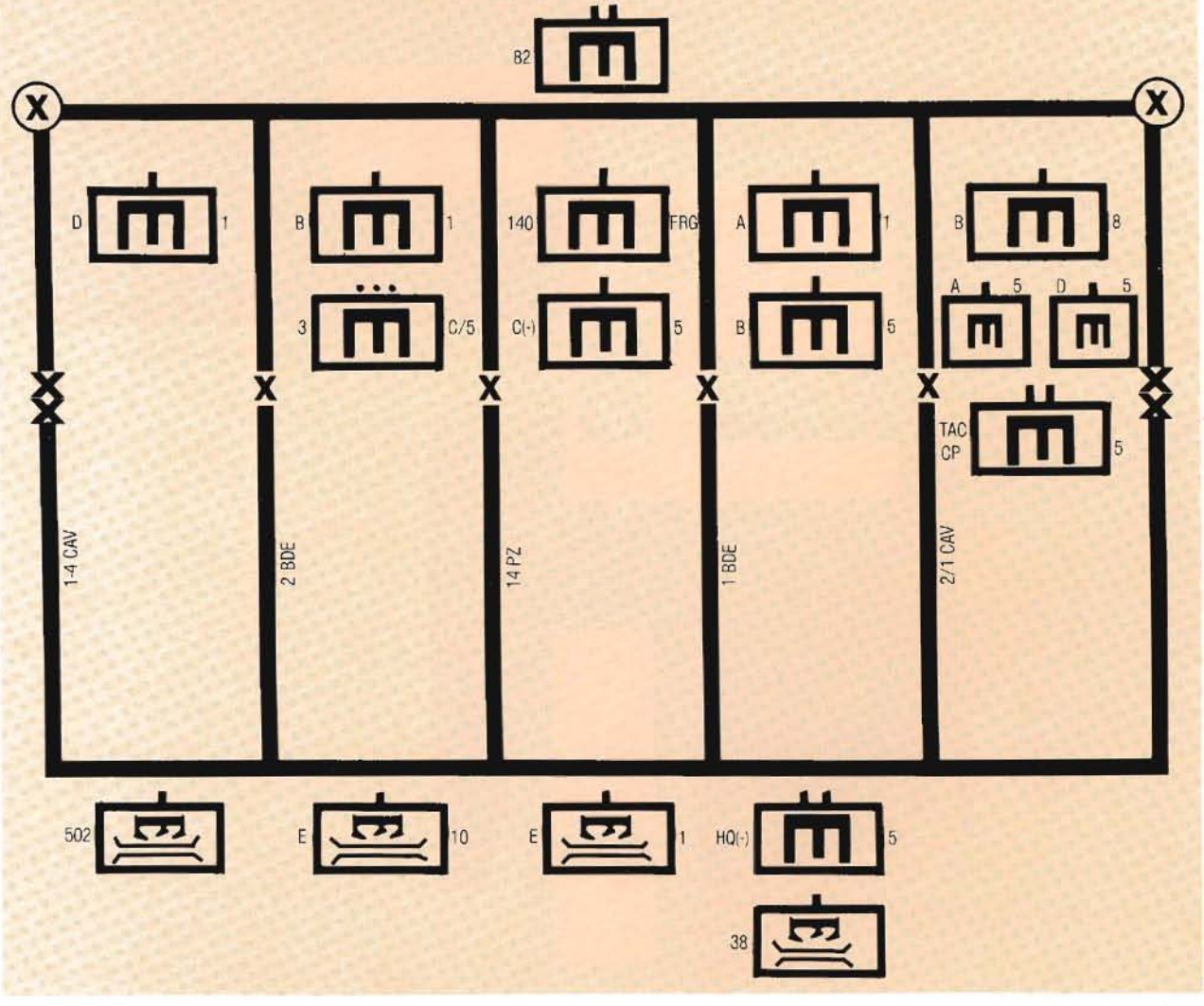
AT ILLESHEIM, units rapidly configured into combat ready units and prepared to link up with 1st Infantry and 1st Cavalry units. Extensive coordination was made with the 7th Engineer Brigade, the 1st Infantry Division, the DRS Brigade from the 1st Cavalry Division and all service support units. During this period, obstacle plans were reviewed and engineer support roles finalized.

Blue Forces included the 1st Infantry Division with a front consisting of five brigades on line with the 2d ACR as the covering force and the 3d Brigade, 1st Infantry Division (Forward) in reserve.

The 1st Engineer Battalion provided direct support to its normally associated brigades with D/1 supporting the 1-4 Cavalry on the west flank. B/8th Engineer Battalion, a 5-platoon engineer company, was to provide organic support to the 2d Bde, 1st Cavalry Division. The 5th Engineer Battalion was placed in a direct support role and was utilized as follows:

A and D companies with a forward TAC CP, formed an engineer task force in the 1st Cavalry area. B Company was in Direct Support to the 1st Brigade, 1st Infantry. C Company participated in the interoperability training with the 14th Panzer Brigade and its engineer company, the 140th Pioneer Company. For the first two days of the ex-

ENGINEER ORGANIZATION IN 1ST INFANTRY DIVISION AREA OF OPERATIONS



ercise, the 3d platoon of Company C was in Direct Support of the 2d Brigade, 1st Infantry. Attached to the 5th Engineer Battalion was the 38th Medium Girder Bridge Company. The 502d Ribbon Brigade Company and E Company of the 10th Engineer Battalion remained in General Support under 7th Engineer Brigade control. Covering force engineer support was provided by the 82d Engineer Battalion.

As time for the exercise approached, line units of the 5th Engineer Battalion moved out to link up with assigned units. The battalion moved to a wooded hilltop south of Illesheim and prepared for the war. As the threat of Orange Forces activity became more apparent, certain preparation actions were permitted and Class V was drawn from PSPs and ASPs. To accomplish this ammunition haul without assistance would have been extremely difficult, since most vehicles were squad dump trucks.

THEREFORE, a decision was made to ground the bridge from the 38th MGB Company and use its trucks for hauling all Class V to support the engineer task force in the 1st Cavalry sector. All other units were receiving ammunition from the brigades they were supporting. The trade off of grounding the bridge for Class V haul proved successful. As soon as sufficient Class V was prestocked forward to support obstacle plans, one set of MGB was uploaded for a quick response to any bridge mission while the 2d platoon of the 38th MGB Company continued Class V resupply.

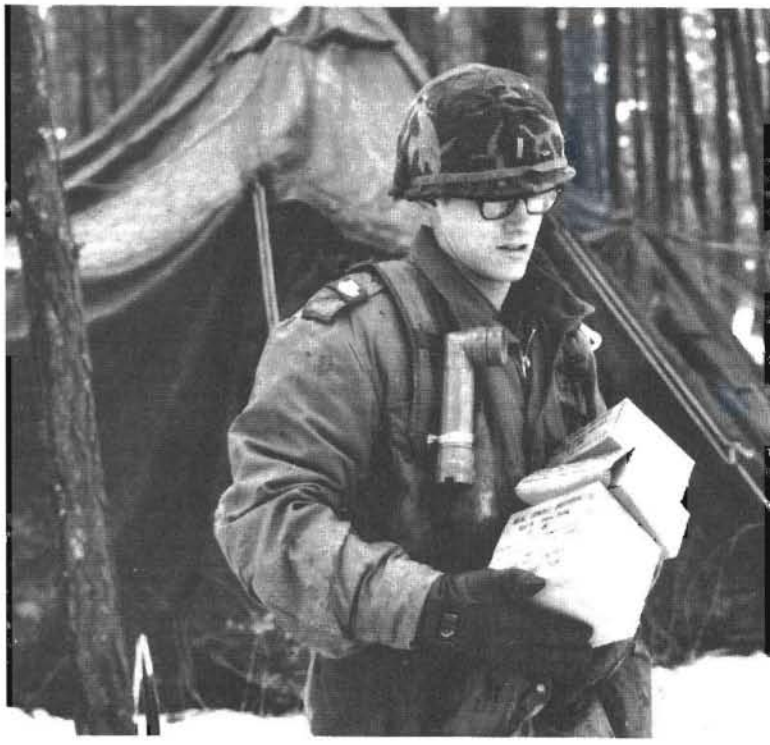
The actual start of the FTX for engineers began prior to the Orange Force attack. The 5th Engineers, as well as all other engineers, were actively involved in obstacle preparation to support the Blue Force defensive phase of "Certain Sentinal."

However, complications including extensive delays in shipping 1st Cavalry Division equipment to the port of embarkation, improper rail loading for shipment to VII Corps, and lack of unit integrity in rail shipments, caused significant delays for the 1st Cav and organic engineers. These problems caused the eastern flank to be insufficiently equipped and manned to defend against Orange Forces, which were familiar with the terrain and already had units deployed and poised for the attack.

Due to the late arrival of the 2d Bde, 1st Cav Div, the 5th Engineer Battalion task force found itself forward of the FEBA emplacing obstacles in the first belt, a zone previously assigned to B/8th Engineers.

Working around the clock, engineers placed 90 unexecuted obstacles in the 1st Cav sector prior to

Movement by autobahn to MUAA



LT Mark Setman of A Company stocks up on C-rations

LTC Atkinson (left) briefs BG Watts, the acting C G of the 21st Support Command, and MAJ Newman, commander of the 6th CEGE Company

the Orange Forces breakthrough. Similar numbers of obstacles were emplaced in other sectors. The Fightin Fifth and other Direct Support engineers conceived a good scheme for delaying the Orange Forces.

However, a major problem in execution surfaced which proved to be a serious training deficiency. Although 90 obstacles were prepared in the 1st Cav Sector, only a very small fraction were ever turned over to 1st Cav maneuver units. Among those turned over, only about 10 percent were executed.

This serious problem in target turnover and target execution, combined with the late arrival of the 1st Cavalry DRS brigade, left the eastern flank extremely vulnerable to Orange Force penetration. The 5th Engineer Battalion task force found itself being rapidly attrited due to the requirement to guard unexecuted targets after emplacement. This prevented the emplacement of obstacles in depth as previously planned.

Therefore, Orange Forces faced a thin belt of unexecuted obstacles with a partially effective maneuver brigade to defend in zone. Th Orange thrust consisted of a diversionary attack in the west, followed by a withdrawal and night rail move to the east flank where the major attack took place with Highway 470 being the main axis of advance.

Compounding the problem was the fact that the main Orange advance (Hwy 470) fell upon the boundary line between the DRS brigade and the 1st Bde, 1st Infantry. As a result, Orange penetration was rapid and almost unobstructed. The third day of the exercise found A Co, 5th Engineer Battalion and four tanks against the Orange thrust spearheaded by an armored brigade. A day later, A Company was reconstituted and back in the exercise.

AS A RESULT of the rapid Orange Forces advance, Blue Forces on the eastern flank were continuously withdrawing and fighting a delaying action in order to shift forces to blunt the Orange penetration. The 5th Engineer Battalion TAC CP relocated five times to remain with the DRS Brigade headquarters and the 5th's main CP relocated three times.

The FEBA was held in sector by the 14th Panzer Brigade, which refused to yield ground or accept penetration. Problems of target turnover and target execution did not exist in the 14th Panzer Brigade. Obstacles were planned well in advance. Like clockwork, the maneuver unit shows up, takes over the targets from the engineers, and executes them when the maneuver plan calls for execution. The associations of C Company, 5th Engineer Battalion, and the 140th Pioneer Company resulted in excellent interoperability training.

Command and control for interoperability training was a problem for two reasons. First, Company C mounted German APCs in order to keep up with the battle. Second, German communications doc-

Engineer equipment being moved through narrow German streets

trine prohibits any radio transmission until enemy contact is made. All panzer transmissions were sent by messenger. The first instructions received by C Company from the panzer brigade commander were "under no circumstances will you transmit on radios."

Radio communications for the entire exercise were a problem due to limited FM range, areas of radio dead space, shortages of secure voice equipment, shortages of allocated frequencies, and the requirement to operate more nets than organic radio assets allowed.

Movement was also a problem. Fifth Engineer units soon found that while moving through a German town on a narrow street, an oncoming Blue or Orange force could be coming toward them on the same street. Movement showed a lack of training in reading and understanding bridge classifications. At times, M60 tanks were seen crossing class 20 or smaller bridges. At the beginning of the exercise, B Co, 5th Engineers did considerable bridge recon and classification to support maneuver units.

By 3 February, Orange Forces had penetrated deep into the Blue Force zone and it was time to reorganize and conduct the Blue Force attack phase of "Certain Sentinel." However, a sudden thaw caused soft, muddy ground conditions which resulted in subsequent extensive maneuver damage to the German countryside. As a result, the decision was made to terminate the exercise, leaving the 5th Engineer Battalion with five additional days to plan for training.

The commander of the 7th Engineer Brigade, who was on top of every aspect of engineer support throughout the exercise, anticipated the problem and had all player units prepare a training schedule to productively utilize the unscheduled time previously planned for the Blue offensive phase.

THE FIGHTING FIFTH seized the opportunity to train all units on German prechambered targets and to conduct Medium Girder Bridge training. Both the "Fighting Fifth" and the 38th MGB Company were determined to do some unique MGB bridge training. The decision was made to construct a class 60 double story MGB and airlift it into position. It would be the first time that the MGB was emplaced by helicopter.

The 5th Engineer Battalion planned the exercise using the Illesheim training area. Coordination with VII Corps aviators produced three CH47 Chinook aircraft for the exercise (one for bridge lift, one for deck filler panels, and one for troop transport).

The next morning, the 38th MGB Company established two training sites at Illesheim. The 82d Engineer Battalion would train at the first site and the proposed airlift construction would take place at the second site. Because of an excess of 82d Engineer Battalion personnel, a decision was made to have A Company/5th Battalion and the 82nd jointly construct the double story MGB to be airlifted. The bridge was constructed, less deck filler panels, and the pathfinders were brought in to rig it.

Chinook being hooked to MGB deck filler panels

The bridge weighed 19,500 pounds with the Chinook having a maximum lift capacity, with considerable fuel trade-off, of 20,000 pounds. The MGB was located three kilometers from the gap. The Chinook lowered into position and hooked onto the bridge. The MGB lifted slowly and was carried to its destination where troops slowly moved it into position. This exercise provided excellent training and proved the feasibility of airlifting a 60' MGB.

During this training period, the 5th Battalion regrouped, recovered deadlined equipment, performed extensive maintenance, and prepared for

Personnel of the 5th and 82nd Engineer Battalions construct MGB during training phase

the move to Aschaffenburg, where the 9th Engineer Battalion and the Aschaffenburg community would host the 5th Engineer Battalion cleanup operation. After the road march to "A-burg," the 5th spent five days cleaning, inventorying equipment, and packing Milvans for shipment home.

A very intensified customs inspection was made of all equipment loaded in the Milvans for shipment back to the States, with special attention to cleanliness of all equipment. The time at "A-burg" gave the Fighting Fifth its first opportunity to sleep and live in a garrison environment after 28 harsh days of winter bivouac conditions.

On 16 February, the battalion moved back to Miesau to turn-in POMCUS equipment. An agreement was made to turn in by company sets to avoid reconfiguring everything back into a battallion set. The plan worked exceptionally well, with each unit tasked to provide support for a major phase of the turn-in maintenance operation. The task was to clean, service, inventory, inspect, and repair all equipment and sets in four days. The Fighting Fifth met the challenge and accomplished it with tremendous success.

After turn-in was completed, 5th Engineer personnel were rewarded with four days of relaxation, which included tours to Paris, Luxemburg, Verdun, and Germany. On 26 February, the troops resumed final preparations for customs inspections and redeployment. Personnel received the most extensive customs inspections immaginable and departed for home on 27 and 28 February by commercial aircraft.

LESSONS LEARNED

Engineer battalions, as well as maneuver battalions, must have their equipment stocks upgraded. One-half of all dump trucks issued were M-51 gasoline engine trucks averaging 17 years of age. Although they were practically "new" from lack of use, parts for these obsolete models were not available.

None of the dump trucks were issued with canvas. Had it not been for canvas provided by the 7th Engineer Brigade, cold injuries would have been a serious problem. Several trucks did not have heaters which are essential for defrosting windshields. Tool kits, sets, and outfits must be properly inventoried by current SCs. Fuel tankers as well as fuel trucks must be topped off at issue. The majority of radios were inoperable due to missing components and vehicle installation kits.

No longer can the traditional engineer workline be employed between divisions and corps units in a Direct Support role. Engineers must work in bounds. For example, the division would put in the first belt of obstacles and the corps battalion would put in the second belt. Division engineers would then bound behind the corps unit and put in the third belt of obstacles in depth.

This concept requires the same mobility for corps engineers as division engineers. When the artillery calls for reinforcement, a like mobile unit moves up; the engineers must follow the same principle. Corps engineers must be track-mounted with like equipment. However, they also need dump trucks for class IV and V transport and accomplishment of standard engineering tasks.

Major Laux was the S-3 of the 5th Engineer Battalion during the Winter REFORGER 79.

Selling Engineer Capability

to the Maneuver Commander

by MAJ V. Paul Baerman

THE MANEUVER commander on today's battlefield has a vast quantity of combat power at his call. In addition to the correct employment of his direct and indirect fire weaponry, he can effectively increase his combat power with a variety of combat multipliers, such as smoke and electronic warfare.

One of the most useful combat multipliers is terrain reinforcement, done either by the maneuver unit alone or, most profitably, in conjunction with supporting engineers. However, its usefulness is directly proportional to the maneuver unit's ability to understand and apply terrain reinforcement measures. While it is incumbent on the maneuver commander to understand terrain reinforcement and its contribution to combat power, it is also the engineer's job to increase awareness of terrain reinforcement operations.

Terrain reinforcement (TR) operations are simply those measures that degrade enemy mobility and improve friendly survivability. To be effective, those operations require a fully developed coordination/partnership role between engineer and maneuver unit. Obviously, the maneuver commander must perform terrain analysis to have a good knowledge of the ground on which he will be operating.

THERE ARE a number of techniques which engineers can use to demonstrate the value of TR operations to maneuver commanders. This article examines those techniques from the viewpoint of a maneuver arms officer, with the goal of contributing to his awareness of TR operations.

Probably the most important step to keeping maneuver units in tune with TR operations is the establishment of a firm unit-to-unit relationship. Obstacles to the formation of such a relationship are many, but it is essential that these obstacles be overcome. The maneuver unit only appreciates other members of the combined arms team to the extent that those members are known and available. Ways to foster the unit relationship include the mutual exchange and review of training schedules, field training exercises, and classroom instruction.

If a maneuver brigade habitually receives the training schedules of each company of the engineer battalion, then the company commanders within the engineer battalion should also have access to the brigade's training schedules. Each engineer company commander's platoons should also receive the training schedules of the battalion which it habitually supports. The engineer platoon leader should review the schedule to determine if he can offer assistance with that battalion's training. After a period of time, the battalion should be aware that an engineer is part of the team, willing to assist.

Likewise, the engineer would be smart to send his company training schedule to the Brigade S-3 if there is training being conducted in which units of brigade could participate. To promote the unit-to-unit relationship, the engineer has to "sell" himself and his product. Regular, personal visits by engineer platoon leaders and company commanders also go far in promoting their "product" and improving training schedule interaction.

MANEUVER UNIT exercises should include engineer support or expertise. Of course, the Field Training Exercise (FTX) is the most obvious example, but there are numerous other opportunities for engineer support or expertise—Command Post Exercises (CPXs), war games/simulations, sand table, training exercises without troops (TEWTS), terrain walks, etc. TEWTS and terrain walks offer particularly good opportunities for the engineer to assist and foster knowledge of engineer capabilities.

Claymore mine being set on live-fire range at Fort Carson

Destroying a mine in place with C-4

TEWTS are generally low-key exercises that offer ample time for interchange of ideas, impromptu classes, and understanding of each other's jobs. At some time during these activities, the engineer should be explicit in pointing out where he *cannot* help and where the maneuver commander must help himself. Engineer expertise does not necessarily mean officer presence.

In many cases, lower ranking, knowledgeable engineers might prove more worthwhile, e.g., a D-7 operator talking to a maneuver platoon leader. In particular, the engineer should stress those items which he considers in an engineer reconnaissance.

OFFICER AND NCO classes also present opportunities to promote unit relationships. Again, it is a matter of the engineer forcefully "selling" himself and his product. There is enough change in engineer doctrine, when coupled with maneuver doctrine changes, to accommodate numerous engineer presentations to unit officers and NCOs in a classroom environment.

An additional opportunity for promoting unit relationships occurs when the brigade engineer and his subordinates participate in unit social functions.

But there is probably no better place to establish the capabilities of TR than during training. Here, the engineer can offer his expertise to train individuals or he can offer training tips to the maneuver unit commander.

Many basic TR tasks are included in maneuver unit Soldiers Manuals and Skills Qualification Tests. A unit can save valuable time by "packaging" hands-on training in kit form. One kit might come in a footlocker-size container and deal exclusively with the unit's authorized mines. The kit would include all the mock-up mines (from TASC), any graphic training aids (to be handed out to the troops), plus laminated cards on which instructions for emplacement and retrieval of each type of mine are included.

Kits can be used at small unit level during slack time (e.g., in the motor pool), for regular training periods, as concurrent training, or for inclusion in inclement weather schedules. Because kits are pre-packaged, they can be used quickly and with little advance preparation. Other similarly designed kits could cover such subjects as troop-emplaced obstacles (fougasse, etc.), demolitions, and booby traps.

RANGE TRAINING should be conducted with an eye to maximizing the potential of the range. By coordinating with the appropriate range authorities, units can conduct interesting, realistic TR training while on another type range.

How many times have you seen troops bored to death with concurrent training, such as weapons assembly/disassembly, while waiting to fire or awaiting transportation? Spice up their life a bit—let them fire a claymore,

or prepare and set off a demolitions charge, or build a flame mine. Its guaranteed to keep their interest and avoid training doldrums. The engineer can provide the expertise to start this training and, at the same time, to get across the importance of TR operations.

There are a number of easy ways, while in the field, to increase the maneuver commander's awareness of the use of obstacles and the effectiveness of terrain reinforcement. Many of these ideas utilize soldier ingenuity and promote the kind of thinking that will help overcome the odds we might be faced with on the European battlefield.

Here are some examples:

- Since mines are difficult to portray in the field (unless you use TASC mock-ups which must be accounted for and cost money), take scrap 2x4 lumber and cut it into 6-inch lengths. Paint the resulting blocks blue and stencil the word "MINE" on top and bottom. Several hundred of these can be made up and issued for field training. If some are lost, it doesn't really matter.

Scattered throughout an avenue of approach, these dummy mines force an attacker to perform some sort of mine-clearing action. To make the situation more interesting, bury a tear gas grenade (with pin pulled) in the ground and put a block on top of the grenade spoon. Anyone who comes along and kicks or lifts the dummy mine will set off the tear gas. It is called mine awareness and causes the attacker to slow down and be more careful when he encounters "blocks" the next time.

- CS/smoke grenades with pins pulled and buried in a road obstacle will definitely slow the CEV/tank dozer crew that pushes down the obstacle and sets off the grenades. They will also be more careful at the next obstacle.

- CS powder and/or pellets can be used to increase the value of less substantial obstacles by creating confussion or more difficult working conditions. How do you disseminate the CS? Tie or tape a baggie, with CS powder or pellets inside, to every smoke grenade or smoke pot. No matter what color smoke, one whiff of the burning CS and masking procedures will slow everybody and make them more wary.

- TR operations also include survivability of the friendly force. Survivability not only includes digging in personnel and equipment, but deceptive measures to increase the lifespan or usefulness of fortifications. The TOW and Dragon are crucial antitank weapons that must be protected. If you've had that maneuver unit out with their claymores, suggest splicing several strands of used claymore wire together and wire a TOW M-80 blast simulator to the ends of the claymore wire, setting the entire device off with the claymore "clacker." Voila! They've duplicated the signature of the antitank missile firing without giving away their position.

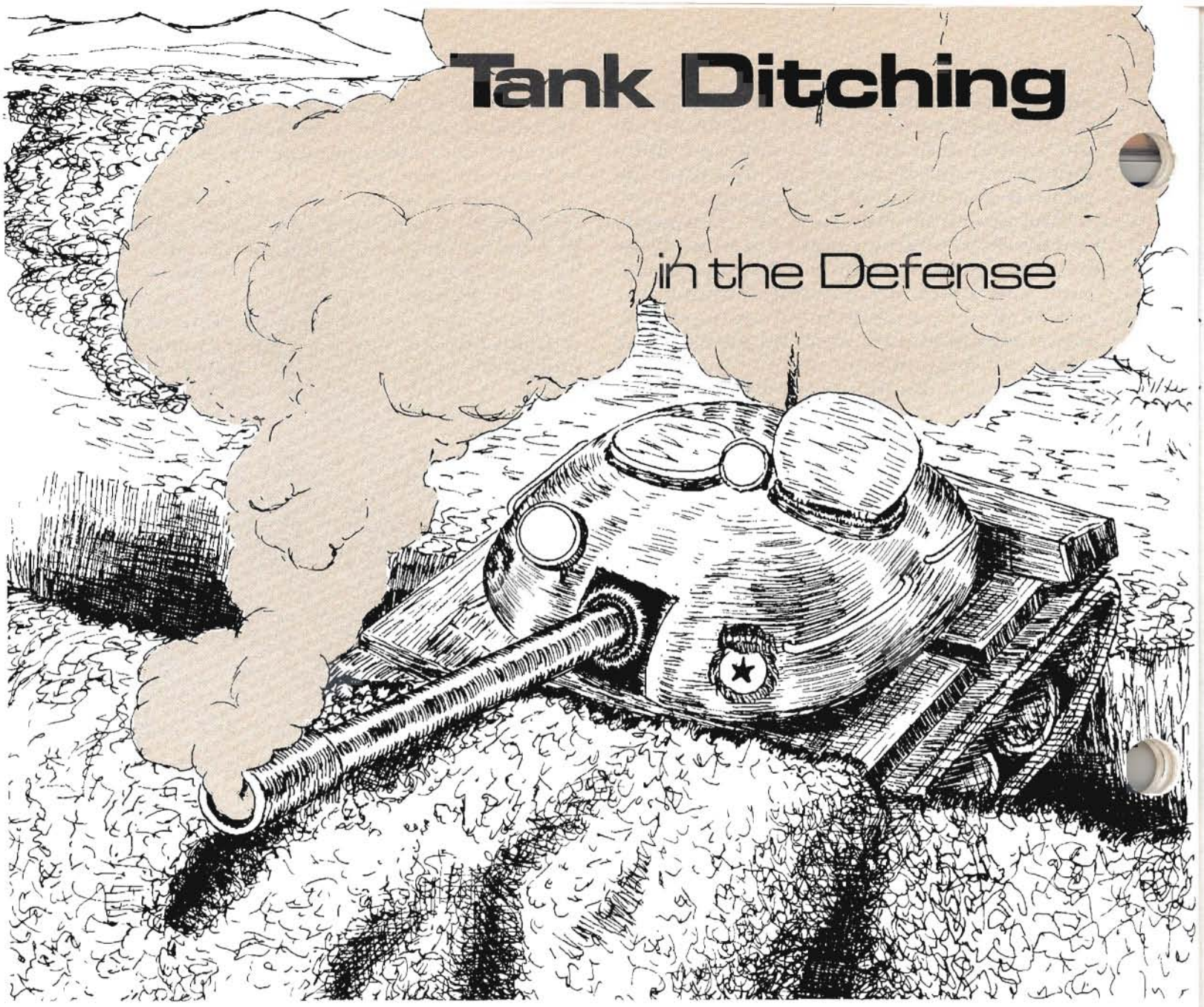
Bangalore torpedo set to fire

Such actions will increase the value of obstacles and, more importantly, increase the maneuver unit's interest in TR planning. "Tricks of the trade" of this sort allowed an armored cavalry platoon scout section, ably supported by engineers, to bottle up a mechanized infantry battalion for more than four hours in one recent exercise. And the scouts and engineers thoroughly enjoyed themselves!

These are just a few of the methods by which engineers can better sell their product to maneuver commanders and make the combined arms team more effective. The more aware that the maneuver commander is of his engineer assets and their capabilities, the better off he and his engineer partner and their soldiers will be.

Major Baerman is an Armor officer who wrote this article while attending the Command and General Staff College. Previous assignments have included command of a tank company and armored cavalry troop, and assignments as a battalion, brigade, and squadron S-3.

Tank Ditching in the Defense



by LTC Jerry A. Hubbard and MAJ John R. Mullans

PROPER terrain reinforcement is critical in our preparations to fight and win a no-notice defensive battle against forces vastly superior in numbers of personnel, tanks, and artillery. Terrain reinforcement is not the exclusive domain of the engineer soldier, but a result of the combined efforts of all forces on the battlefield. At every level tactical commanders must consider and implement those terrain reinforcing actions which will best support his overall tactical plans.

The 1973 Arab-Israeli War saw the re-emergence of an ancient terrain reinforcement concept in defensive operations—the barrier ditch. Using antitank ditches supported by minefields, the Israeli Defense Force in the Golan Heights defeated an attacking Syrian force which enjoyed an overall 4 to 1 superiority in tanks and a 10 to 1 advantage in artillery. The Syrians were required to use armored dozers and armored vehicle launched bridges for breaching, thereby preventing a rapid advance and channeling them into predetermined kill zones.

On today's battlefield, characterized by speed and mobility of forces and lethality of weapons systems, the antitank ditch is a valuable terrain reinforcer. The introduction of the antitank guided missile (ATGM) has greatly increased the ability of infantry to destroy tanks and is extremely valuable in overcoming the NATO disadvantage in numbers of armored vehicles. The antitank ditch stops a tank for two to five minutes, exposes lightly armored portions of the vehicle, and places its weapons systems in an ineffective attitude. It sets him up for the kill.

In 1976, the 94th Engineer Combat Battalion (Heavy) conducted a series of tests to examine the effectiveness of the antitank ditch as a barrier to armored vehicle movement, and to determine the capabilities of engineer

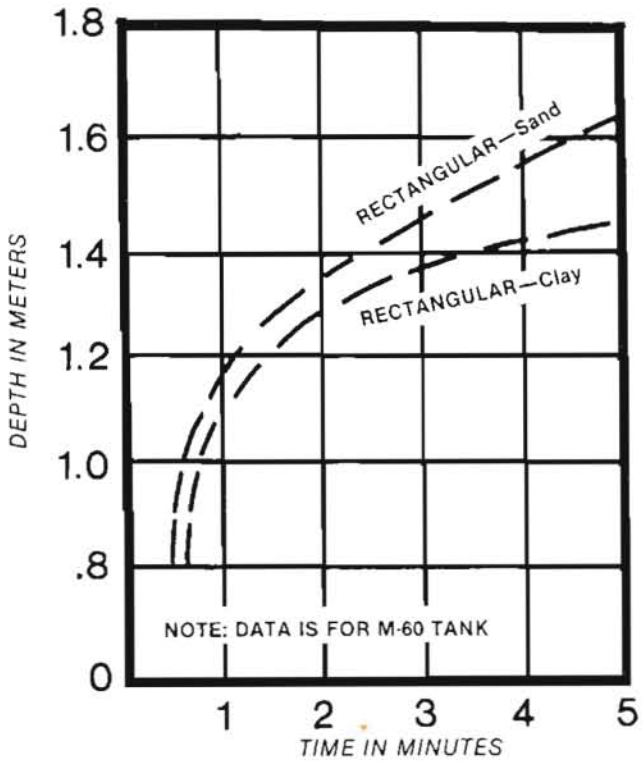
equipment to construct tank ditches. These results were discussed in the article, *"Anti-tank Ditches"*, by LTC Frederick A. Perrenot in the January - March 1977 issue of THE ENGINEER and are summarized in Figures 1 and 2.

THESE TESTS developed equipment combinations which could operate effectively as a tank ditch team. They also determined the maintenance support required to keep the team operating. The term *Tank Ditch Team* (TDT) represents the optimum mix of equipment which, operating independently as a unit, can efficiently construct tank ditches. Optimum teams consist of two dozers, a dozer and front end loader, and three each 290 rubber-tired tractors with scrapers, with either an additional tractor or dozer as a pusher.

The 94th Engineer Combat Battalion (Heavy), after reviewing missions, capabilities, and equipment assets, developed a self supporting element capable of tank ditching. This element, referred to as the Tank Ditch Element (TDE), underwent several changes in composition and capability after strictly in-house engineer review. However, the battalion had never before had the opportunity to review the concepts in a combined arms exercise. FTX Certain Shield (Reforger 78) proved to be the ideal opportunity to check and revise the original organizational concepts.

The 94th is organized with a Headquarters and Headquarters Company, an Engineer Equipment Maintenance Company (Company A), and three Combat Engineer Companies (Companies B, C, and D). For FTX Certain Shield, the battalion deployed in General Support of V Corps with two companies providing engineer support on an area basis to the rear of the brigade rear boundary, one company providing the command and control element, and the majority of personnel and

DELAY TIME VS. DEPTH



NOTE: TIME IN MINUTES FOR A TANK TO ATTACK ACROSS A DITCH OF VARYING DEPTH

FIGURE 1

TANK DITCH CAPABILITY OF ENGINEER COMBAT BATTALION (HEAVY)

NUMBER OF TEAMS BY TYPE*	SAND		CLAY	
	HOURLY RATE Each team (meters/hour)	DAILY RATE** All teams (Km/day)	HOURLY RATE Each team (meters/hour)	DAILY RATE** All teams (Km/day)
3 SCRAPER TEAMS (each team includes three tractors with scrapers and one tractor without scraper)	100/hour	0.1 x 3 x 20 = 6 Km/day	125 m/hr	.125 x 3 x 20 = 7.5 Km/day
5 DOZER TEAMS (each team includes two dozers)	100/hour	0.1 x 5 x 20 = 10 Km/day	80 m/hr	0.08 x 5 x 20 = 8.0 Km/day
INCREASE IF SCOOP LOADERS TEAMED WITH DOZERS*** (three additional teams)	(100)	0.1 x 3 x 20 = (6)	(80)	0.08 x 3 x 20 = (4.8)
TOTAL BATTALION CAPABILITY	200 meters/hour (300)	16.0 Km/day (22.0)	205 m/hr (285)	15.5 Km/day (20.3)

*Expected availability rates: 290 Tractor—67%, Dozers—80%, Scoop Loaders—50%

**20-Hour Combat Day, 4 hours maintenance

***This equipment might better be used in digging defensive positions

NOTE: Rates will vary according to weather and soil conditions

FIGURE 2

Cross-section of finished anti-tank ditch

equipment for the Tank Ditch Element (TDE). The organization of the TDE as it deployed is shown at Figure 3.

The 94th was the only General Support engineer battalion available to V Corps during FTX Certain Shield. In order to best use its capabilities, the Corps Engineer used the 94th only in support of defensive operations. Therefore, during the first half of the exercise, the battalion supported the Blue Force while it was on the defensive and then was inserted in support of the Orange forces as they reverted from the offense to defense.

ON THE BLUE side, the TDE was placed in direct support of A Company, 7th Engineer Battalion, supporting the 1st Brigade, 5th Infantry Division (Mechanized). The brigade commander, with his engineer advisors, developed a terrain reinforcing plan to support his overall tactical plan for defense in the main battle area. The covering force battle enabled the terrain reinforcement, approximately 20 kilometers to the rear of the initial line of contact, to proceed without enemy disruption. The battalion was credited by the umpires with completion of 15 ditches totaling over 14 kilometers in length.

At this point, it is necessary to explain the realities of operations on such a large scale as FTX Certain Shield. Maneuver damage and environmental protection considerations precluded the actual digging of antitank ditches. Umpires credited the Tank Ditch Teams with completion of 80 meters of tank ditch per hour once they arrived and sited their equipment at the ditch location.

All five Tank Ditch Teams worked in the 1st Brigade area. The Tank Ditch Element was responsible for providing administrative and logistical support to the teams. The teams themselves, each under the leadership of an E-5 or E-6 NCO, received their movement and digging instructions directly from the 7th Engineer Battalion Platoon Leader coordinating the work in that sector. Teams were spread across a front of about 15 kilometers and were constantly being moved to new locations. The primary concern of the headquarters and operations sections of the TDE were locating teams and providing them with mess, maintenance, fuel, and administrative support. The difficulties encountered in providing hot meals for the exercise could not be completely overcome and C-rations often had to be substituted.

Since the equipment was not actually digging and no maintenance or battle damage play was inserted by the umpires, the utilization of maintenance and repair parts

personnel and supply channels was not exercised.

The value of tank ditches was summarized by Colonel Stephen R. Pawlik, Commander of the 1st Brigade, 5th Infantry Division (Mechanized): "tank ditches, as part of the obstacle and denial plan, proved to be an important and significant reason that the opposing forces could not penetrate the brigade defense."

DURING the middle weekend of the FTX, as the roles of the opposing forces were reversed, the battalion was withdrawn as the Corps General Support Battalion working directly for the 130th Engineer's Blue control element and was placed in Direct Support of the 23rd Engineer Battalion, divisional engineer battalion of the 3rd Armored Division. The TDE, augmented by one additional dozer team, was then attached to the 23rd with the teams further attached to the division engineer companies supporting brigades across the 60 kilometer front (Fig. 3). This wide separation made their attachment to the supported companies mandatory. However, only the maintenance section of the TDE had the necessary repair parts and trained mechanics to perform maintenance on the heavy engineer equipment.

The weather, which had been relatively good the first week, turned rainy with reduced visibility as the Orange defense began. Safety became a paramount concern in moving teams of oversized equipment on the small crowded German secondary roads.

Where Blue force had fought a covering force battle to provide time to prepare the defense of the main battle area, the Orange force defended against the counterattack in their most forward positions. The tank ditch teams were directed to dig their ditches in or near the line of contact. Because of the rapid advance of the Blue forces and the low mobility level of the TDTs, they were repeatedly overrun. On one occasion, a team on its way to a proposed ditch location in the forward area was captured by Blue forces. The completion of only five ditches totaling four kilometers was the result of the attempt to dig far forward in the battle area.

Several major problem areas in the control and administration of the TDE surfaced during the exercise. Some have been addressed by the battalion, while others involve fundamental problems which must be addressed in the larger context of basic missions and equipment of the combat heavy battalion.

The lack of communications was the major problem encountered. The problem resulted first due to the lack of a central point of contact at the tactical brigade level, and second, due to the lack of radios and the resulting inability to communicate with TDTs on the rapidly changing battlefield. The combat heavy battalion does not have the organic communications equipment to support decentralized, modular employment of its assets.

ORGANIZATION OF THE TANK DITCH ELEMENT (TDE)

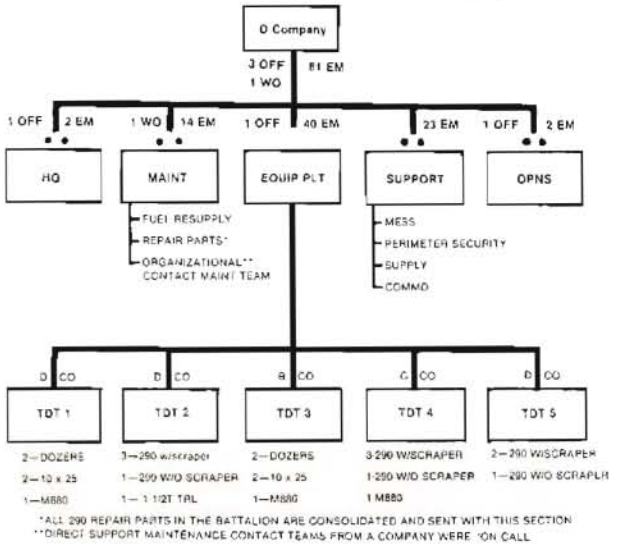


FIGURE 3

The slow-moving, very vulnerable heavy equipment of the combat heavy battalion is not suited to front line employment. The TDE must have 24 to 48 hours lead time to produce a usable obstacle for the tactical commander.

THE CONCEPT of forming a special organization to control and support tank ditching assumes the team will be used in a limited geographical area. Because of unique equipment and the requirement for maintenance and repair parts, it is essential that the TDE be provided this support in a timely manner. In retrospect, the employment of teams across the entire Orange division front was unmanageable. Better support could have been provided by each parent company controlling its own element from its position in area support to the rear of the brigade rear boundary.

In a wartime situation, support requirements change. Since C-rations would be the norm, the need for a mess section is obviated. By co-locating the headquarters and maintenance elements with the brigade trains of the supported brigade, the requirement for a perimeter security force is deleted. The maintenance requirements increase with the need for direct support maintenance teams and a corresponding array of repair parts.

With proper employment, the tank ditch capability of the Combat Heavy Battalion can provide the decisive edge required for victory on the modern battlefield. It produces a creditable obstacle without the logistics and transport requirements of, for example, a minefield. It reinforces the terrain to allow full utilization of both direct and indirect fires and provides the tactical commander an important multiplier of his combat power.

Lieutenant Colonel Jerry A. Hubbard was Commander of the 94th Engineer Battalion (Heavy), while Major Mullans was the S2/S3 of the 94th during FTX Certain Shield, REFORGER 78.

SOVIET

engineer equipment

by MAJ Arthur J. Parr, Jr.

SURELY there is no interested military engineer who has not heard of the "ribbon bridge," the Soviet PMP of which the U.S. ribbon bridge is an improved version. This item of equipment, and most other Soviet bridge construction and assault crossing equipment items are at least recognizable to non-Soviet combat engineers due to their size, visual impact, or uniquely Soviet design and purpose. But what about the less visibly-striking mine and countermine warfare equipment, the field fortification equipment, and road construction equipment?

While it is easy to stress Soviet equipment for river and gap crossings, the frequent result of doing so is that other Soviet engineer items receive bare mention. A comprehensive review of this equipment, besides re-creating the existing equipment identification manuals, would simply require too much space.

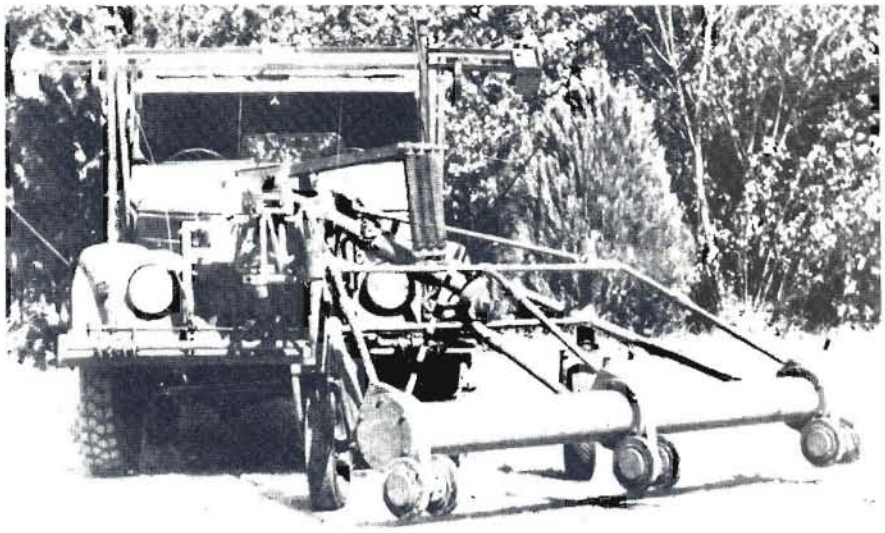
This article deals with standard equipment items in Soviet tank and motorized rifle divisions, stressing certain types which are generally not included in presentations on the Soviet military. Prior generations of equipment continue in use in reduced-readiness category divisions and non-divisional combat engineer units, so older items which retain their importance are included here.

Soviet equipment designations used here can convey meaning to the language-trained analyst to aid in his understanding of the role and function of a given equipment item. Much as UET or CEV both designate and, to a degree, describe those items of equipment, so also IMR (inzhenernaia mashina razgrazhdeniia) designates and describes the Soviet "engineer obstacle-clearing vehicle." Unfortunately, not all Soviet designations expand as usefully, nor are all the expansions known.

THE BASIC manual reconnaissance and mine clearing kit KR comprises one sectional mine probe, one four-prong grapple with approximately 50 meters of rope, one lot of small marking flags, one reel of black/white marking tape, and a pair of wirecutters. Hand-held portable mine detectors include the World War II-period VIM series, the post-war UMIV/UMIN type, and the transistorized IMP.

All are capable of detecting metallic mines or mines with metallic components on dry land, at detection depths ranging from 35 to 50 centimeters, and (except in the case of the UMIV) in water to depths of slightly more than one meter. For high-speed detection of metal-body antitank mines to depths of 25 centimeters, the road induction mine detector DIM/DIM-3 is used. This detector is mounted on a GAZ-69 or UAZ-469 jeep and can sweep a 2.2 meter wide strip at speeds up to 10 kilometers per hour on roads and at lesser speeds cross-country.

Mechanical mine clearing equipment designed to be mounted on tanks includes mine rollers, plows, and combination plow-roller sets. The older cross-country mine



Road induction mine detector (DIM)

sweepers PT-54 and PT-55 have now been largely supplanted by the route mine clearers KMT-4 plow and KMT-5 roller-plow combination. Each KMT-5 requires a 7.5-ton cargo truck fitted with a special auxiliary crane (KM-61) for normal non-operational transport. Each roller of the KMT-5 sweeps approximately 80 centimeters, while each section of the KMT-4 plows a strip approximately 60 centimeters wide.

EXPLOSIVE mine clearance means include rocket propelled line charges and the bangalore-torpedo type elongated charge UZ, which may be conformed as single, paired, or triple (triangular) charges. Minefields can also be cleared by using the charge-emplacing devices SPZ-2, SPZ-4 and ITB-2. The SPZ-2 is a metal-framed guide which uses a winch to draw the charge onto the minefield from the near edge. The ITB-2 propels a rocket-launched cable and anchor across the minefield, then uses a winch or other motive force to draw the charge toward the anchor and onto the field. The SPZ-4 appears to be the most widely-used device discussed in the military journals. It is a fitting which permits a tank to push or pull the prepared charge into position on the minefield. Rocket-propelled line charges mounted on specially-equipped tanks or armored personnel carriers are not discussed in Soviet journals and their characteristics are uncertain. The demolitions kit used with the explosive means above may be designated "SMP".

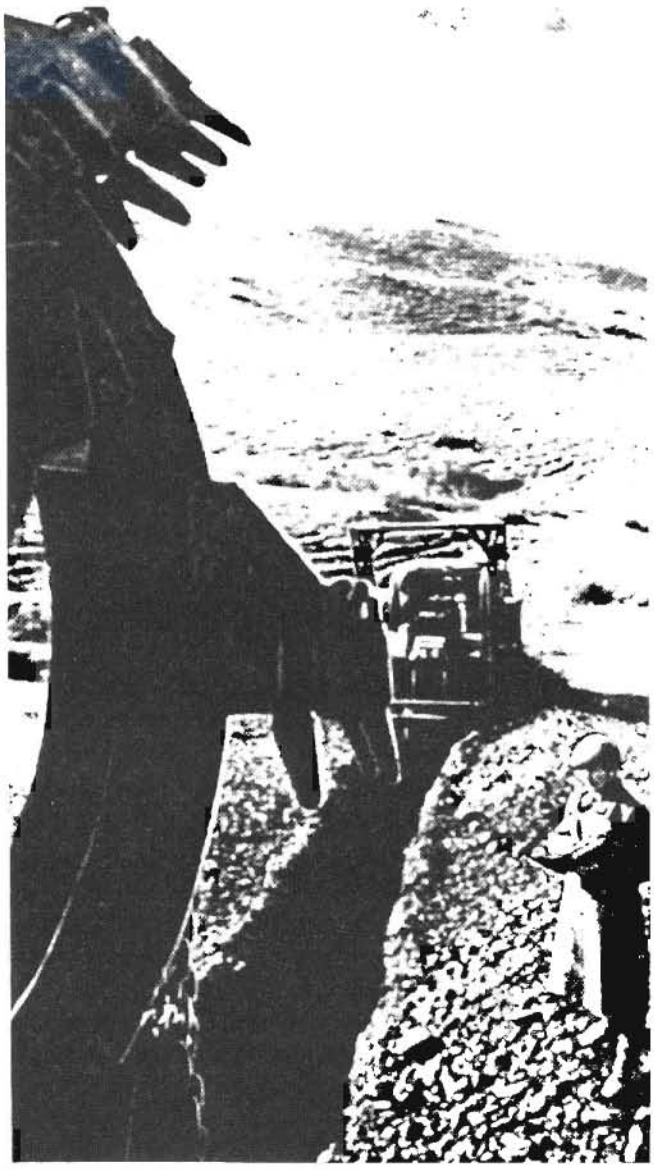
In response to their doctrinal requirement for high-speed emplacement of antitank minefields, the Soviets have developed and deployed a number of towed and tracked self-propelled minelayers. Detachable mine chutes and the obsolescent PMR-2 trailer may be used by any APC or cargo truck for surface emplacement of antitank mines. With the PMR-3 or PMZ-4 trailers, a four or five-man crew can emplace up to 200 antitank mines, depending on the carrying capacity of the towing vehicle, on the surface or buried 30-40 centimeters in the ground, in less than 20 minutes. The GMZ tracked minelayer vehicle with a four-man crew can surfacelay or bury antitank mines (transport capacity variously estimated at 150-200 mines).

Mine detection team emplacing marker flags

RECENT articles in the Soviet press (1976) have also discussed locally-developed, non-standard, mechanical devices for assisting in the emplacement of antipersonnel mines, and the use of floating or bottom-emplaced anti-assault mines for riverline or shoreline mining.

Minelaying devices also may be fitted to helicopters. A special Victory Day film aired on Moscow television in May 1978 showed the MI-8 (HIP) helicopter fitted with a new type of minelayer chute, a horizontal "foot" at the end of the chute to cause antitank mines to fall to the ground with the desired "fuse up" attitude, at a 2-3 meter interval.

Equipment contained in the pioneer kit includes the following: sapper shovel, entrenching tool, pick-mattock, carpenter's axe, crow bar or digging bar, 2-man cross-cut saw, and a tracing cord or tape. Mechanical entrenchers and excavators include: the BTM-3 high-speed entrenching machine which can dig 200-300 meters per hour of 1.5-meter deep trench (maximum capacity: 1120 meters per hour of .8-meter deep trench); the PZM regimental digging machine which trenches to 1.1 meters deep and excavates weapon or vehicle pits to three meters deep at a rate of 100 cubic meters per hour; the MDK-2 rotary excavator which excavates 3.5 meter-wide pits or trenches, to 3.5 meters deep at a rate of 200-300 cubic meters per hour; and the E-305V single-bucket excavator which can trench or excavate to 4.1 meters deep at a rate of 50-60 cubic meters per hour.



BTM high-speed entrenching machine

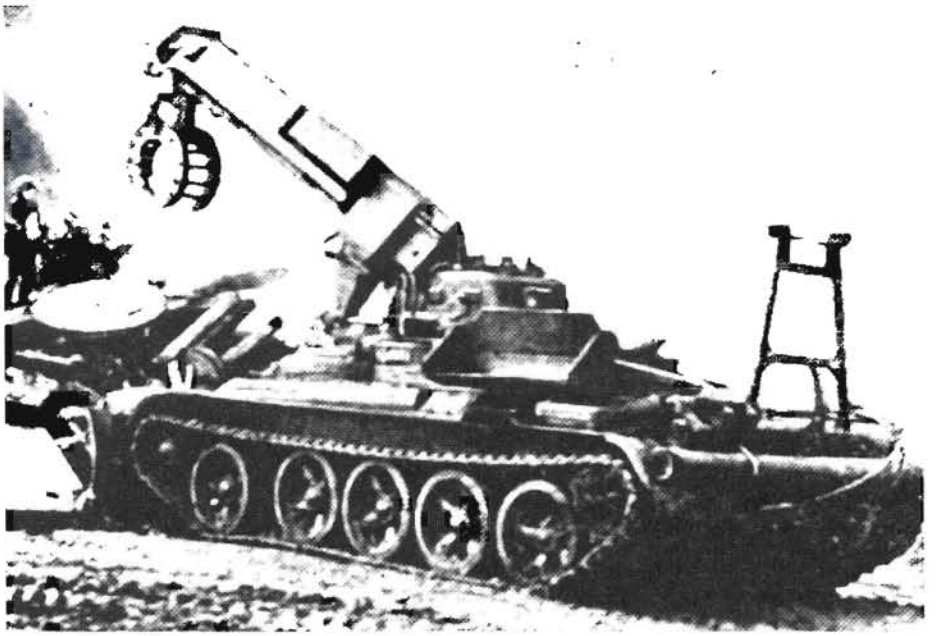
A WIDE range of prefabricated field fortification components are available, including corrugated steel and concrete shelter cover, and reinforced straight or curvilinear cardboard sandbags. Fortification is completed by the use of MKT-L, -T or -S camouflage sets (twelve 6x3 meter net panels per set), metallic radio-location reflectors OMU, and various mockups and dummy equipment.

Route construction equipment includes: the BAT or BAT-M road constructor, based on a heavy tracked artillery tractor, which mounts a variable-configuration dozer blade and a 2-ton crane in the BAT-M version, with a working capacity (depending on the task) of 120-400 cubic meters per hour, or four to eight kilometers per hour of cross-country route; the PKT, based on the MAZ-538 wheeled tractor, which can prepare graded and crowned cross-country routes at a rate of two to three kilometers per hour, or vehicle pits at a rate of 800-1000 cubic meters per hour; and various types of dump trucks and graders which may be available, although engineer road work in divisional units would appear to de-emphasize hauling and grading.

Some additional fortification and route construction support may be gained from the use of strap-on dozer blades for tanks and artillery tractor prime movers. The BTU/BUT-55 (bul'dozer tankovyi universal'nyi—miltipurpose bulldozer tank) has a working capacity of 100-200 cubic meters per hour. Its winter counterpart is the STU or STU-2M (*snegochistitel'* tankovyi universal'ni—universal tank snowplow). OL-T, OS-T, and OT-T dozer blades may be fitted to the AT-L light artillery tractor and AT-S medium artillery tractor and the AT-T heavy artillery tractor, respectively. Where prepared roads or cross-country routes become impassable due to weather or heavy usage, use will be made of fascines, corduroy roads, spaced-log roads for tracked vehicles, and prefabricated sectional wooden treadway blocks or hinged sectional steel treadway mats, where available. Prefabricated steel roadway sections are known to be available with rear Road Construction Troops at higher echelons. There, use or availability in engineer units at or below division level is probably quite limited, due to simple logistical considerations.

THE MOST recent addition to the available types of road construction and obstacle clearing equipment for tactical units is the IMR engineer obstacle-clearing vehicle. This vehicle has a 2-man crew, a mechanic-driver and an operator. It is fitted with an extendable hydraulic "Manipulator" and a dozer blade. It is used under fire for clearing abatis or removing steel or concrete beams from collapsed buildings, as well as to assist in tank-dozer tasks such as clearing contaminated soil, preparing firebreaks, and light road repair.

For wet or dry short gaps beyond the capabilities of



IRM engineer obstacle-clearing machine

simple expedients, vehicle-mounted bridges are used. The obsolescent KMM truck-mounted treadway bridge comes in sets of five 7-meter spans with 3.5 meter long adjustable trestles (on 4 spans), and may be fully constructed in 30 minutes by a well trained crew. Its carrying capacity is 12 tons, its maximum width of span per set is 34 meters, and it requires a crew of 10 men. The KMM has been largely replaced in Soviet forces by the TMM heavy truck-mounted bridge, which is issued in sets of four 60-ton capacity spans, each 10.2 meters long with 3-meter adjustable trestles. The full 40-meter bridge requires a crew of 12 and takes 15-30 minutes to emplace. Both KMM and TMM may be emplaced underwater, with emplacement times increased by one-half. Since both KMM and TMM are truck-mounted, MTU tank-launched bridges are selected for use under enemy fire. Both the MTU (T-54 tank, 50-ton capacity) and MTU-20 (T-55, 60-ton) use a cantilever-launch method for spanning up to 11 and 18 meters, respectively. Scissors-launched bridges developed by the East Germans may also be used by some Soviet units.

IN SITUATIONS where it is desirable to keep open a crossing site after vehicle-launched or ponton bridges have been removed to other sites or displaced forward, prefabricated bridge elements may be employed. One such wood and metal bridge uses telescopic trestle bents with 6-beam wooden treadways. Each span is four meters long with a 35-ton capacity. Larger capacity (60 ton) spans of the prefabricated wooden low-water bridge USM may be constructed on existing or specially-driven piers.

The bridge construction equipment set KMS, used to drive wooden pylons for bridge piers, consists of four pile-drivers mounted on float bridge sections, with auxiliary folding assault boat sections, all transported on five trucks. The 28-man crew, augmented by reconnaissance elements and bridge element transport trucks, is organized into the following functional teams: pile-driver operating team, pier-building team, free span emplacement team, pile bent delivery team, treadway assembly team, and truck drivers to pick up assembled treadways for delivery to the bridge site.

Average construction speed on pile piers is 15-20 meters per hour, and 20-25 meters per hour on trestle piers. Bridge elements may be prepared from locally available materials using pioneer kit saws, chain saws, and the trailer-mounted LRV high-capacity gangsaw or RP-75 lumber sawframe.

Float bridge support for airborne units is provided by the air-droppable, helicopter transportable PVD-20 airborne forces bridge set which consists of aluminum balks on rubberized fabric floats, comprising ten 4-ton ferries or rafts of up to eight tons capacity, or 8-ton bridges up to 64 meters long. The bridge is normally transported on 10 GAZ-63 2-ton trucks or six ZIL-151/157 4.5-ton trucks.

Float bridging for motorized rifle and tank units is provided by the TPP heavy ponton bridge set or PMP ponton bridge set. The TPP consists of bow and center-section rigid metal pontons with an integral roadway assembly superstructure, transported on ZIL-151/157 trucks. A full set includes 48 bow sections, 48 center sections, 12 power boats, and auxiliary equipment. The set may be configured as varying capacity rafts, or as bridges, with up to 70-ton capacity.

TPP HAS been almost entirely superceded by the PMP ribbon bridge. The full 36-link PMP set (32 river links and four shore links) may be configured as 40 to 170-ton

rafts, or 20-ton or 60-ton bridges using 12 powerboats for emplacement and stabilization of the bridge. Divisions normally have a half-set (one complete bridge) of 16 river and two shore links, six boats, and auxiliary equipment. This gives the division the capability to construct 118 meters of 60-ton bridge, 225 meters of 20-ton bridge, or rafts.

To facilitate raft construction, each river link has auxiliary ramp sections. Transition from rafts to bridging, and vice versa, is rapidly accomplished. Norms for bridge construction in current velocities up to two meters per second require rates of nearly eight meters per minute, and substantially faster have been observed.

Powerboats of the BMK series are used with both the TPP and PMP. Most of the boats are towed, having integral wheel struts instead of trailers for transport. The most recent model, the BMK-T, is transported on a modified ponton carrier truck, launched and recovered in the same manner as the PMP pontons.

Line of communication bridges such as the heavy ponton PPS, highway railroad ponton bridge NZhM-56, and fixed or sectional bridges such as the RMM, MARM, and SARM are not organic to division combat engineers, but are deployed with Road Construction Troops of the Military Transportation Service. The Soviet military newspaper Krasnaia Zvezda (Red Star) recently disclosed the existence of an underwater ponton bridge, which appears to have a carrying capacity of less than 20 tons. Allocation of the bridge is not known.

RECENT developments in Soviet amphibious equipment have extended beyond light amphibious tanks and APCs to include the new self-propelled 122mm artillery, and the SA-8 Gecko and SA-9 Gaskin air defense missile systems. These developments, and the wide use of snorkelling tanks, are geared toward reducing the combat requirement for assault engineer support. Soviet engineers, however, still possess a wide range of assault river crossing capabilities, from simple pneumatic or collapsible canvas-and-frame assault boats and individual flotation kits, to amphibious transports and ferries.

The obsolescent MAV is an amphibious jeep-type vehicle, primarily used for command or reconnaissance, with a five-man or 500 kilogram payload. The ZIL-484 BAV, an improved version of the U.S. World War II DUKW, is a wheeled amphibian capable of handling loads up to 3.5 tons (28 men, a light gun or howitzer, or an unloaded 2-ton truck) at speeds of 8-9 kilometers per hour for up to six hours. It is safe to say the BAV has been replaced in virtually all active Soviet combat engineer units by the K-61 tracked amphibious transporter, which is, in turn, being replaced by the PTS/PTS-M tracked amphibious transporter.

The K-61 can transport 5-ton loads (50 men, a 100mm gun or 152mm howitzer, etc.) for up to eight hours at speeds of 8-9 kilometers per hour. The PTS can accommodate a 10-ton load (72 men, one or two guns, one prime mover) at speeds of 10-11 kilometers per hour for 10 hours of continuous operation. The PTS can transport an artillery prime mover, an artillery piece, and its crew in a single lift. The gun can be rapidly loaded or unloaded without disconnecting the PKP from the PTS, thus greatly speeding turn-around time in river crossing operations. The PTS also has a designed capability to function over the beach or as an ambulance vehicle, transporting 12 litters on special rack mounts.

THE GSP tracked, self-propelled ferry is designed for the transport of heavy tracked vehicle loads (to 50 tons). It consists of non-interchangeable left and right-half units with large, foam-filled outboard pontons that are carried on top of the basic vehicle and rotated outward once the vehicles are connected in the water. The crew is probably five men.

Engineer reconnaissance equipment includes scuba and light diving equipment; various devices for measuring current velocity, taking bottom soundings to determine river bottom composition and profile, etc; and optical equipment such as the engineer reconnaissance periscope PIR/PIR20, sapper range-finder DSP-30, the long focal length periscopic camera PDF, and other periscopic and binocular observation instruments.

Water purification and supply equipment, in addition to tanker trucks and cisterns, includes the truck-mounted filtration station and other mobile purification sets with capacities up to 1800 liters per hour.

Generators are employed for power supply to lighting sets, gangsaws, jackhammers, augers, and other purposes. Designations "ESB" or "ESD" indicate "electrical station" powered by gasoline or diesel fuel, respectively, followed by a numerical designation of the unit's power output in kilowatt hours and a two-letter indicator of the general application of the unit. Thus, for example, ESB-4-IB designates a four-kilowatt-hour, gas operated generator for engineer earth preparation.

Numerous crane trucks are available to engineer troops, but divisional units seem most frequently to be equipped with the K-61, K-67, 8T210, and auxiliary cranes such as the KM-61. Engineer repair service to engineer units on the move is provided by the APRIM-M, PARM-1, and TRM-A or TRM-B mobile repair shop vans.

Major Parr is currently assigned to the Office of the Joint Chiefs of Staff as a Presidential Translator on the Washington-Moscow hotline. He was previously assigned to the Defense Intelligence Agency as a Soviet Ground Forces Analyst. Major Parr has had two previous articles on Soviet military engineering published in **ENGINEER.**

Officer Career Info

COLONELS

The new Engineer Colonels assignment officer at MILPERCEN is Lieutenant Colonel Arthur Williams. He recently graduated from the Navy War College after a tour in Korea.

LIEUTENANT COLONELS

Lieutenant Colonel Ernest J. Harrell has taken over the Specialty 21 assignment desk at MILPERCEN. He recently completed a tour as battalion commander of the 43rd Engineer Battalion at Fort Benning, GA. He is a 1973 graduate of the Command and General Staff College.

MAJORS

Congratulations to those officers who were selected for promotion to Major (AUS) by the board which met in April.

COMPANY GRADE OFFICERS

This year, as part of the second specialty designation process, 124 officers from other branches will be designated SC 21, Engineer, as a second specialty. Many of these officers will be eligible for tours as Engineers in the near future. Most assignments for tours in the second specialty will be made to Engineer Districts and Facilities Engineer positions.

All company grade officers are urged to insure that results of physical examinations and official photographs are current and on file at MILPERCEN. Photos provide a first impression when board members review your file. Is yours more than four years old? Have you failed to have one taken since your last promotion? If your answer is "yes" to either question, you should submit an up-to-date photo as soon as possible.

WARRANT OFFICERS

Congratulations to those warrant officers who were selected for promotion to CW3 and CW4 (AUS) earlier this year. Announcement of selectees for promotion to CW2, 3, and 4 (RA) is expected in October.

OPMF CONVERSION

The destruction of OPMF paper files for all officers except Majors and Lieutenants had been completed as of 1 July. The start date for destruction of the remaining paper files is 1 September. Copies of the paper files for grades 0-1, 0-2, and 0-4 may be purchased through 31 August. As announced previously, all paper files are being converted to microfiche files. The MILPERCEN contact for Majors and Lieutenants who still wish to purchase a copy of their paper files is Lieutenant Colonel Heseman, Autovon 221-9612/3.

OER SUPPORT FORM

The Army will transition to the new Officer Evaluation Reporting System during the period 15 September to 1 November. The new system includes several features which haven't been part of previous OER systems.

One of the new features is DA Form 67-B-1, the OER Support Form, which is viewed as an ideal technique for increasing two-way communications between the rater and rated officer, especially in terms of developing and clarifying the elements of the rated officer's performance.

The Support Form is designed to be used by the rated officer and rating officials. It is not forwarded to DA. At the beginning of the rating period the form is used as a guide for discussion between the rater and rated officer about the rated officer's duties, responsibilities, and performance objectives for the period. During the rating period, it acts to guide the performance of the rated officer and the counseling and coaching by the rater. At the end of the rating period, it gives the rated officer an opportunity to provide the rating chain information about his performance from his point of view.

At the beginning of the rating period, the rated officer receives a copy of the Support Form which is blank except for the name, grade, and position of his rater and the positions of the remaining members of his rating chain. Within the first thirty days of the rating period, the rated officer and rater are required to discuss Part IIIa, the specific nature of the rated officer's duties (his duty description), and Part IIIb, the focus or direction of his performance (his major performance objectives).

It is important to note that although the objectives are meant to focus attention on only the more critical aspects of performance, they are not all inclusive. The rated officer is still responsible for all that is normally expected of his grade and duty position.

These objectives can be developed in several ways. They can be set by the rater, suggested by the rated officer, or jointly developed. Furthermore, task can be accomplished formally or informally, depending on the situation, style and personality of the rater. The important thing is that the discussion takes place and the rated officer gets started in the proper direction.

During the rating period, the rater and rated officer should update the duty description and performance objectives to reflect shifts in emphasis additional missions, and other changes that are likely to occur.

At the end of the rating period, the rated officer receives a Support Form with Parts I and II filled out, to include the names of the senior rater and the intermediate rater if one has been included in the rating chain. The rated officer is required to complete all three portions of Part III—his duty description, major performance objectives, and significant contributions—and submit the Support Form to his rating chain. if the rated officer has kept his information updated and has continued to communicate with his rater, he is in the best position to provide objective comments concerning his performance and avoid unrealistic remarks.

Part IV of the Support Form is for comments by the rater and/or the intermediate rater based on the entries made by the rated officer in Part III. These comments are optional. If comments are made they should address the accuracy of the duty description and performance objectives. Comments on performance should be reserved for the OER; however, if included in this part, they should be consistent with the performance and potential evaluation on the OER.

The completed Support Form accompanies the OER form through the rating chain and is returned to the rated officer after it is read and considered by the senior rating official. It does not accompany the OER to DA.

The Support Form instutionalizes a procedure that has been a part of effective military leadership for generations—that of clarifying performance expectations for subordinates and, in the process, assisting the subordinate in his professional development.

Enlisted Career Info

BRANCH CHIEF COMMENTS

How would you like to answer the telephone an average of 120 times a day? Your career advisors at MILPERCEN do, and they spend an average of three minutes talking to each engineer soldier who calls.

Some of the questions asked include: Where is my next duty assignment going to be? When can I expect to receive orders for my next assignment? What is the turnaround time for my grade and MOS? What can I do to improve my chances for promotion? Why wasn't I promoted on the last E7/E8 list?

These are only a few of the multitude of questions asked by soldiers in the field, and we feel that it is important for us to give you the most accurate answer possible in the brief time allowed for a telephone conversation.

The most important tool available to provide you with a reasonably researched answer is your Career Management Individual File (CMIF) maintained here at MILPERCEN.

Who makes the most important input to your CMIF? You do, through your Military Personnel Office (MILPO). Each and every time we answer your correspondence or telephone call, we request an updated Preference Statement (DA Form 2635) and DA Form 2-1. It is extremely difficult for your career advisors to give you any kind of answer when the most current forms in your CMIF are three to 10 years old.

Remember, your most important file— the Official Military Personnel File (OMPF)—is maintained at the Army Enlisted Records and Evaluation Center, Fort Benjamin Harrison, IN, and it must be updated regularly. Do not, under any circumstances, bypass the OMPF and provide documents only for your CMIF maintained at MILPERCEN.

The mailing address for forwarding documents for inclosure in your CMIF is: MILPERCEN, ATTN: DAPC- EPL-E, 2461 Eisenhower Ave., Alexandria, VA 22331.

EER RULES CHANGE

Enlisted Evaluation Report (EER) rules for all EM changed April 1. The changes are designed to make EERs more complete and less frequent, according to MILPERCEN officials.

EERs are now required at least yearly but not during amonth that is based on a soldier's grade. Instead, annual reports will be made one year from a soldier's last report month. Exceptions to this change will be allowed if a soldier should need a "change of rater" or "special" EER, or if an EER must be delayed because a rater has not managed a soldier for at least three months. When a soldier does receive a "change of rater" or "special" EER, the next annual report will not be due until one year after that EER.

Other changes include mandatory comments in all EERs. Currently, comments are only required if soldiers are rated below or above average. Recommendations for promotion must also be explained in a rater's comments, no matter which option a rate recommends. Career development recommendations for schooling and assignments must also be made in every EER.

Another change is that raters will have the option of using a "complete the record," or updated, EER for soldiers in grades E-6 through E-9. This report could be made when a soldier is being considered by a DA promotion or selection board. This option will allow raters to "update the official record" and call attention to new and special information.

The new rules are spelled out in changes to AR 600-200, DA Pam 623-1 and DA Pam 600-8.

MOS 12F RESURRECTED

MOS 12F, Combat Engineer Vehicle/Armored Vehicle Launched bridge Crewman, is being resurrected effective 1 September. The MOS, which was converted to MOS 11E in 1976, will include Engineer APC Operators as well as CEV/AVLB Crewmen.

Reclassification is mandatory for all 12B1U personnel and for all current Skill Level 1 incumbents (19E10 and 19F10) now serving in CEV/AVLB positions. Reclassification is voluntary for Skill Levle 2 and higher personnel currently or formerly associatd with CEV and AVLB.

Coordinating drafts of Soldiers and Commanders Manuals for MOS 12F were scheduled for completion in August and should be delivered to TRADOC in January 1980 for printing and world-wide distribution. Manuals should arrive at unit level by next summer.

Work on Skill Qualification Tests for skill levels one through four will begin at The Engineer Schol late this year. The initial testing period will have an evaluation (ending) date of 30 June 1982.

Soldiers in grades E-6 and E-7 who qualify for relcassification into MOS 12F may apply for Instructor duty in the 12F Course, which is to be taught at Fort Leonard Wood, MO. Applications should be forwarded through command channels to MILPERCEN.

MILPERCEN CONTACTS

Should you at any time wish to call or write your career management branch regarding an assignment or other aspects of your career, the address is: U.S. Army Military Personnel Center; ATTN: DAPC-EPL-E; 2461 Eisenhower Avenue; Alexandria, VA 22331. The telephone number is Area Code 202, 325-7710/11/12 or Autovon 221-7710/11/12.

Engineer career advisors include: Master Sergeant Kelly Brown, CMF 81, Drill Sergeants (Fort Leonard Wood only), MOS 12Z and 12B for E-7 (P); Sergeant First Class Al Henderson, CMF 12 Combat Engineering; and Sergeant First Class Billy W. Moore, CMF 51 General Engineering.

SQT REVIEW

The Army is considering reducing or eliminating the written portion of the Skill Qualification Test (SQT) for E-1 through E-5 in combat arms MOS, including MOS 12B, Combat Engineer.

Similar changes may be in store for soldiers in combat support and combat service support MOS, according to TRADOC officials.

Trainers, personnel managers and units in the field have been reviewing the SQT based on tests conducted in combat arms MOS. Decisions were expected by September, with changes to be implemented early next year.

The SQT is intended to test a soldier's ability to do his job rather than his ability to answer written questions. SQTs conducted over a three-year period in combat arms MOS show that soldiers improve progressively on the hands-on and performance certification portions. Improvement on the written test, however, has been "modest or uneven."

In addition to reviewing the written portion of the test, officials have been looking at the various standards established for the SQT and whether these standards provide a workable and equitable system for determining eligibility for promotion and reenlistment.

APPRENTICESHIP PROGRAM

More than 11,000 soldiers, including many engineer soldiers, are using their Army training and work experience to prepare themselves for civilian jobs. They're making sure their Army training doesn't go to waste by applying their work experience toward becoming qualified journeymen in a skilled trade or craft.

Currently registered with the U.S. Department of Labor's Bureau of Apprenticeship and Training (BAT) are no less than 15 engineer programs and 23 engineer-oriented MOS. listed below.

PROGRAM	MOS
Plant Equipment Operator	62H,62G
Grading & Paving Equip. Operator	62E
Heavy Duty Repairman (Construction Equipment)	62B
Universal Equip. Operator (Construction Equip.)	62F
Carpenter	51B
Plumber/Pipefitter	51N
Electrician	51R
Lithographer (Offset Press Operator)	41K.83E, 83F
Drafter (Architectural)	81B
Refrigeration/Air Conditioning Repairer/Servicer	52C
Firefighter	51M
Industrial Electrician-Repairer	52E
Powerhouse Electrician/Repairer	52E
Surveyor (Engineer)	82A,82B, 82D
Rigger	12B,12C, 51C,51H

Apprenticeship terms range from one to five years or from 2,000 to 10,000 hours, depending on the trade or skill. Each 2,000 hours of work experience also requires 144 hours of related instruction.

To participate, soldiers must be working in a primary or secondary MOS that is part of the program. Soldiers may transfer from one program to another, but they cannot participate in more than one program at a time.

To enter the program, soldiers must visit their local education office to complete an application form. Their past work experience will be evaluated and they will receive a DA Pamphlet 621-series which lists the number of hours required and Army Correspondence Courses available if needed.

Each soldier is responsible for recording work experience hours in a log book. Hours are recorded daily and once a week the soldier's immediate supervisor must certify the log book.

Upon completion of the program, a certificate is awarded from the Department of Labor. Although this certificate will not guarantee a civilian job, it will make former soldiers more competitive with civilians in the trade.

For more information, soldiers should contact their local education office.

OCS DEADLINES

Enlisted personnel interested in attending Officer Candidate School will have to wait until next year unless they have already submitted a compelted DA Form 61, Application for Appointment, to MILPERCEN. The deadline for receipt of applications for OCS Class 1-80, with a starting date of 18 November, was 17 August. Applications for Class 2-80, scheduled to start on 3 february 1980, must be received by MILPERCEN no later than 5 November. The deadline for receipt of applications for Class 3-80, scheduled to start on 6 April 1980, is 7 January.

SOCAD PROGRAM

Six American colleges and universities have agreed to extend their Servicemen's Opportunity College Associate Degree (SOCAD) program to soldiers overseas. The program standardizes procedures for academic evaluation of, and college credits for, military schooling, experience, and training for more than 70 educational institutions. The program provides flexible credit transfer options and adjustable residence requirements leading to an associate degree. The SOCAD program was originally designed for soldiers in combat arms, but has been expanded to meet the needs of soldiers in other career fields. Soldiers interested in the program can get full details from their local education services office.

"CODE-A-PHONE"

Soldiers wanting information about the Army Correspondence Course Program (ACCP) or wanting to check the status of a course they are now taking, can get answers direct from the Training and Doctrine Command (TRADOC) by a new "code-a-phone" service.

Training specialists will answer soldiers' questions via phone. Or, if soldiers call after duty hours, they may leave a recorded message and have their questions answered when their call is returned the next work day. If soldiers do not have access to an Autovon line, their questions will be answered by mail.

The number for ACCP information is Autovon 927-3085 or commercial 804-878-3085.

We need your help. Whenever a significant change in your local assignment, duty position, marital status, area of preference, etc., occurs, take a few minutes to prepare an updated copy of your DA Forms 2-1 and 2635.

ARMY DIVERS NEEDED

Enlisted personnel in grades E-2 through E-4 interested in becoming Army divers should submit a formal school application through channels to HQDA, ATTN: DAPC-EPL-E, 2461 Eisenhower Avenue, Alexandria, Virginia 22331.

Applicants must meet all prerequisites in AR 611-75, paragraph 2-2. Personnel accepted will attend a 12-week Second Class Diver Course at the Navy's Diving and Salvage School in Washington, D.C. Upon successful completion of the course, soldiers will be awarded MOS 00B10 and further assigned to the Engineer Hard Hat Diving Unit.

EERWA DATA

The Enlisted Efficiency Report Weighted Averages (EERWA), as of 31 March 1979, were as follows:

Pay Grade	EERWA
E-9	124.41
E-8	123.73
E-7	122.19
E-6	120.25
E-5	117.82
E-4	113.94

NCO Channels

ACADEMIC GRADING POLICIES

Students reporting to the U.S. Army Engineer School to attend the Engineer Advanced Course should be fully aware of the current grading standards applied to professional development courses.

Students must pass each examination with a grade of 70 percent or higher in order to receive a passing score. If the student fails to achieve at least 70 on the first examination, he is retested following remedial training in the deficient areas. If he fails the retest, his academic record will be reviewed by the Professional Course Review Committee, which is composed of senior NCOs detailed to the board.

The Professional Course Review Committee will convene twice during the course, upon conclusion of the common phase of training, and after completion of the entire course. Upon completion of the common phase, the committee will review the academic record of all students who have failed a retest on one or more examinations. Based upon the student's academic record, the committee may recommend any of the following actions:

Continue the course—based upon the premise that the student will benefit from the instruction although he may not graduate.

Referral to the Faculty Board—Faculty board may grant additional tests or recommend relief from the course, depending on the student's academic records.

Upon completion of the course, the Committee wil again review all academic records of students who have failed one or more retests in the entire course. This review will include an academic evaluation as well as the "whole person concept." Based upon these two areas, the committee may recommend the following actions:

a. Administrative Pass—graduation with diploma.

b. Certificate of Attendance—Unsuccessful Completion— Students *may* be given an option to complete specific correspondence subcourses to meet course requirement within a one-year period. Upon satisfying course requirements, the student is issued a diploma.

Academic averages are used to determine a general ranking of students which will be annotated on the Academic Evaluation Report DA Form 1059. Four categories identify student achievements as follows:

"Exceeds Course Standards"—Limited to 20 percent of class enrollment, it includes only those students who achieve the highest academic averages, exceeding 90 percent.

"Achieved Course Standards"—Includes all students who do not "exceed course standards," but pass each examination with a score of at least 70 percent.

"Marginally Achieved Course Standards"—Includes students who "fail to achieve course standards" due to their failure on retests. These students are given the opportunity to earn their diplomas by completing additional academic work in a specified period of time or they may be granted an "administrative pass" for the course. Diplomas are awarded to these students.

"Failure to Achieve Course Standards"—Includes students who fail to achieve a passing grade of 70 percent from any element of the course.

These grading standards reflect The Engineer School's current policy that students must be proficient in all academic areas. Students failing to achieve the minimum score of 70 percent on the first examination receive reinforcement training and are retested in the subject area. If the student then receives a passing score, he has profited from the reinforcement training and testing.

Academic Evaluation Reports: Effective with the Engineer Advanced NCO (ENCOA) Class which graduated in May, corrected copies of academic evaluation reports are no longer being used. Previous policy permitted The Engineer School to issue corrected copies of academic evaluation reports once the student had completed course requirements.

Academic Evaluation Reports: Effective with the Engineer Advanced NCO (ENCOA) Class which graduated in May, corrected copies of academic evaluation reports are no longer being used. Previous policy permitted The Engineer School to issue corrected copies of acadmic evaluation reports once the student had completed course requirements.

Students who fail to achieve course standards and are given an option to complete a specific correspondence subcourse, will have a notation placed in block 16 of the DA Form 1059 as follows: "A certificate of attendance is issued at this time. A diploma will be issued upon successful completion of the following sub-courses within a one-year period."

Upon completion of course requirements, copies of the diploma with a letter of explanation, will be forwarded thru the same distribution channels as the academic evaluation report, to include the soldier's Official Military Personnel File.

NEW TOP-LEVEL NCOs

Personnel reassignments this summer at the U.S. Army Engineer Center and School have resulted in new senior Noncommissioned Officers for both the center and the school's Directorate of Training Developments.

The new post CSM is Frederick I. Eisenbart, Jr., who just completed a tour as the Command Sergeant Major of the DA Military Personnel Center. CSM Eisenbart replaced CSM Lucion L. Cowart, who departed for Korea in June.

CSM Eisenbart has an extensive background in combat and general engineering and has served most of his Army career in the Corps of Engineers. He is a graduate of the Sergeants Major Academy and numerous schools of engineering. His 26-year career has included assignments as First Sergeant, Command Sergeant Major of several battalions, and Command Sergeant Major of an engineer brigade.

The new Sergeant Major of The Engineer School's Directorate of Training Developments is SGM Waverly George. He is now the key point of contact for field units in the areas of individual and collective training. If you have a problem or just need information on Skill Qualification Tests, Soldiers Manuals, ARTEPs, correspondence courses, or TEC, SGM George is the person to contact at The Engineer School. Letters and ohter correspondence may be addressed to: Commander, U.S. Army Engineer School, ATTN: SGM George, DTD, Fort Belvoir, VA 22060.

Reserve Components

ITSCHNER AWARDS

The annual Itschner Award winners for the Reserve Components were announced in the Spring edition of ENGINEER and honored at the annual Engineer Dinner May 11 at the U.S. Army Engineer Center and Fort Belvoir. The USAR winner was the 332nd Engineer Company (Dump Truck) of kittanning, PA, commanded by Captain Ernest M. Cooper. The ARNG winner was Company C, 612th Engineer Battalion, Norwalk, OH, commanded by Captain Dale L. Liebenthal. The Itschner Award is named for Lieutenant General Emerson C. Itschner, a former Chief of Engineers.

NEW ENLISTMENT OPTION

A "3x3" enlistment option for non-prior service males was initiated 30 May. The new option allows a three-year unit/three-year control group obligation. Men who select the 3x3 option are not eligible for enlistment bonuses, educational assistance, or the split training option. Since 1975, males age 17-25 have had the choice of only two options—the "6x0" option in which all six years are served in a unit, and the "4x2" option which calls for four years in a unit and the other two years in a control group.

SCHOOL APPLICATIONS DUE

Applications for most 1980 school year courses are due, through command channels, by 1 November. Included are applications for the Army War College, the National War College, Logistics Executive Development Course, Command and General Staff College, and the Industrial College of the Armed Forces. Warrant Officer Senior Course applications were due at DA in August fo the January 1980 class; applications are due at DA by January for the June 1980 course. Applications for all courses are submitted through command channels. Check with unit training officials for further guidance and eligibility.

TRAINING SCHEDULES

Subparagraphs 3-3e and 3-3f of AR 140-1 explain how USAR unit commanders may select training schedules to best suit their unit's needs. The reg breaks out the allowable limits of choosing individual Unit Training Assemblies (UTA), Multiple Unit Training Assemblies (MUTA) or combinations of the two. There are restrictions on the percentage of a unit's total training hours which may be scheduled within any one month or three-month period. Only area commanders may authorize deviations from the percentages. Under no circumstances will the authorization allow individual unit members to exceed 48 training assemblies a year.

OVERSTRENGTH APPROVAL

DA has approved a new policy, allowing CONUSA commanders the authority to approve requests from subordinate units to exceed the 110 percent enlisted overstrength ceiling. There are some additional ground rules. The unit's parent USAR command (ARCOM or GOCOM) cannot exceed the 110 percent ceiling, and the CONUSA cannot exceed 103 percent of its enlisted strength. Also, a unit cannot recruit over the 110 percent ceiling if there are no other units within normal commuting distance under the 110 percent level. Members recruited under the policy must be informed that, upon mobilization, they may be reassigned anywhere the Army has a requirement.

UPDATE ON SRIP

The expansion of the Selected Reserve Incentive Program (SRIP) to all USAR units ended in June, but commanders who are still eligible to offer enlistment incentives are encouraged to keep providing referrals and to stay closely in touch with the unit's supporting recruiters.

PRIMARY LEADERSHIP COURSE

The Primary Leadership Course is the first leadership and management course approved for E-4s and E-5s with non-combat skills. USAR schools offer a self-paced PLC which closely parallels the Active Component course. More than 4,000 soldiers are currently enrolled. At the present time, several community colleges, mainly in the states of Washington and California, offer academic credit in personnel management for successful completion of the PLC. Community colleges in other states are reviewing PLC content, and more schools are expected to grant credit for it. USAR school commandants are urged to submit the PLC curriculum to local colleges and universities for evaluation.

NCOs SOUGHT FOR NCOLP

The Non-commissioned Officer Logistics Program is available for NCOs in grades E-6 and above. The program includes an intensive 9-week resident course at the Army Quartermaster School at Fort Lee, Virginia. A non-resident NCOLP course is also available. To be eligible, NCOs must be high school or GED graduates, and be qualified in an MOS within Supply and Service, Transportation, or Maintenance. Chapter 13 of AR 614-200 spells out all requirements. Both unit and Individual Ready Reservists are urged to take advantage of NCOLP. Other references include DA Pam 600-8 and AR 604-5.

LONG TOUR MANAGEMENT PROGRAM

DA has approved the establishment of a USAR Long Tour Management Program, designed to improve the quality and professionalism of the long tour USAR force. The program also seeks to more effectively control spaces and personnel assigned. DA Circulars 140-14 (for officers) and 140-13 (for enlisted personnel) spell out the details. A Long Tour Management Board met during the summer to review all officers on tour and all new applications, and also to provide an order of merit to be used to fill future vacancies.

RECRUITING PARTNERSHIP

The last of 57 District Recruiting Commands (DRC) assumed the USAR recruiting mission in May, thus fully implementing the USAR-USAREC partnership. All Reservists should play an active role in the partnership by making referrals to the recruiters who support their unit. The new USAREC/FORSCOM Regulation 601-67, USAREC/USAR Referral Program, spells out the procedures. Remember the formula—quality referrals equals more USAR accessions equals successful partnership.

The School Solution

TIME REQUIREMENT

Nine bays are required to cross 170 feet (Table 6-1, FM 5-34). Assembly time is five minutes per bay, or a total of 45 minutes, under normal conditions. However, weather and blackout conditions must be considered, along with the time required to install a BEB temporary anchorage system.

A factor of 50 percent must be added to the erection time due to blackout conditions, while a 30 percent factor has to be included due to the frigid temperatures. Allow approximately 9-10 minutes for installation of the BEB temporary anchorage system. The net result is a final estimate of 90 minutes for construction of the Ribbon Bridge.

PERSONNEL REQUIREMENT

Since two, rather than three, launching sites are to be considered in estimating the required troop strength, and since the requirement for a fixed anchorage crew has been eliminated, the figures in Table 6-11, FM 5-34 must be adjusted. The final estimate is four NCOs and 36 enlisted per personnel. Officer requirements may be added as necessary.

EQUIPMENT REQUIREMENT

From Table 6-9, FM 5-34, you determine that two bridge bay ramps and seven bridge bay interiors are required to span a distance of 170 feet. Bridge bay ramps may be adjusted to compensate for the extra 20 feet in length of the nine bridge bays.

The number of bridge erection boats required is determined by the number of launch sites (2), the number of required bays (9), and the stream velocity (6 FPS). The estimated requirement is seven boats, which can also be used for the anchorage system after bridge erection is completed. Since one M-812 Transport Vehicle is required for each bay and erection boat, 16 vehicles are required.

OTHER CONSIDERATIONS

Bridge erection time may be considerably longer depending on (1) the speed and skill of personnel involved, (2) the availability of necessary equipment, (3) weather conditions, and (4) miscellaneous factors which could hinder mission accomplishment.

Troop strength estimates are based on assumed availability. Use of additional launch sites and a fixed anchorage system would increase the number of troops required and would, likewise, lengthen the time required for completion.

The equipment estimate is the minimum required to accomplish the mission. Back-up and safety equipment, as well as command and control vehicles, should be on hand in case of equipment failure on site.

ENGINEER "HOTLINE"

The U.S. Army Engineer School at Fort Belvoir, VA, has established a 24-hour "Hotline" to answer questions from the field on subjects such as TO&E organization, doctrine, materiel, MOS, training literature, Skill Qualification Tests, etc. Engineers using the Hotline must provide their name, unit, address and telephone number in order to get answers to their questions. The Hotline number is Autovon 354-3646 or commercial 703-664-3646. Questions will be referred to the appropriate activity within The Engineer School. Callers will be contacted by telephone and/or in writing as soon as possible.

CORPS DESIGNATED AS MACOM

The U.S. Army Corps of Engineers (USACE) was designated as a Major Army Command (MACOM) on 16 June, the 204th anniversary of the founding of the Corps. The new command consists of the Office of the Chief of Engineers, the Engineer divisions and districts, research and development laboratories, and other assigned field agencies. Excluded are members and units of the Corps of Engineers' branch of the Army, such as combat and construction engineers, facility engineers, and other engineer organizations which are part of other MACOMs. The Corps remains a DA staff agency with the Chief of Engineers serving as both head of the agency and commander of the new MACOM. Traditional oversight of Corps programs by Congressional military and public works committees and the Executive Branch remains unchanged. The establishment of the Corps as a MACOM is expected to clarify the Corps' functions and relationships within the Army.

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