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SOVIET COMBAT ENGINEER SUPPORT

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SOVIET COMBAT ENGINEER SUPPORT

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FOREWORD

This research project represents fulfillment of a student requirement for successful completion of the overseas phase of training of the Department of the Army's Foreign Area Officer Program (Russian).

Only unclassified sources are used in producing the research paper. The opinions, value judgements and conclusions expressed are those of the author and in no way reflect official policy of the United States Government; Department of Defense; Department of the Army; Office of the Assistant Chief of Staff of Intelligence; or the United States Army Institute for Advanced Russian and East European Studies.

Interested readers are invited to send their comments to the Commander of the Institute.

ROLAND LAJOIE
LTC, MI
Commander

SUMMARY

This paper examines Soviet combat engineer equipment, organization and tactical groupings, staff procedures, and support to defensive, offensive, movement and river crossing operations. Types of engineer equipment are reviewed and briefly described. Organizational tables are adapted from accepted U.S. sources and improved to provide additional detail and conformity with Soviet sources, resulting from an extensive review of Soviet military journals, 1974-1978. The single most important source is the book, "Engineer Support of Combined Arms Combat" by Pliaskin, Lysukhin and Ruvinskii (1972), as translated by the author of this paper.

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INTRODUCTION

> Soviet military-engineering art has proved its complete superiority over bourgeois military art in the years of the Civil War and the Intervention, and especially on the fields of combat of the Great Patriotic War....Soviet military-engineering art, guided in its development by Soviet military science, will be the most advanced in the future as well.[1]

It is doubtful that any Western military engineer would have acknowledged the superiority claimed above by the Soviet author in 1954. Yet, in 1961 the Soviet Union fielded its ribbon bridge, a revolutionary new design of tactical floating bridge. Nearly a decade and a half later, the U.S. Army paid the Soviets the supreme compliment of fielding a new standard ribbon-type floating bridge: a reverse-engineered copy of the Soviet bridge. It is not the intent of this paper to prove or disprove the superiority of Soviet combat engineer support concepts, doctrine or equipment. Soviet engineers do provide their tactical units and formations with professional, minutely-planned and dynamic support in all phases of combat, whether in postulated nuclear or non-nuclear situations. The manner in which this support is organized, the units outfitted and employed, is a topic worthy of detailed analysis.

In the Soviet Army's vocabulary the term, "military engineer", is a broadly-applied designation for a whole range of military-technical specialties embracing all arms and services. A military engineer may be an artillery engineer, radio-electronics engineer, or a command systems engineer as well as a construction engineer or an engineer in a combat unit.[2] "Engineer support", however, generally refers only to combat engineer training, preparation, and measures in support of the various aspects of combat operations, mobility and disposition of troops. It does not include railroad construction and repair, pipeline construction and maintenance, or cartographical preparation and supply.[3] In other words, the Soviets understand "military

engineer" in a broader sense than it is usually applied in the West, while their concept of "engineer support" does not encompass some Western combat engineer functions. In this paper the generic term "engineer" and the terms "combat engineer" and "sapper" will be used to describe those units (subunits)[4] and those functions normally ascribed to engineer support of ground and river-crossing mobility (less repair functions) in division-sized units.

Soviet combat engineers proudly trace their historical antecedents to Russian fortification specialists in the eighth and ninth centuries. Road construction and maintenance is claimed to date to Ivan the Terrible's assault on Kazan in 1552. Regular engineer units were first formed beginning in the 18th century, when Peter the Great affirmed the creation of a company of mine preparers (1702) and ponton teams (1704), and founded a regiment of military engineers in 1712.[5] Nearer to the present, engineer regiments were formed in 1941 in all military districts and regions, consisting of about one thousand personnel comprising a staff, two engineer and one technical battalions, and support and service subunits. During the Great Patriotic War (World War II) more than two hundred brigades, battalions and separate companies were awarded the honorary designation, "Guards".[6] The experience of the war provides a history rich with examples of individual and unit bravery and self-sacrifice, constantly referred to in Soviet military journals as the source of object lessons for psychological preparation and inspiration of engineer troops in today's Soviet Army.

CHAPTER I

GENERAL

Soviet engineer authors contend that "...practice has shown that the greater the degree of motorization, the greater the dependency on the trafficability of terrain and the condition of roads, and the more complex the defense against modern means of destruction."[1] Rivers, mountains and other natural obstacles now present a more serious hindrance to troop movement than they previously did. Overcoming these obstacles requires a high degree of engineer support measures by all troops, to include specialized support by engineer units. The basic goal of engineer support, then, is:

> ...to create conditions for more effective application of the means of attack, unhindered movement of friendly troops in the vicinity of the enemy and the effecting by them of maneuver on the battlefield; and also for their defense from the destructive means of the enemy....The basic goals of engineer support to combined arms combat include: the creation of favorable conditions for the deployment of subunits and their swift transfer to the offensive; the effecting of maneuver and successful forcing of water obstacles at high speed; and, with regard to modern weapons, increasing the stability and viability of subunits in the defense.[2]

Engineer tasks common to all forms of combat operations include: reconnaissance of the enemy and the terrain, in close coordination with combat reconnaissance; preparation and maintenance of routes of movement and maneuver; surmounting of natural and man-made obstacles and barriers; demolitions work and the construction of obstacles; fortification and camouflage of positions, areas, command posts and rear facilities; exploration for sources of water, and its supply and purification; measures to camouflage troop movements and operations; and engineer actions to eliminate the after-effects of nuclear attack.[3]

As stated above, engineer measures are not the function solely of engineer units. "With the sharp increase in the

scale and scope of engineer measures, the role of the basic troop arms in the accomplishment of many tasks of engineer support has increased."[4] In order to avoid excessive reliance on specialized engineer machines, which may not be available in the required numbers in certain circumstances, tanks and other tracked vehicles can be fitted with a number of special "strap-on" items (dozer blades, mine-clearing plows, etc.). Further, in addition to personnel trained in the use of strap-on gear, each subunit should also contain several personnel competent to perform certain other engineer tasks, such as mine and countermine warfare, the use of demolitions materials, and so forth. This not only lessens reliance on engineer troop units, but also insures that subunits will have a certain level of organic "engineer" support on hand to fulfill the necessary tasks and reduce the time required to accomplish engineer support in general.

Engineer units are organic in the Soviet ground forces units down to and including maneuver regiments. This provides these units the opportunity independently to resolve the basic tasks of engineer support. When necessity requires, at the option of the senior commander, additional engineer units may be attached for general support or to accomplish specific tasks. General principles of employment, or guidelines for the use of organic and attached engineers, may be enumerated as follows:[5]

1. Concentrate engineer efforts on the main or critical area.

2. Use assets properly. Proper use refers not so much to the application of the capabilities of a given machine, but to the centralized application of units in accordance with tactical requirements.

3. Consider the inherent engineer capabilities of all organizations. When combat troops are detailed to perform engineer tasks, organic or attached units may also be integrated.

4. Attached engineers are most often used with organic engineers, except when the senior commander specifies the mission (intent or use) and the period of attachment. In such a case, he must also stipulate the details of the task, provide covering forces and support, and the timely return of the unit to his control. When the attachment is not thus limited, the

supported commander must clarify the details of the mission, provide security, etc.

5. As a rule, organic engineer units are used only for tasks in support of the unit of which they are a part. Attached engineer units may not be diverted to other tasks; they must work only on assigned missions of engineer support of combat operations.

6. Removal of even one man from the normal crew of an engineer machine substantially degrades the effectiveness of the machine and subunit performance. The optimum working day for a man (10 hours) and a machine (15 hours) may be extended in extreme circumstances to demand more from the men and to stress machines to their technical limits, at the option of the combined arms commander.

7. Centralized control is preferred during the preparation of an offensive, during construction of fortifications and minefields, during river crossing operations, and in other rapidly arising situations. Decentralized control, however, is preferred at the start of the offensive, or on going over to the defense.

8. Bridge or crossing sites and passages through minefields, etc., are usually maintained and serviced by the unit which emplaced the bridge (established the crossing) or cleared the passage.

9. Always maintain an engineer reserve to meet new requirements or replace losses.

In any given tactical situation, with the possible exception of a lesser degree of emphasis during the preparation of the defense, the bulk of engineer planning and control authority rests with the chief of engineer services (nachal'nik inzhenernoi sluzhby, or NIS) located as a member of the commander's special staff at all levels down to maneuver regiment. "The regimental chief of engineer services both in peace and in time of war is responsible for organization of engineer support of the regiment; preparation (training) of regimental personnel in engineer matters; support of the regiment with engineer equipment, to include maintenance in working order of that equipment; and combat and mobilization readiness of the engineer-sapper subunits

of the regiment."[6] It must be assumed that chiefs of engineer services at higher levels perform essentially the same broad duties.

As noted above, the NIS is a "chief of service", a position which finds its closest U.S. equivalent in the commander's special staff. The NIS is the direct chief (staff supervisor) of all organic and attached engineer subunits, and as such, his directives and the decision of the commander comprise the basis for organization of engineer support. In the organization and planning of engineer tasks, the NIS assures that:

a) the plan complies with the commander's concept of the operation and his decision, in accordance with the concrete realities of the tactical situation.

b) engineer tasks are executed in a timely fashion.

c) actions by engineer units are conducted with due concern for security, so as not to inadvertently divulge the nature of the plan to the enemy.

d) engineer tasks are clearly defined so as to concentrate efforts in the direction of the main effort or on critical defense sectors.

e) in accordance with the developing tactical situation, and in close coordination with combat forces, engineer units maneuver correctly in response to requirements.

f) camouflage and deception measures are applied by all units.[7]

The NIS, usually a major at regiment level, participates directly in the work of the staff, coordinating his actions with those of the other chiefs of services, but primarily cooperating with the chief of staff and the assistant chief of staff for operations (pomoshchnik nachal'nika shtaba-1, or PNSh-1). He contributes to the reconnaissance plan, the combat order, the river-crossing graphic and the plan of CBR defense; he works out the details of the plan of engineer support, the combat disposition of engineer subunits, and the disposition of combat units assigned to engineer tasks.[8] Although the NIS's organization of engineer support of the unit is quite

logically based on his commander's decision, he is also responsive to the directives of the NIS at the next higher level, so that there is a direct technical connecting line between engineer staff officers at all levels.

The general sequence of staff-planning procedures followed by the NIS may be briefly summarized: on receipt of the commander's warning order, or if possible his concept of the operation, the NIS quickly clarifies the mission, and conducts an estimate of the situation from an engineer's point of view. He considers initial reconnaissance-intelligence data available (map studies, military-geographic studies, long-range reconnaissance information) and issues an alert to the engineer subunit commanders in order to allow them the maximum possible preparation time. He next works out his proposals and recommendations for the plan of engineer support of the operation, to include: the sequence and timing of engineer tasks; forces detailed to engineer tasks and reinforcement of engineer subunits; location, disposition and maneuver of engineer subunits; and mutually supporting operations with units and subunits of other arms and services. The NIS then presents to the commander his analysis of the terrain and the situation in an engineer sense, pointing out areas of difficulty or threat, and indicating how his plan recommends dealing with the anticipated problems. The commander may require the NIS or his engineer subunit commander to report on other matters of interest, such as the capabilities of assigned or attached engineer subunits, along with additional recommendations as to their employment. When the plan is accepted and affirmed by the commander, it is signed by the NIS and counter-signed by the chief of staff to become a part of the combat order for the operation. Specifics of tasks assigned to engineer subunits are refined as preparations move forward. Both the NIS and the engineer subunit commander(s) closely monitor the fulfillment of the assigned mission and prepare to shift or reassign assets to address problem areas or meet newly-arisen tasks during the course of the operation.[9]

CHAPTER II

ENGINEER UNITS, EQUIPMENT AND ORGANIZATION

Types of engineer units in the Soviet ground forces, based on a 1972 source,[1] include reconnaissance, sapper, road, position (field-fortification), bridge construction, camouflage, crossing-assault, ponton, and special subunits for obstacles, countermine warfare, water supply and other functions. Note that the "technical" unit designation, as in the technical battalion of the engineer regiment in 1941, is no longer present in the list. A review of Soviet military journals from 1974 to February, 1978, indicates that all these types of unit designations continue to be in use, with two exceptions: camouflage and water supply are discussed as subject areas and continue to be of concern to engineer authors, but none of them note the existence of specific engineer units charged with carrying out these functions.

Before attempting to deal with organization and equipment levels of engineers supporting Soviet divisions and higher echelons, it is necessary to discuss briefly selected items of equipment available, including older or obsolescent items which have been or are being replaced, since they may still be observed from time to time and would most certainly play some role in the ground forces or civil defense structure in the event of a major mobilization of the Soviet Army. Data published recently in open-source Soviet publications differ only in minor detail from those presented in the Identification Guide (USAREUR PAM 30-60-1)[2] which is therefore used as the basic reference (except as noted) for the summary technical data presented here.

EQUIPMENT

1. Mine detection and clearing. The basic manual reconnaissance and mine clearing kit KR (komplekt razvedki i razminirovaniia) 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.[3] Hand-held portable mine detectors include the World War II-period VIM series, the post-war UMIV/UMIN type, and the transistorized IMP.[4] 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 (dorozhnyi induktsionnyi minoiskatel') 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 ten 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 sweepers PT-54 and PT-55 have now been largely supplanted by the route mine clearers (koleinyi minnyi tral, KMT) 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 eighty centimeters, while each section of the KMT-4 plows approximately 60 centimeters.

Explosive mine clearance means include the bangalore-torpedo type elongated charge UZ (udlinennyi zariad), which may be conformed as single, paired or triple (triangular) charges, and rocket-delivered line charges. Minefields can also be cleared by using the charge emplacing devices (sredstvo podachi zariadov) SPZ-2, SPZ-4 and ITB-2.[5] 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, comprising 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 (APC) are not discussed in Soviet journals and their characteristics are uncertain.

2. Minelaying equipment. 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 PMR-2 (pritsepnyi mino-raskladchik --

towed minelayer) may be used by any APC or cargo truck for surface emplacement of antitank mines. With the PMR-3 or PMZ-4 (pritsepnyi mino-zagraditel' -- towed minelayer) a 4- or 5-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 twenty minutes. The GMZ tracked mineiayer (gusenichnyi mino-zagraditel') with a 4-man crew can surface-lay or bury antitank mines (transport capacity variously estimated at 150-200 mines). Minelaying devices may also be fitted to helicopters. Recent articles in the Soviet press (1976) have also discussed locally-developed non-standard mechanical devices for assisting in the emplacement of antipersonnel mines,[6] and the use of floating or bottom-emplaced anti-assault mines for riverline or shoreline mining.[7]

3. Fortification construction, road-laying and obstacle clearance. The basic manual entrenching or fortification construction means is the infantryman's entrenching tool. Additional manual equipment is contained in the pioneer kit, which 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 (bystrokhodnaia transheinaia mashina - 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 (polkovaia zemleroinaia mashina - 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;[8] the MDK-2 rotary excavator (expansion probably mashina dorozhnaia kopatel'naia, or kotlovannaia - road digging, or excavating machine) 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 (universal'nyi odnokovshovyi ekskavator - universal single-bucket excavator) which can trench or excavate to 4.1 meters deep at a rate of 50-60 cubic meters per hour. A wide range of types of prefabricated field fortification components is available, including corrugated steel and concrete shelter covers and reinforced straight or curvilinear cardboard sandbags.[9] 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 mock-ups and dummy equipments.[10]

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 80-100 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 require little of this type of support.

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/BTU-55 (bul'dozer tankovyi universal'nyi - multipurpose 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'nyi - universal tank snowplow). OL-T, OS-T and OT-T[11] 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.

The most recent addition to the available types of road construction and obstacle clearing equipment for tactical units is the IMR (inzhenernaia mashina razgrazhdeniia), or 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", much like the so-called "cherry-picker", 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.[12]

4. Bridging, river-crossing and accessory equipment.

a. Short Gap Bridges. In preparation for traversing very broken terrain, tank and APC crews prepare fascines,

corduroy road sections, road covers of boards, logs or pickets; and in the case of the motorized infantry, small "trench bridges" of logs or boards up to 2.5 meters long.[13] For wet or dry short gaps beyond the capabilities of those simple expedients, vehicle-mounted bridges are used. The obsolescent KMM (koleino-mekhanizirovannyi most - truck-mounted treadway bridge) comes in sets of five 7-meter long 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, maximum width of span per set 34 meters, and it requires a crew of 10 men.[14] The KMM has been largely replaced in Soviet forces by the TMM (tiazhelyi mekhanizirovannyi most - 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, tank-launched bridges (tankovyi (?) mostoukladchik - MTU) 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-launch tank 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 to continue their support of advancing subunits, prefabricated bridge elements may be employed. One such wood and metal bridge uses telescopic trestle bents with 6-beam wooden treadways, each span four meters long with a 35-ton capacity. Larger capacity (60-ton) spans of the so-called "low-water bridge of prepared wooden elements", designated "USM" (mostostroitel'naia ustanovka - bridge construction set or package),[15] may be constructed on existing or specially-driven piers. The bridge construction equipment set KMS (komplekt mostostroitel'nikh sredstv) 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.[16] Average construction speed on pile piers is 15-20 meters per hour, and 20-25 meters per hour on trestle piers.[17] Bridge elements may be prepared from locally-available materials using pioneer kit saws, chain saws and the trailer-mounted LRV (lesopil'naia rama vysokoproiz-voditel'naia - high-capacity gangsaw) or RP-75 (rama-pila - lumber sawframe).[18]

b. Ponton bridges. Float bridge support for air-borne units is provided by the air-droppable, helicopter-transportable PVD-20 (perepravochnyi park vozdushnodesant-nykh voisk - 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.

Bridging for motorized rifle and tank units is provided by TPP (tiazhelyi pontonno-mostovoi park - heavy ponton bridge set) or PMP (pontonno-mostovoi park - ponton bridge set) bridges. 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 comprises 48 bow sections, 48 center sections, 12 power-boats and auxiliary equipment (flotation drum sets, etc.). The set may be configured as varying capacity rafts, or as bridges with up to 70-ton capacity. The 265-meter 50-ton bridge can be constructed in current velocities up to three meters per second in 3 and 1/2 hours, using powerboats in lieu of cable-anchoring systems. TPP has been almost entirely superseded by the PMP ribbon bridge. The basic PMP ponton link comprises four hinged, automatically deploying, accordion-folded ponton sections with integral roadways, transported on a KrAZ 214/255 7-ton truck. The full 36-link set (32 river links and four shore links) may be configured as 40-170 ton rafts, or 20- 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, 6 boats, and auxiliary equipment (such as roadway matting). This gives the division the capability to construct 118 meters of 60-ton bridge, 225 meters of 20-ton bridge, or rafts as follows: two 170 ton, three 110 ton, four 80 ton or five

or six 60 ton. 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 rates have been observed.

Powerboats of the BMK series (buksirno-motornyi kater - motor tugboat) 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 ("T" standing for tolkach - pusher tug) is transported on a modified KrAZ 214/255 ponton carrier truck, launched and recovered in the same manner as the PMP pontons it supports.

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.[19] The Soviet military newspaper Krasnaia Zvezda (Red Star) recently disclosed the existence of an underwater ponton bridge,[20] which appears to have a carrying capacity of less than 20 tons. Allocation of the bridge is not known.

c. Amphibious assault vehicles. Recent developments in Soviet amphibious equipment have extended beyond light amphibious tanks and APCs to include the new self-propelled 122mm artillery, and 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 forces' 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 (malyi plavaiushchii avtomobil' - small amphibious truck) is an amphibious jeep-type vehicle, primarily used for command or reconnaissance, with a 5-man or 500 kilogram payload. The ZIL-485 BAV (bol'shoi plavaiushchii avtomobil' - large amphibious truck), 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 (gusenichnyi plavaiushchii transporter, GPT, sometimes seen as a designation for the K-61), which is in turn being replaced by the PTS/PTS-M tracked amphibious transporter (plavaiushchii transporter srednii, medium amphibious transporter). The K-61 in the water 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 accomodate a 10-ton load (72 men, one or two guns, one prime mover) in the water at speeds up to 10-11 kilometers per hour for 11 hours of continuous operation. With its working pair, the PKP amphibious trailer,[21] 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 (gusenichnii samokhodnii parom, tracked self-propelled ferry), designed for the ferry transport of heavy tracked vehicle loads (to 50 tons) such as tanks comprises 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.

5. Other equipment. 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 (periskop inzhenernoi razvedki), sapper distance measurer DSP-30 (sapernyi dal'nomer), the long focal length periscopic camera PDF (periskopicheskii dlinnofokusnyi fotoapparat), 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 MAFS/MAFS-2 (avtomobil'naia fil'troval'naia stantsiia) and other mobile purification sets with

capacities up to 1800 liters per hour.

Generators are employed for power supply to lighting sets, gangsaws, jackhammers or augers used to drill tamp-holes for demolitions work, and other purposes. Designations "ESB" or "ESD" indicate "electrical station" (elektro-stantsiia) 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-IG (elektro-stantsiia benzinovaia inzhenernaia gruntorazrabatyvaiushchaia) 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 (avtomobil'naia podvizhnaia remontnaia inzhenernaia masterskaia), PARM-1 (podvizhnaia avtoremontnaia masterskaia) and TRM-A or -B (tankoremontnye masterskie) mobile repair shop vans.

ORGANIZATION

The organizational data presented at Tables 1-8 represent the analytical findings and, in some cases, the opinions of the author. They are not official Department of Defense (DOD) or Department of the Army (DA) holdings. They are, however, composites based to one degree or another on the following publications, including DOD/DA sources: Handbook on Soviet Ground Forces, FM 30-40, (1975); USAICS Handbook on the Soviet Ground Forces, (August, 1976); Wiener, The Armies of the Warsaw Pact Nations, (1976); DIA, Soviet and Warsaw Pact River Crossing: Doctrine and Capabilities, (1977); and, of course, open-source Soviet, East German and Polish military publications. The tables are presented in order to add detailed data from Soviet sources and to clarify some of the data already presented. Probably no Soviet engineer company or battalion conforms precisely to these organizational and equipment figures. Regional and other variations in manning or equipment fill may create fairly wide deviations from these rough guides. They may, nevertheless, serve for a generalized analysis

of the type and degree of combat engineer support at division and maneuver regiment level. Engineer support (except river crossing support: see Table 8) above division level is less easily addressed due to an almost complete lack of Soviet sources, as is also the case with engineer support to airborne divisions. For this reason, they are not included.[22]

Within the maneuver elements of a regiment, BTU tank dozers are available on the basis of one per tank battalion, and KMT-4 mine clearing plows on the basis of one per tank platoon (nine per battalion).[23] Both KMT-4 and BTU are normally transported on KrAZ (7-ton) or URAL (5-ton) trucks. The engineer company of the maneuver regiment has nine or more additional KMT-4 sets, and KMT-5 roller plow sets probably on the basis of one per tank battalion in the regiment. The company also has road construction, position preparation, mine and countermine warfare, reconnaissance, and short gap bridging capabilities -- in short, some capability for every type of engineer support available in the division except float bridging and amphibious transport.

The division-level engineer battalion has five specialized engineer companies.[24] In accordance with Soviet sources, the technical company designation has been omitted in favor of the engineer-road company. The internal organization of the company is somewhat speculative, being functionally based, especially with regard to the position (field fortification) platoon and the MTU bridge element. Equipment levels, however, are reasonably reliable. Equipment levels for the ponton bridge company and the assault crossing company are more certain than those for any of the other companies; but, again, internal organization is postulated with some still unresolved questions. The six boats in the ponton bridge company under optimum conditions operate as an entity, but since their use is ultimately linked to that of the ponton platoons they may be integrated into them, rather than comprising a separate platoon. In the assault crossing company, tracked amphibious transporters are organized into squads of two vehicles, which seems to support a two-platoon organization. In a K-61 equipped platoon, this means a capability to transport six guns of the standard towed artillery battery, or the three guns with prime movers of a firing platoon. The situation in a PTS-PKP equipped unit may be somewhat different: since three PTS-PKP can transport a full firing

platoon with prime movers, the transporter squad structure may be altered to three vehicles,[25] resulting either in two platoons of two squads each or one 4-squad transporter platoon. The capability remains the same in either case: simultaneous lift of two batteries of guns, one battery with prime movers, or up to two batteries with prime movers if the transporter company is fully equipped with PTS-PKP. Accepting the notion that engineer subunit organization ought to be compatible with the organization of the supported unit, the GSP ferry platoon(s), especially in motorized rifle divisions, may now have four ferries instead of three. There is, as yet, no indication of this change in Soviet sources.

With the exception of ponton bridge and assault crossing units whose specialized application of equipment limits their use in other engineer support roles, engineer unit tactical employment does not always follow strict organizational lines. Tactical employment of sapper, engineer-reconnaissance, road and road-bridge subunits generally involves the formation of one or more of the following functional groupings:

--mobile obstacle detachment, POZ (podvizhnoi otriad zagrazhdenii).

--movement support detachment, OOD (otriad obespecheniia dvizheniia).

--engineer reconnaissance patrol, IRD (inzhenernoe razvedyvatel'nyi dozor).

--reconnaissance/obstacle clearing detachment, OR (otriad razvedki i razgrazhdeniia).

These groupings will be discussed in detail in the following sections on engineer support to the defense, the offense, march support and the meeting engagement, and river crossing operations.

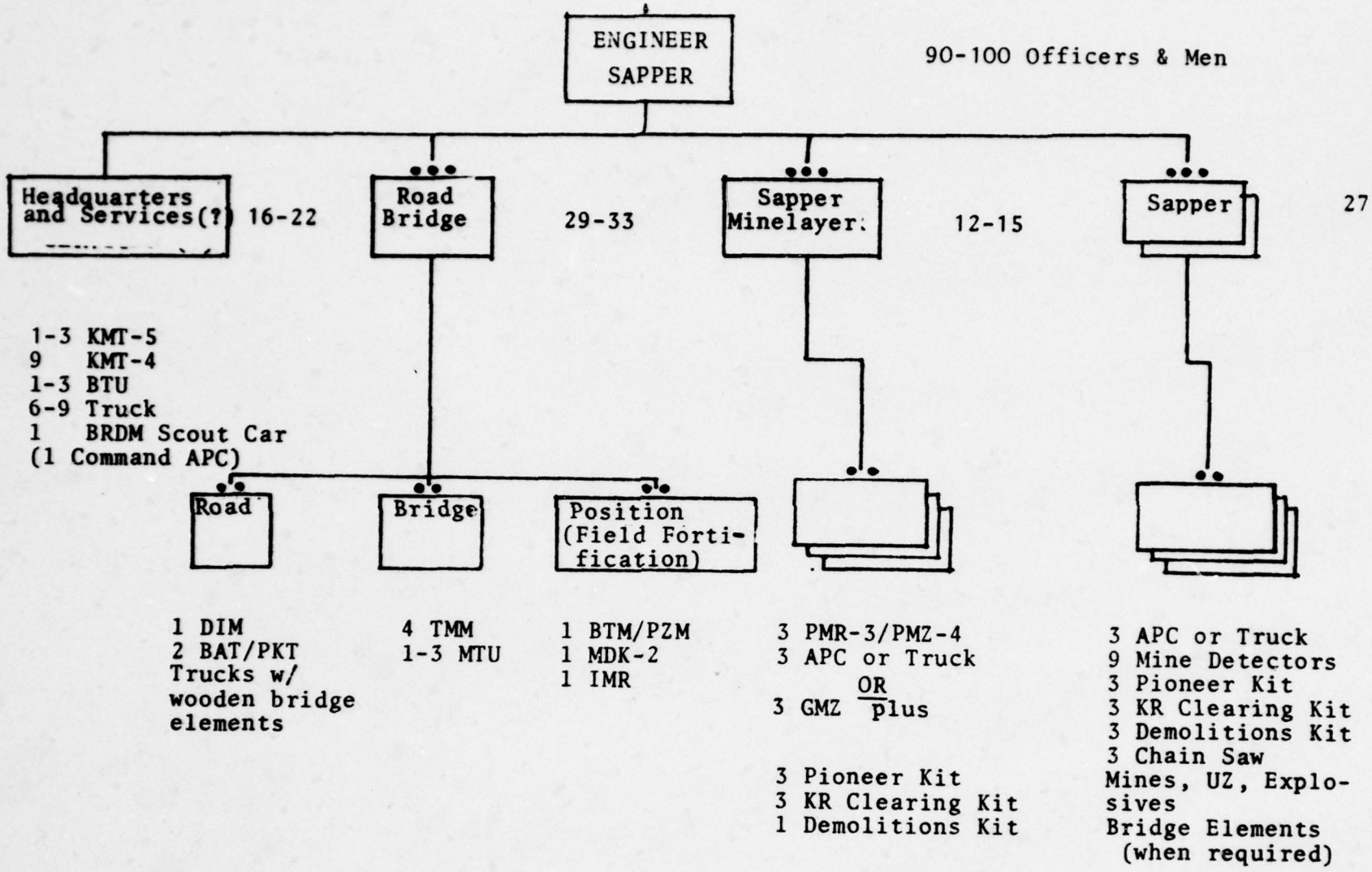
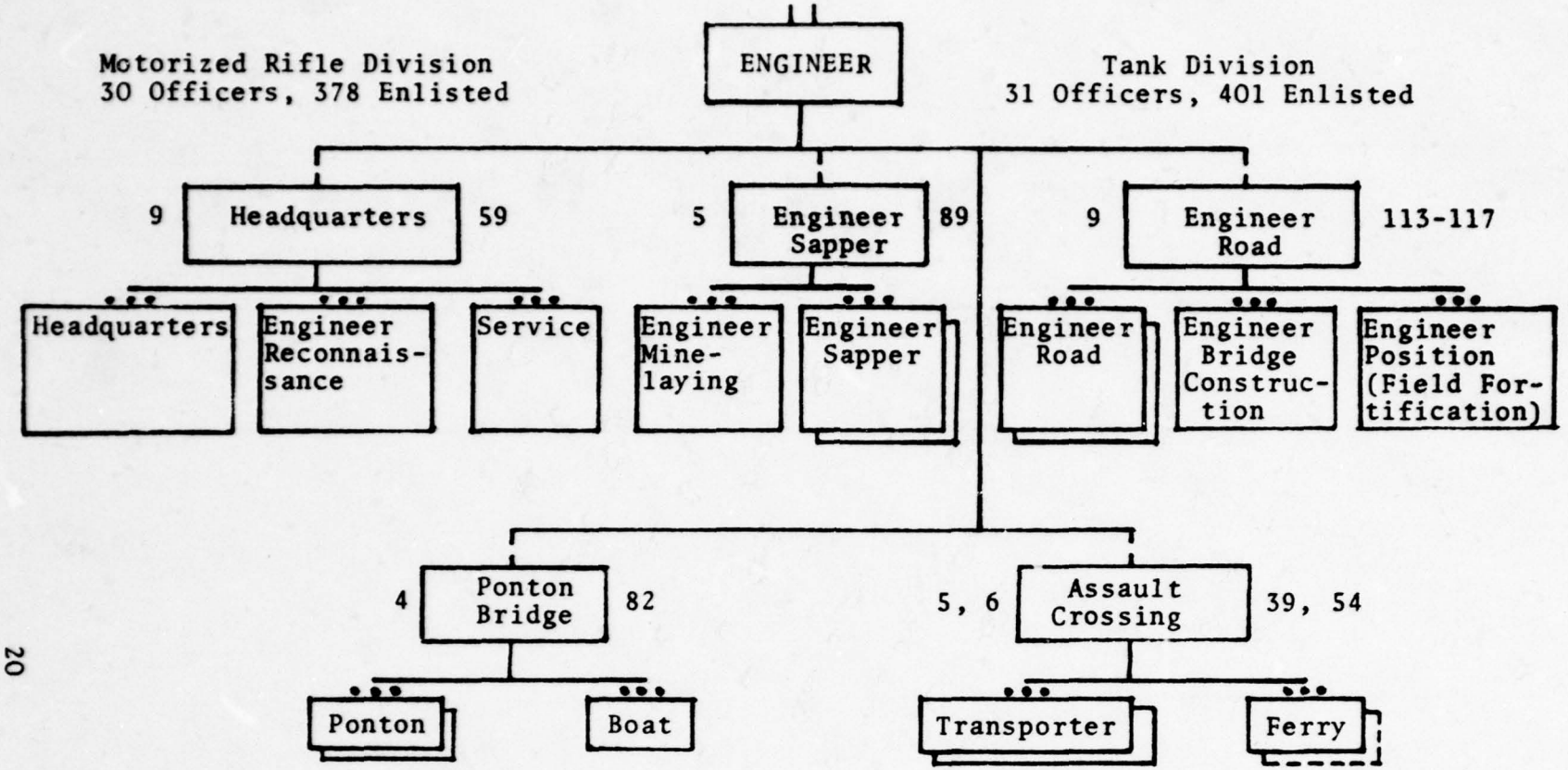


TABLE 1: Engineer Sapper Company, Motorized Rifle or Tank Regiment



NOTE: Only Subordinate Platoons Depicted.

TABLE 2: Engineer Battalion, Motorized Rifle or Tank Division

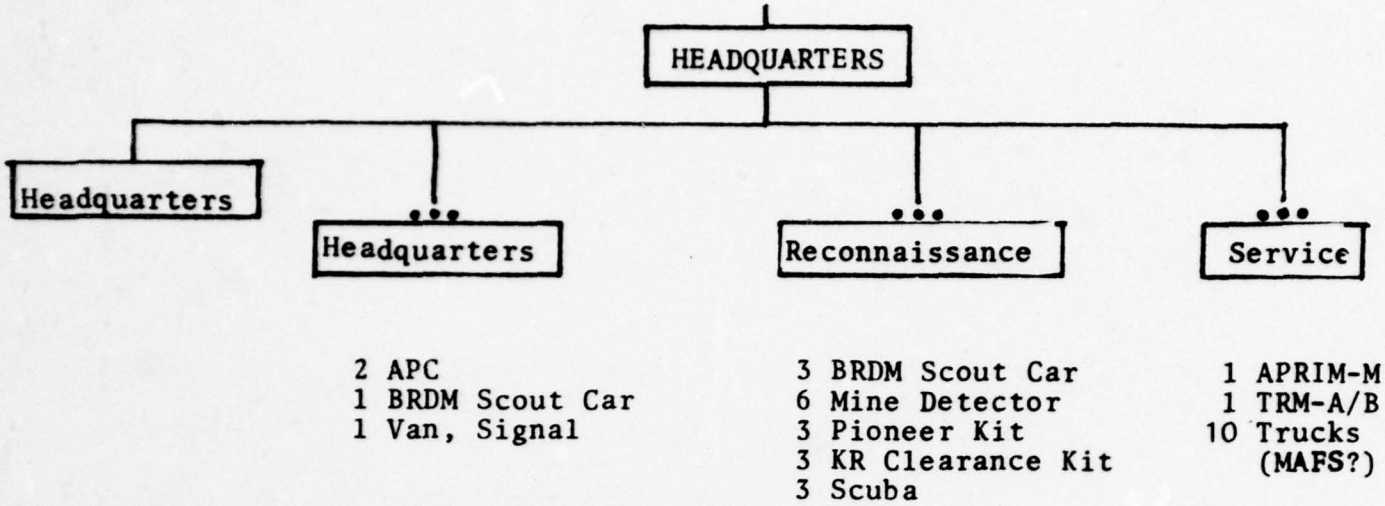
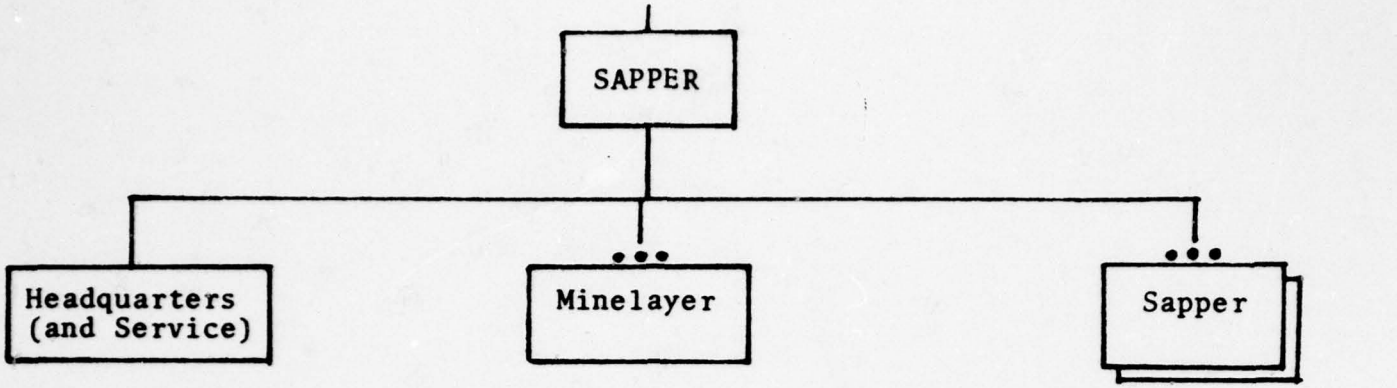


TABLE 3: Headquarters (and Service?) Company, Engineer Battalion

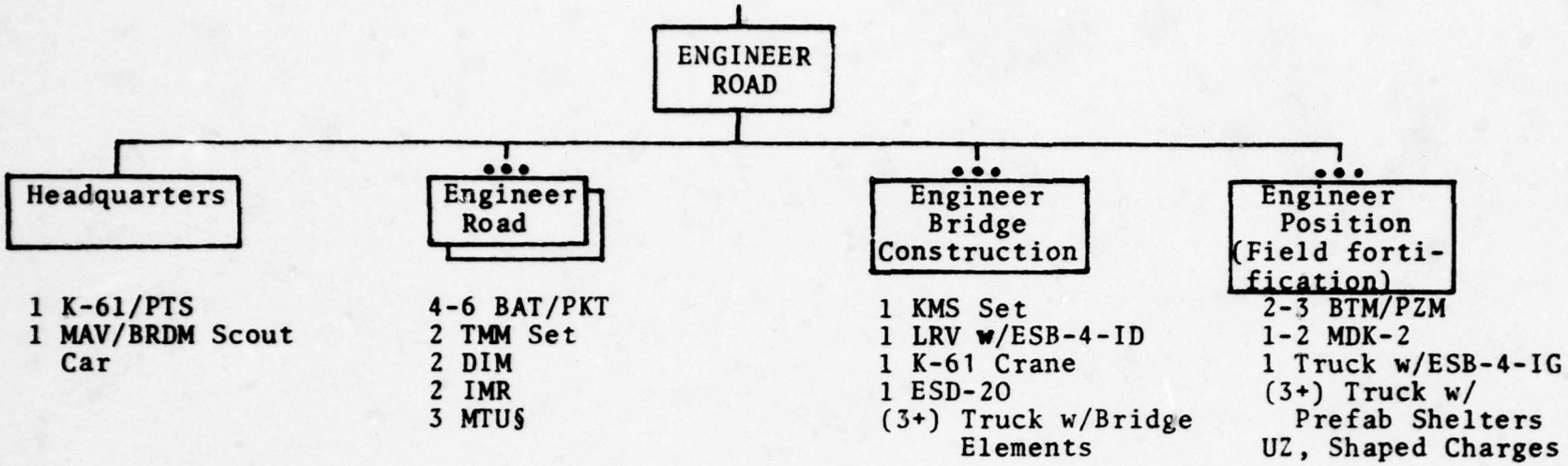


1-3 Trucks (KMT-5)
1 Truck (KMT-4,9)
1-3 Trucks (BTU)
3 Trucks, Cargo

3 PMR-3/PMZ-4
3 APC/Truck
or
3 GMZ plus
3 Pioneer Kit
3 KR Clearance Kit
1 Demolitions Kit

6 APC/Truck
6 Mine Detectors
6 Pioneer Kit
6 KR Clearance Kit
6 Chain Saw
2 Demolitions Kit
Mines, UZ
(when required, bridge elements)

TABLE 4: Engineer Sapper Company, Engineer Battalion



§ Allocation of the 3 MTU between the 2 platoons is not known.

TABLE 5: Engineer Road Company, Engineer Battalion

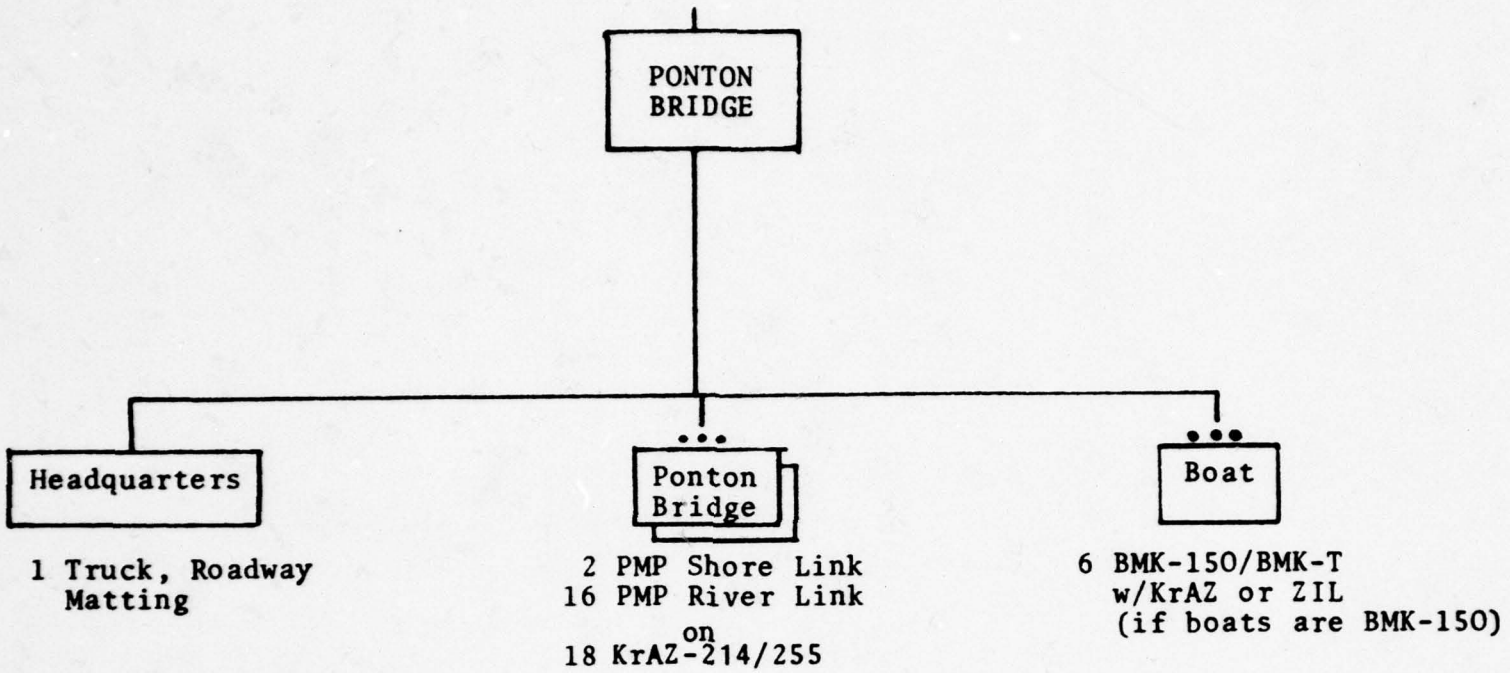


TABLE 6: Ponton Bridge Company, Engineer Battalion

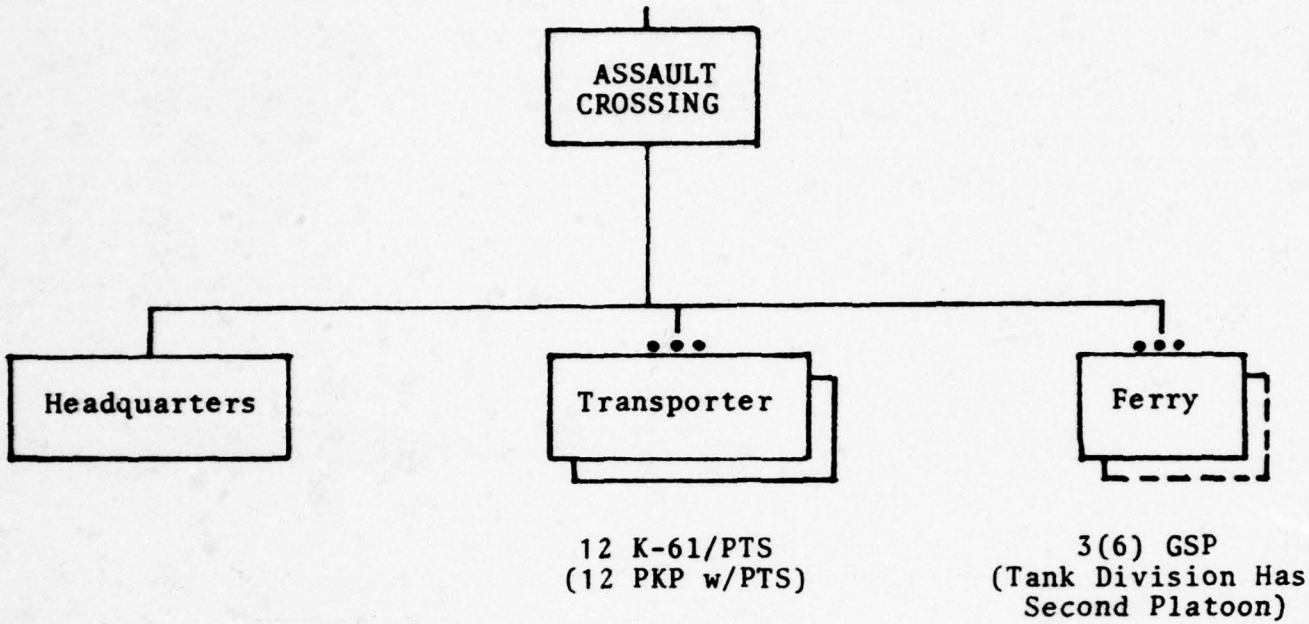


TABLE 7: Assault Crossing Company, Engineer Battalion

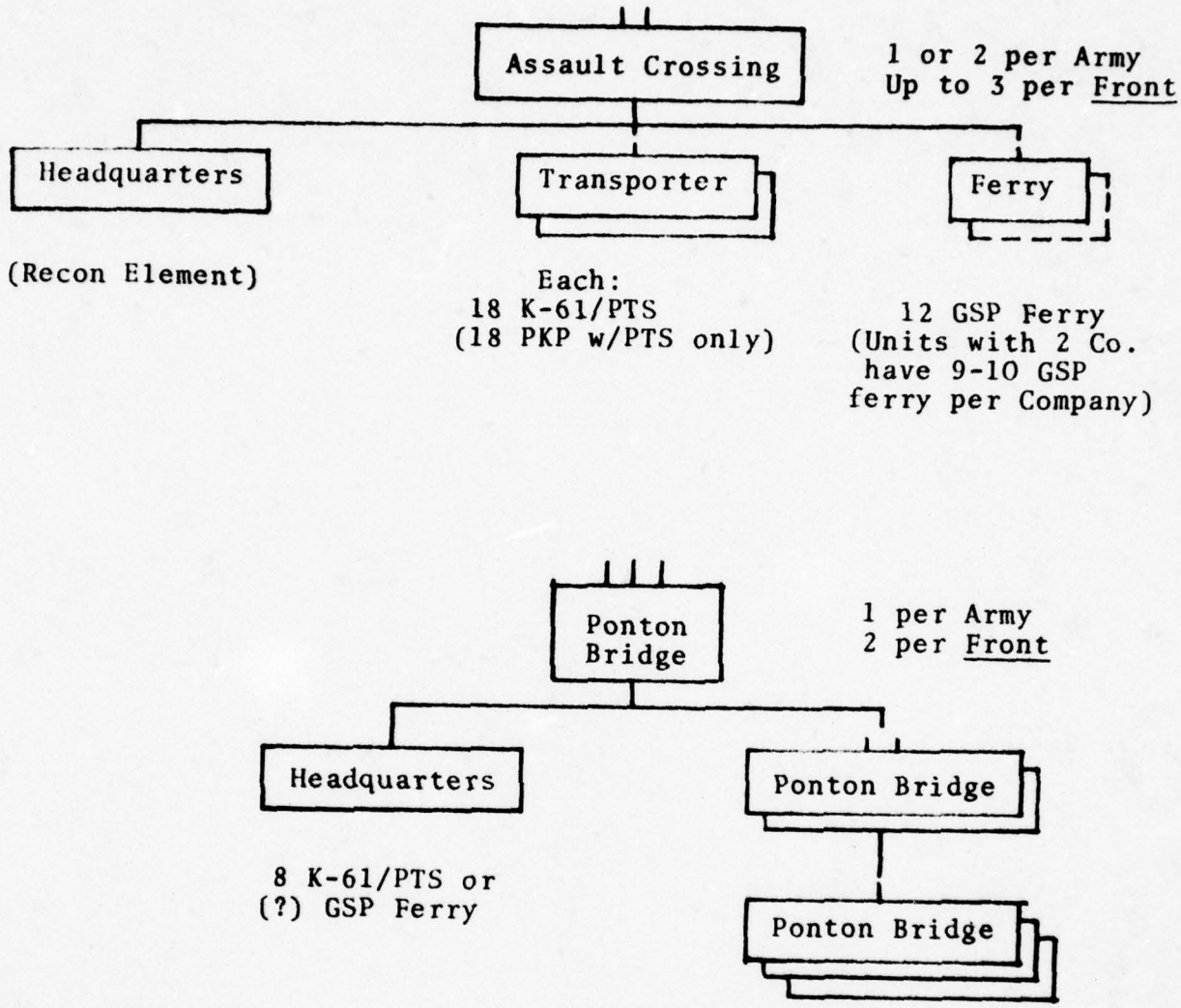


TABLE 8: Non-Divisional River Crossing Support Units

CHAPTER III

ENGINEER SUPPORT TO THE DEFENSE

Soviet Army subunits go over to the defense only on authority of the next senior combined arms commander. Based on the commander's decision as to the nature of the defense, engineer support measures are employed to increase the stability and tenacity of defensive operations. Generally, the system and nature of fortifications must provide constant preparedness to repulse attack, including effective use of weapons and reliable protection against the enemy's mass destruction weapons. Antitank and antipersonnel obstacles must be tied in with natural obstacles and fire support in such a way that maneuver of friendly forces is not hindered. Existing and prepared road nets must provide adequate maneuver and uninterrupted rear support movement. And finally, camouflage must be both timely and plausible, in order to deceive the enemy as to the nature of the defense.[1]

Engineer preparation of the defense is the responsibility of all troops. In first echelon units it is preferably done at night or under other conditions of reduced visibility, since it must be accomplished by hand, and possibly under fire. Mechanized digging capability can be used successfully for trenches, revetments and shelters only in those areas not subject to small arms and machine gun fire or direct enemy observation; i.e., in positions, strongpoints and areas in the second echelon and the depth of the defense.[2]

The combined arms commander is the main organizer of the defense.[3] His personal command reconnaissance is critically important, for during it he makes final disposition of units, strong points, fire support systems, the obstacle and barrier system, and the type of engineer preparation desired. He considers the cover and concealment (camouflage) potential of the terrain, and devotes special attention to determining those areas where he can employ earth-moving machines and prefabricated fortification constructions.

Engineer troops assist in reconnaissance and preparation of the defense by determining the protective and camouflage features of the terrain and aiding in selecting positions, command posts and strongpoints. They study natural obstacles to see how they can be used best and improved. The condition

of roads and bridges in the defensive area, availability of local materials for construction of positions, and the status of water supply are also determined. Through observation and active patrolling, they seek to unmask enemy offensive preparations -- lanes through minefields or increased mining in selected sectors, additional bunkering to shelter troop concentrations, improved roads and lateral communications routes, etc. Engineer observation posts (OP) usually comprise two or three sappers with periscope and distance measurer, and possibly photographic equipment, established roughly two to three kilometers apart along the front. Night reconnaissance is by listening posts. During the conduct of the defense, engineer troops attempt to determine the enemy's tank attack axis, and they monitor the condition of roads, barriers, bridges and water supply by direct examination, while assisting in monitoring radiation and contamination levels.

Fortifications, shelters and vehicle revetments are constructed by all troops, including engineers. Barrier systems, coordinated with the fire support system and always covered by fire, are normally constructed by engineer troops, with first priority given to antitank obstacles. Additional maneuver routes are prepared by engineers, to include full mine clearance within the defensive area, if required. During the defense, engineer subunits are charged with maneuver of engineer obstacles to blunt penetrations by the enemy, repair of existing roads and further preparation of new maneuver routes, and the elimination of the after-effects of nuclear strikes.

As an example during the preparation of the defensive area of a motorized rifle battalion, basic trenches and company strongpoints in the first echelon may be completed by hand and by explosive methods in two to three hours. Within ten hours, basic revetments for tanks, APC's, command-OP's, antitank guided missiles (ATGM) and mortars will be in place. By the second or third day, using machine methods in the battalion's second echelon (if the defense is structured that way),covered shelters and bunkers or deep shelters, communications trenches and alternate ATGM and mortar positions will be prepared.[4] Basic, temporary and alternate artillery firing positions, ammunition bunkers, personnel shelters and prime mover revetments are prepared by the gun crews. With the aid of a strap-on dozer, two to three days are required to complete all preparations. Barrier systems may be emplaced by other than engineer troops and for this

purpose it is recommended that all subunits include a contingent of personnel trained in mine warfare. Obstacles are placed on approaches into the position, in front of artillery and air defense firing points, in the intervals between strongpoints and on flanks. Antipersonnel minefields are placed only forward of the forward edge of the battlefield to cover antitank fields, or between defensive areas. Existing roads are cleared, improved and marked first; then they are supplemented by cross-country routes and dirt roads cut by engineers. Frontal and lateral maneuver routes and supply-evacuation routes are prepared, usually by engineer assets of the senior combined arms commander. Dummy equipment and facilities are emplaced only on approval of the senior commander. Effectiveness of all camouflage measures is periodically spot-checked by aerial observation. Water supplies, once established by engineers, are usually operated and monitored by a motorized rifle squad.[5]

The Soviets contend that "a tank, situated in a revetment, is significantly more powerful than an attacking enemy tank and is superior to it in range of direct fire, hit probability, camouflage and defense."[6] Therefore, among the peculiar features of engineer defensive preparation of tank subunits, particular attention is given to use of the masking and protective aspects of terrain, and the preparation of revetments with cleared fields of observation and fire. Tank strongpoints are prepared with basic and alternate positions (200 meters apart) for all-round defense. The basic revetments go in first, then alternates and ammunition storage; then, if time allows, personnel shelters are constructed. Equipped with three BTU tank dozers, a tank battalion with attached motorized rifle elements can dig all basic tank revetments in six hours, all positions (62 tank revetments) and APC revetments in one and one-half days. Three days are required to fully bunker and shelter all vehicles and personnel. Approach/counterattack routes for reserve tank units are selected with careful attention to the use of natural obstacles.[7]

It is considered that camouflage measures are equally appropriate in the defense, the offense and on the march. It is in defensive situations, however, that camouflage is applied in the greatest detail. The basic intent of camouflage is to compel enemy reconnaissance to report incorrect data on troops and facilities, through the use of concealment, imitation/deception, and demonstration operations.

The guiding requirements of successful employment of camouflage are, 1) that it must be active, not merely passive; 2) it must be convincing in its realism; 3) it must be constantly and consistently applied through the whole area; and 4) it must be diverse. In organizing for camouflage, allowance must be made for proper use of the masking effect of terrain features, for the season and time of day, weather and other visibility factors. Troops should be dispersed and their dispersal areas frequently relocated, but not at the expense of either security or control. To insure maintenence of camouflage discipline, all troops should be aware of de-masking factors such as light, sound, motion, incorrect coloration or contrast, shape, skylining and trackage.[8]

CHAPTER IV

ENGINEER SUPPORT TO THE OFFENSE

Engineer reconnaissance in support of preparation for or the conduct of the offensive is directed toward determination of the location of the enemy's forward edge, approaches to his position from the rear, and the existence and location of further defensive positions. Reconnaissance is performed by photographic and aerial observation, ground operations, raids and deep reconnaissance. If the offense is to be initiated from a defensive position, one engineer OP is established every two kilometers of front, usually drawn from the units conducting the defense. Sapper scouts (up to a squad) are included in combined arms reconnaissance patrols and groups.

On receipt of the mission, the NIS begins his engineer estimate of the situation in accordance with the commander's concept of the operation and the directives of the senior NIS. He notes the required engineer support tasks, calculates the possible methods and deadlines for their accomplishment, and prepares those data necessary for the commander to take or refine his decision. First priority for engineer support in the offense goes to forward detachments (peredovye otriady), first echelon subunits, rocket or missile subunits, and tactical air assault (airmobile) units and shock assault detachments or groups, if used. The plan of engineer support is coordinated with the assistant chiefs of staff and chiefs of arms and services where applicable, signed by the NIS and Chief of Staff, and authenticated by the commander.[1]

When the offense is initiated from or through a defensive position, particular attention is devoted to the preparation of waiting areas, initial positions, and movement routes to these areas. Waiting areas (vyzhidatel'nye raiony) are assembly areas intended for the secure disposition of subunits prior to their commitment. The selection of waiting areas is accomplished during the commander's reconnaissance. Engineer reconnaissance subunits check the area for mines, the presence and extent of abatis or destroyed areas, trafficability of the ground, and the quantity and quality of water sources. A 25-50 meter wide strip adjacent to the roadway is cleared, using the mine detector vehicle DIM, if possible. A waiting area must be so situated that

it is secured by defending units in direct contact with the enemy, far enough to the rear to preclude ground observation of the area, but not so far as to complicate timely movement to the attack. It is usually positioned a little to one side of the intended area of attack.[2]

An initial area (iskhodnyi raion), or attack position, is a pre-offensive position occupied in direct contact with the enemy. Entry into and disposition of offensive troops within the area is accomplished in a stealthy manner. The area usually includes initial positions for motorized rifle units, waiting areas and routes of movement to attack areas for tank units, firing positions for artillery and air defense units, control posts, and lateral communications routes to permit regrouping of forces and the timely movement or commitment of second echelons or reserves. Engineer preparation of an initial area is accomplished by defending units under the guise of further development of the defensive position. A one-battalion defensive position may serve as the initial area for two battalions preparing for the offense.[3]

Route preparation before and during an offensive is based first on existing roads, which along with other basic routes become the responsibility of engineer-road subunits or movement support detachments (OOD) task-organized around engineer-road elements (OOD's will be discussed in detail in the chapter on engineer support of the march.) Designation of main routes is accomplished by the senior ground commander. Fifty to eighty kilometers of roads must be prepared for a motorized rifle battalion or tank battalion from its waiting area, through the line of departure, and up to passages prepared in the forward edge. To familiarize attacking troops with their routes of advance, they are made responsible for preparation of the routes (clearing, minor improvement, marking). If the unit is in contact with the enemy, the route preparation requirement is reduced generally to 30-50 kilometers per battalion, and it is considered expedient that engineer troops prepare the routes.[4]

The single most important engineer factor in insuring the success of the attack is the clearing of lanes through mine and other engineer obstacles and barriers and the construction of passages or crossings over natural obstacles.

The number of lanes cleared depends upon the attack formation. Usually one lane per platoon in the forward line is prepared. A tank platoon attacking with a motorized rifle platoon may use only one lane. If the obstacle is to be crossed in pre-battle (column) formation, there is only one lane per first echelon company. An attacking battalion, then, may use from two to eight lanes. Engineer preparation of lanes must be done stealthily so as not to disclose attack intentions to the enemy. Lanes must be straight and well-marked, with all mines rendered harmless, blown in place, or removed. Passages through friendly obstacles may be prepared as much as two days prior to the offensive, usually by hand, by the engineer unit(s) that emplaced the obstacle. Lanes through enemy minefields are generally prepared during the fire preparation, using demolitions emplaced the night prior or during the fire preparation. In either case, the charges are detonated only during the preparation, in order to conceal the fact that lanes are being prepared, and their location.[5] Recent journal articles have indicated a decided preference for either of two clearance methods: equipping virtually all tanks in the first echelon tank companies on the main axis with KMT-4 mine plows; or employing UZ elongated charges fitted with an SPZ-4 to a tank that also is equipped with a KMT-5 roller-plow. Once charges are in place across the full depth of the minefield or obstacle, engineer sappers move forward to detonate the charges, mark the lanes and act as lane guides and traffic control. This so-called "commandant's service" (kommandantskaia sluzhba - a function, or tactical employment, not a specific unit) usually comprises three or four sappers from the subunit which cleared the lane, and usually that subunit has no further requirement for immediate support to the offensive of the first echelon. These sappers, and motorized rifle subunits detailed to assist them, are not attached to the first echelon battalion, but respond to the battalion commander's directives concerning location, direction and ready times for the lanes in his sector. For mine clearing and passage of obstacles during the offense, a motorized rifle battalion generally requires one or two sapper platoons, up to nine sweepers and three dozers for attached tanks, one or more tank-launched bridges, 300-600 kilograms of explosives, and 150-300 UZ links with detonators and markers. Sappers and bridges attached for support during the offense are controlled directly by the battalion commander, and sweepers and dozers are allocated to the using tank subunits.

As the offensive breaks through the enemy position, advancing subunits will extend their attack deep into the

enemy's rear area or initiate a pursuit of the retreating enemy forces. These situations, or an uneven development of the offensive on a broad front give rise to the possibility not only of enemy counterattacks with reserve forces, but also flanking attacks against the advancing subunits. For defeating these counterattacks in the course of the offensive, the commander must have at his disposal a highly mobile, specially trained and equipped engineer-sapper subunit, a distinctive reserve which must not be diverted to other tasks -- the mobile obstacle detachment (POZ). The POZ has been the subject of no less than eight articles in Voennyi Vestnik (Military Herald), 1975-1977, in which there was a discussion of its role and proper manner of employment. It is normally formed by task-organizing the specially-equipped sapper minelayer platoon, but any sapper platoon may be designated to function as a POZ.

The POZ normally operates with the commander's antitank reserve, being co-located in assembly areas, moving together into action, and each complementing the other's positive features in employment. The POZ not only emplaces minefields on the most important directions (tank approaches, flanks), but also when possible destroys bridges, craters, roads and junctions, improves defiles and so forth, out to the limit of the effective fire of the antitank reserve. Obstacles created by the POZ must be covered by fire to attain maximum effectiveness. The POZ is also capable of independent employment, in which case it would cover the obstacles with its own individual and vehicle-mounted weapons.[7]

A sapper platoon with either three APC's with PMR/PMZ towed minelayers or three GMZ, and three cargo trucks for mine reloads, is capable of emplacing the platoon basic load (boekomplekt, more accurately, "unit of fire") of 600 antitank mines in twenty minutes. Reload time, depending on the condition in which the mines are transported on the cargo trucks, is 12-15 minutes. Therefore, the platoon can emplace up to 1200 antitank mines in less than an hour. Antipersonnel mines may be employed in the vicinity of cratered road obstacles, and demolition mines may be emplaced on the approaches to blown bridges, so the platoon carries up to 500 antipersonnel mines and 500-600 kilograms of explosives.[8]

The preferred method for emplacing mines is not in a continuous strip, but in shorter fields disposed both laterally and in depth along the threatened axis. Where enemy observation of the minelaying is likely, it is expedient to intersperse false minefields by merely plowing strips

without emplacing mines.[9] Minefields in front of a single battery of antitank guns or ATGM's could require up to 1500 mines, with a density of one mine per two meters of front and a theoretical 50% probability of hit. Recovery of mines by the emplacing platoon is a standard practice. Minefields which must be left are marked and immediately reported to the NIS by the POZ commander.[10]

If necessary, the POZ can be drawn from engineer reserves or from engineer subunits operating in a given attack direction. Sappers attached to motorized rifle subunits for obstacle clearance should also carry 30-50 antitank mines per APC/truck. The use of non-engineer personnel in the POZ is not recommended due to the problems of coordination and increased expenditure of time in completing the operation.[11] The POZ may find application not only in the offensive, but also in the defense for maneuver of obstacles onto enemy axes of advance, and in the meeting engagement (which is discussed in the next chapter).[12]

CHAPTER V

ENGINEER SUPPORT TO THE MARCH AND MEETING ENGAGEMENT

Engineer support of the march includes reconnaissance, preparation of routes of movement, insuring passage of difficult areas, maintenance of bridges and other crossings, preparing rest and assembly areas, and elimination of the after-effects of enemy nuclear strikes. Engineer subunits are tasked to function as movement support detachments (OOD), mobile obstacle detachments, and reconnaissance subunits. These are attached to forward detachments, first echelon subunits on separate routes of march, and march security elements when necessary. First priority for support in a movement to contact goes to forward detachments or advanced/march security detachments, then to the introduction of the main forces into battle.[1]

The NIS determines the possible march routes and evaluates them as to length, condition, throughput capacity, and requirement, availability and condition of crossings. He establishes the character of obstacles and poorly trafficable areas, probable areas of abatis, demolition obstacles and barriers, and possible detours of these areas and obstacles. Lastly, he assesses the water supply situation, and determines the possible uses of natural cover and concealment in halts, rest and assembly areas. Initial disposition of engineer subunits does not wait for the commander's affirmation of the engineer support plan, but is made as soon as possible by the NIS in the form of a warning order.[2]

Engineer reconnaissance on the march is conducted by engineer reconnaissance patrols (IRD's). An IRD may comprise sapper scouts included in the composition of various combat reconnaissance patrols or groups, engineer subunits sent out to accomplish specific tasks, and engineer officers in command of reconnaissance groups. When helicopters can be advantageously used, regular engineer patrols concentrate their efforts on difficult areas and objectives. One IRD is sent by the NIS to every intended march route, with size and composition dependent upon the situation. Normally, an engineer scout squad or sapper squad is sent to each route.[3]

In Soviet engineer terms a march route (marshrut) is a direction of movement on-road or cross-country which is defined on a map or on the terrain by orientation points

(terrain features, towns, markers, etc.). A road (doroga) is a specific engineer construction built on the terrain for the passage of wheeled and tracked vehicles, with specified technical features (cross-section, crown, drainage, etc.). A column route (kolonnyi put') is that section of a march route which is laid out cross-country and intended for the temporary passage of troop columns, usually with separate tracked and wheeled vehicle routes. For each route, an engineer road platoon up to an engineer road company is used, sometimes reinforced, and usually operating on several sections of the route at once. In summer weather, on average terrain, and with no enemy interdiction, up to 100 kilometers of road per day can be prepared. This figure drops to as little as 20 kilometers per day with enemy interdiction, in which case existing or prepared roads may be abandoned in favor of parallel routes. Up to 70 kilometers per day of column route can be laid, using prepared bridge elements where required. Seasonal variations and construction at night reduce the rate of construction by 15-30 per cent; if the column route is only for tracked vehicles, the rate is increased up to double.[4]

The movement support detachment (OOD) is a highly mobile, specially-equipped detachment based on an engineer road subunit, capable of rapidly making passages through barriers and across obstacles, or preparing detours around them, and marking prepared routes. Composition of the OOD should include tank and motorized rifle subunits to protect the detachment from sudden enemy attacks, and chemical-radiation reconnaissance elements for monitoring radiation and contamination levels. In some instances, a sapper unit instead of a road unit may be used as the base for the OOD. The missions and functions of the OOD in support of the march include reconnoitering routes; clearing passages through mine or other obstacles and rough terrain, or constructing detours around them; repairing and maintaining roads; reinforcing existing bridges or constructing temporary launch bridge crossings for first echelon subunits, or fixed wooden bridges for second echelon or reserve subunits; preparing halt and assembly areas; constructing column routes; and marking the prepared march route. Equipment of the detachment may include DIM mine detectors, BAT and BTU dozers, MTU and TMM/KMM launched bridges, cranes, prepared wooden bridge elements, road covers, or matting, and UZ links and explosives.[5] "The location of the OOD in battle, pre-battle and march formations is not fixed, but depends on the actual situation. During a pursuit or advance into

the rear of the enemy's defense the OOD can fulfill its route preparation mission following immediately after reconnaissance subunits as much as one to two hours in advance of the head of the column."[6] If the reconnaissance encounters the enemy, then the security subunits (advance security detachment - golovnaia pokhodnaia zastava, GPZ; or march security detachment/advance guard - avangard) overtake the OOD and engage the enemy. The OOD then fulfills its mission following behind the security element. If the enemy force is large enough to require the deployment of the first echelon units under security force cover, then the OOD locates itself behind the first echelon and continues its mission, only now in support of the second echelon, reserves, artillery and air defense units, command elements, and even supply-transport and evacuation efforts. Engineer subunits not specifically tasked as reconnaissance, POZ, OOD, or attached to first echelon units are spread through the march column.

The OOD is generally organized into two main groupings, the reconnaissance-obstacle clearing group and the road-bridge group. It may also include a support group (tekhnicheskoe zamykanie, "technical follow-on", usually a repair support van, etc.).[7] The reconnaissance-obstacle clearing group (otriad razgrazhdenii, OR) itself may have an existence apart from the OOD. Operational sub-groups in the OR are reconnaissance, obstacle clearing, and support.[8] The OR normally includes some engineers or sappers, the combat arms element of the OOD, chemical reconnaissance, DIM, tank with KMT-5, IMR, some launch bridging and explosives. The road-bridge group includes a bridge construction element (low-water wooden bridge, USM), the bulk of the BAT/PKT dozers, additional launch bridging, and may include chemical decontamination vehicles.[9] If there is more than one road-bridge group in the OOD, the normal manner of operation is by bounds. Fires or contaminated areas are by-passed where possible. If a problem with fires is anticipated, additional BAT/PKT dozers or IMR "rubble removers" may be detailed, and attached chemical decontamination vehicles will function as fire trucks.[10] The commander sending out the OOD supports communications with it, and the OOD commander (who, in some instances, may be a motorized rifle or tank subunit commander) supports communications with his subordinates in the OOD by signals, runner and by radio if possible.[11]

The Soviets place great stress on the possibility in modern warfare of attacking directly from march formation, i.e. the meeting engagement. In such a situation there will be little time for redeployment or regrouping of

engineer subunits; therefore, the positioning of engineers in the march column must not only ensure uninterrupted movement of the column, but must correspond closely to the commander's concept for the anticipated meeting engagement.[12] Full engineer support for a motorized rifle or tank battalion in a meeting engagement is likely only when that battalion acts as march security/advance guard, or when it is marching on a separate route. On a separate route the battalion commander will organize his own OOD; as advance guard, he will coordinate closely with the OOD of the senior commander (which will probably be operating as close as possible behind the reconnaissance or advance security detachment).

Duties of the OOD in the meeting engagement are essentially the same as for the march in general, but are completed more swiftly and to a lesser degree of thoroughness, since the column may be moving without an extensive logistical tail. For example, only light or minimal repair of roads is accomplished; TMM spans may be left in place not only for first echelon units, but for the whole column; prefabricated wooden bridges will be employed only in extreme circumstances; and IRD's will likely function within the composition of combat reconnaissance patrols.[13] At short halts, only the right side of the road will be checked for mines, and personnel will dismount and vehicles will deploy to the right.[14] Great stress is placed on individual concealment and protective measures at such halts. Digging in, and the quick preparation of covered shelters at even short halts is essential.[15] For instance, for an eight-hour halt, up to 80 per cent of motorized rifle personnel can be tasked for up to three hours of engineer fortification work.[16] The mobile obstacle detachment in the meeting engagement will, depending on the commander's concept, primarily function with those subunits meeting the enemy head-on; or, if the main force will attempt to meet the enemy force by a frontal assault, then the POZ must be centrally located and prepared to cover a flank in the threatened direction. Mines will normally be surface-laid, without camouflage.[17]

Extremes of climate or terrain may occasion changes or additions to the engineer measures taken in support of offensive operations, march or meeting engagement. In mountainous terrain the bridging support for combat subunits will be increased, and more sapper demolitions specialists will be introduced to the OOD. Water supply and rest/assembly areas pose special problems in deserts or steppes. Concerns in winter include snow removal, the equipping of warming points for personnel, and the use of special road markers

on roads and belaying (recovery) vehicles at steep slopes. In heavily forested areas, when fires and tree blow-down can be expected, engineer subunits are equipped with additional BAT/PKT, tank dozers, more demolitions for fire-fighting and obstacle clearance; motorized rifle and other troops receive more strap-on dozer equipment than in other situations; and separate wheeled and tracked vehicle routes are used. Night marches or offensives require the use of lighted road markers, more personnel detailed to serve as guides at lanes in obstacles or difficult road passages, more attention to light discipline and camouflage. Finally, in night operations, more engineer subunits are assigned to support first echelon subunits.[18]

CHAPTER VI

RIVER CROSSING OPERATIONS

GENERAL

The attainments of Soviet combat engineer support are most evident and readily discernible in the area of river crossing operations and equipment. The Soviets consider that, as mechanization of their forces has increased, rivers have become more serious obstacles to troop movement. The requirement for engineer support to maintain the momentum of the attack and the mobility of their forces consequently has also increased.

It is anticipated that in the European theater, water obstacles 100 meters wide will be encountered every 35-60 kilometers; between 100 and 300 meters wide every 100-150 kilometers; and more than 300 meters wide every 250-300 kilometers. Further, they anticipate that sixty per cent of all water obstacles will be less than 20 meters wide.[1] Rivers are classified according to:

Width--	Narrow to 60 m.	Average to 300 m.	Wide (Very wide) more than 300 m.
Depth--	Shallow to 1.5 m.	Deep to 5 m.	Very deep more than 5 m.

Current Velocity--

Weak to 1/2 m/sec.	Average 1 m/sec.	Swift to 2 m/sec.	Very swift more than 2 m/sec.

Bottom Condition--

Weak silty, loess or turf	Average sand, clay	Hard rock, gravel

Classifications also consider the nature of the banks and surrounding terrain (degree of slope, presence of marshes, old channels, backwaters, etc.), hydrotechnical features (dams and impoundments, dikes, canals, locks), and seasonal features such as flooding, flowing ice and ice cover.[2]

The "crossing from the march" has been an important feature of tactical combat engineer doctrine since 1941.[3] Deliberate crossings are not considered unlikely, but writings of contemporary engineer authors devote less attention to this type of crossing as compared to the crossing from the march.[4] In essence and in fact, in an engineer sense there is really very little difference in the actions taken to support one type as opposed to the other: the differences are simply a matter of time and degree.

The general features of a crossing from the march may be described as follows: as advancing forces move toward a river line, forward detachments and advance guards or tactical air-landing parties will attempt to seize and hold existing crossings or planned crossing sites until the approach of the main forces. If possible they will continue to develop the offensive into the enemy's depth. Combat air support for the crossing is increased, since full fire support of the far shore must await the arrival and crossing of artillery subunits. In order to insure timely and continuous fire support, artillery, air defense systems, antitank reserves (including the POZ) and engineer subunits detailed to support combat operations on the far shore will usually cross with the first wave (normally two reinforced motorized rifle companies on amphibious APC's) or immediately after it. For this purpose, engineer assault crossing means may be detailed directly to forward detachments and advance guards. As soon as possible following the assault wave, deep-fording (snorkelling) or ferrying of tanks and rafting operations may commence. Following arrival in the area of bridges or ferries, the assault crossing vehicles cease operations and follow after the advancing subunits, prepared to renew operations at a subsequent river obstacle. Bridging is preferably done at night, but daylight operations under conditions of reduced visibility (fog, smoke) are also suggested. USM low-water bridges or underwater bridges of previously prepared wooden or wood-and-steel elements are emplaced using the KMS to replace tactical floating bridges as soon as possible to permit them also to continue to move forward with the supported unit.[5]

The requirements of the supported unit dictate the type of crossing to be set up and the allocation of engineer means to the operation. Types of crossing sites which Soviet engineers are prepared to support are the following:

> Assault crossing (desantnaia pereprava) -- the opposed forcing of a river line; assault crossings are designated for motorized rifle and artillery subunits

serving in the first echelon, advance guards, and forward detachments.[6]

Ferry crossing (paromnaia pereprava) -- use of existing ferries or special ferry platforms (tracked self-propelled, or constructed from float bridge elements), usually not directly opposed.

Snorkelling, or deep-fording (pereprava po dnu reki) -- self-powered or auxiliary-assisted movement of tanks across the bottom of a river; usually unopposed.[7]

Bridge crossing (mostovaia pereprava) -- use of float bridges or transportable semi-fixed bridges constructed from previously prepared or locally fabricated materials.

Ford crossing (pereprava vbrod) -- constructed or improved where other conditions are favorable.[8]

Captured or seized crossings of all the above types are used when possible to assist in maintaining the tempo of the advance and to keep the enemy off balance.

The assault crossing or river-forcing sector includes that portion of the water obstacle and the adjacent-lying terrain on which a unit crosses to the opposite shore in battle.[9] The assault phase of a crossing ends when the assaulting forces have attained that terrain feature or achieved that situation where the opposing force is precluded from ground surveillance of the crossing site for artillery observation and direction.[10] Ferry and amphibious transport operations may begin simultaneously with the assault wave, although it is preferable to await the suppression of small arms fire from the far shore. Bridge assembly specifically will not begin until small arms and machine gun fire on the bridge assembly area have been precluded.[11]

PLANNING

The staff planning sequence followed by the NIS in preparing the plan of engineer support for a river crossing is essentially unchanged from that of any other operation: clarify the mission, estimate the situation, define tasks to be accomplished, initiate and/or direct the engineer

reconnaissance effort, compare available means to requirements, prepare proposals for the commander while making initial disposition of engineer subunits, submit the proposals and, on approval, draw up the plan.[12] The NIS simultaneously works out an estimative calculation of the crossing which combines data on the river obstacle, composition and capability of the units which are crossing, their formation and sequence of crossing, and the availability of engineer forces and equipment. Some of the data come from other members of the staff, some the NIS derives himself. This calculation is used to make a generalized disposition of combat units into loads or waves by crossing site and type of crossing. It is also used as the basis for the assault crossing graphic, which is prepared by the staff with the participation of the NIS.[13]

The assault crossing graphic depicts the assault crossing sector; the locations and types of crossings; elements assigned to equip, operate and maintain crossings; the ready time of each crossing; and the sequence of approach of each advancing subunit and the time each requires to cross. The amount of detail depicted depends on available data and planning time. In a fast-developing situation, only the beginning and end of the operation may be depicted, with detail added as required or available. Normally a backward-planning sequence is employed in preparation of the graphic.[14]

PHYSICAL AND OPERATIONAL FEATURES OF THE CROSSING

Soviet engineer planners express a general preference for establishing crossings initially at a concave bend in the water obstacle, attributing to such sites superior defensive and security features. They also state, however, that selection of a crossing site on less advantageous terrain can offer great advantages, since the enemy will not be expecting use of such locations and his defensive preparations there will be less complete. In any case, the precise location of a crossing site may be determined or changed based on the findings of engineer reconnaissance. All reconnaissance reports are sent to the combined arms commander or the NIS.

As previously stated, sapper scouts may be included in reconnaissance subunits, combat reconnaissance patrols, separate IRD's (engineer reconnaissance patrols), or in the composition of forward detachments, advanced security groups, tactical air-landing parties, etc. Chemical/

radiological reconnaissance teams may also be included in IRD's. Assault sites for subunits with amphibious APC's are checked by sapper scouts in reconnaissance groups or combat reconnaissance patrols. For snorkel or deep-fording sites, a sapper squad with two or three divers and bottom checking gear (profilers, depth finders, probes, hydro-speedometers) operates independently or under cover of the combat reconnaissance. Each squad checks a primary and an alternate site. Up to one hour per site is required. For reconnaissance of ferry or bridge crossing sites or fords, a separate IRD is sent out on the basis of one per site. Such separate IRD's (a squad for a ferry site; up to a platoon for a bridging site) are dispatched by the NIS or the commander of the engineer subunit which is tasked to equip the crossing site.[15]

Adequate reconnaissance often is not possible until the far shore is seized by the assault subunits. For instance, snorkel sites are usually planned for the area of the assault site, since that area is expected to be free from enemy interference first. Given the time required to determine the details of the snorkel site, and the limited throughput capacity of ferry crossings, crossing of large numbers of tanks may not begin until quite some time after the initial assault, and a slow-down of the general tempo of the offense may result at precisely the most critical moment of the crossing.[16]

Approach and maneuver routes are prepared by the OOD. One approach per site is normal, but two may be required in some cases. Deployment/release points are checked and marked so that optimally there will be one entry site to the water for each APC, amphibious transporter or GSP ferry. Maneuver routes are located three to five kilometers from and parallel to the shore and along the shore on occasion. These transverse routes also serve as control points for advancing units. Obstacle clearance on the initial shore is limited to the minimum lanes necessary for access to the river (not one per platoon as in other situations), preferably accomplished with explosive means.[17] Water mines are cleared with UZ charges, or by an amphibious transporter towing a mine sweeper. Barriers on the far shore are cleared by line charges launched from the initial shore, or by sappers in the assault wave.[18] Other preparation of the near shore includes concealed shelters and load-assembly areas for engineer units and crossing

operating personnel, and firing positions for artillery, tanks and river security subunits.

A crossing commandant is designated for each crossing site, and the sector commandant is usually the battalion/regiment chief of staff.[19] The site commandant will usually be the engineer subunit commander tasked to equip and operate the site, or a designated officer of a tank battalion conducting snorkelling operations or a motorized rifle battalion in the assault wave. The crossing commandant controls all activity at the site, including the movements of individual vehicles, by flag, megaphone, light signals, and by radio. Additional radios are essential for the establishing of an assault-crossing net which will permit the commandant to talk to all vehicle commanders.[20] He has up to two assistant commandants (one on the far shore) and the commandant's service. The mission of the commandant's service is to insure the timely and organized approach of advancing subunits to the river and the uninterrupted operation of the crossing, to prevent bunching up, and to shift assets or requirements to other sites as necessary, on both shores.[21] Responsibility shifts from traffic control units to designated engineer and other subunits at the control-regulation point established at the first lateral road (the boundary of the crossing sector initial area). Guides or regulators are stationed at each fork, major turn, or release point, at the site, and on the far shore.[22]

Other services provided at the crossing site include rescue and evacuation, and a river watch or security. The rescue group comprises engineer divers, amphibious transport, and medical teams. The evacuation group is drawn from repair maintenance elements. Command of the rescue-evacuation service is usually assumed by a technical officer from the maintenance element. River watch to protect against divers, floating mines or floating debris is a function of engineer elements, aided when required by artillery, tank, or motorized rifle subunits. The watch is maintained both upstream, downstream and at the site. Engineer support to combat operations on the far shore is organized as in any other offensive action.

Bridging is preferably done at night, or under other conditions of reduced visibility. Night crossings substantially increase the difficulties of control and coordination of the crossing. Units are equipped with additional night vision devices, flashlights and reflectorized

or illuminated markers. Each site is designated by a different color, size and shape symbol combination so that each advancing subunit has its own route code to follow. Use of local illumination at loading sites is permitted. Weak white light is used on board ferries and rafts, which may also be fitted with makeshift lifting gates.[23] Lighted buoys or field-expedient marker buoys made from elements of a floating mine kit may be used to mark crossing lanes.[24] River watch elements employ spotlights to detect floating mines, debris, swimmers and other diversionary elements.

Special attention in military journals is also devoted to construction of crossings in winter (on ice-covered rivers, or through channels cut or blown in the ice) and across very wide rivers. One article[25] concerns river-crossing support to a motorized rifle battalion by a full ponton battalion (320-meter capability).

COMMENT AND CONCLUSION

Combat engineer support is organic to Soviet ground force maneuver units and therefore affords the Soviet commander a substantial degree of assured familiarity with the capabilities and limitations of his own and attached engineer subunits. Through repeated exercising, he may develop an accustomed approach to organizing engineer support that offers the potential advantage of making even fairly complex tasks routine.

Engineer support planning is broadly based, detailed, and responsive to the combined arms commander. Equipment is frequently single-purpose by design, offering the advantage of insuring that minimum engineer support will always be available, not diverted to other tasks. Equipment design is rugged, technically innovative yet simple, and specifically concerned with a number of functions not widely addressed in Western armies. Much of it, however, is also "soft-skinned" and therefore too vulnerable for use under fire. Both allocation and level of fill provide option and redundancy.

In several instances it appears that engineer operations take place at slower rates than are generally felt to be the case. Inspiring advertising to the contrary, there is a great deal of deliberation in the crossing from the march, possibly a function of detailed planning and tight, centralized control. Communications within engineer units, especially sapper units equipped with trucks instead of APC's, is often poor, fostering a reliance on communications through the supported unit. While this virtually guarantees close coordination between the engineer and supported commander, it restricts the movement of the engineer commander and reporting responsiveness within the engineer chain of command.

Soviet engineer commanders, as other Soviet commanders, are caught in the perplexing situation where they are exhorted both to foster and develop initiative and independence among crewmen, sergeants and junior officers, and to maintain strict control in all instances. Many articles reflect a high level of concern with plans to force junior leaders to shoulder unaccustomed responsibilities and demonstrate innovative approaches during exercises, but they indicate that commanders draw up short of fully implementing these plans. The intent to develop initiative

and the realization of that intent are far from identical.

The importance of engineer training and preparation by non-engineer units and personnel cannot be overstressed. Colonel-General S. Aganov, Chief of Engineer Troops of the USSR Ministry of Defense, repeatedly emphasizes this point in his review of the 1977 training year.[1] He states that troops of all arms and services must be able to emplace and clear mines of all types, to reconnoiter and overcome water obstacles on their own, with minimal engineer support. Possibly this statement reflects a concern that in all but highly mobile scenarios the largely-tailored combat engineer organization of Soviet divisions may not possess an adequate amount of ordinary sapper capability. Aganov further states that engineer units also need to perfect their mastery of constructing and overcoming obstacles and the forcing of river obstacles in coordination with combined arms units. Other concerns he mentions are officer development, the need to demonstrate faith in subordinate leaders, and realism in training.

This study has presented largely descriptive information based solely on Russian-language sources, except for certain structural data on organization and general equipment characteristics. It was not the purpose of the study to attempt comparative analyses of U.S. and Soviet combat engineer systems. In several instances they are, in fact, quite similar, especially as regards staff planning sequence and procedures. It is important to note that, with the exception of training concerns and the few other considerations described above, the range of engineer equipment and organization capabilities is fully consistent with the general combat engineer support requirements of a modern technological army. It cannot be unequivocally stated that Soviet combat engineer support is fully capable to meet stated objectives for all forms of combat in either nuclear or non-nuclear environments. Their doctrine for this support, however, does appear to be well-conceived, tailored to the requirements of the supported units, and at least adequate to the likely demands of highly mobile combat in the European theater.

FOOTNOTES

INTRODUCTION

[1]E. Maikov and A. Gnedin, Sovetskie inzhenernye voiska, (Moskva: Voenizdat, 1954), p. 31.

[2]N.V. Ogarkov, ed., Sovetskaia voennaia entsiklopediia, Volume 3, (Moskva: Voenizdat, 1977), p. 547.

[3]Ibid., p. 541.

[4]"Subunit" here and throughout the paper refers to the Soviet term podrazdelenie, used to designate subordinate battalions, companies, platoons and squads.

[5]Ogarkov, p. 544.

[6]Ibid., pp. 542, 546.

GENERAL

[1]V. Ia. Pliaskin, I. F. Lysukhin and V. A. Ruvinskii, Inzhenernoe obespechenie obshchevoiskovogo boia, (Moskva: Voenizdat, 1972), p. 3.

[2]Ibid., p. 7.

[3]Ibid., p. 12.

[4]Ibid., p. 10.

[5]Ibid., pp. 14-16; extracted in modified form.

[6]Voennyi Vestnik, No. 9 (1976), p. 100. (Excerpt from the Internal Service Regulations of the USSR Armed Forces.)

[7]Pliaskin, et al., p. 17.

[8]Ibid.

[9]Ibid., p. 18.

ENGINEER UNITS, EQUIPMENT AND ORGANIZATION

[1]Pliaskin, et al., p. 13.

[2]Headquarters, U.S. Army Europe and Seventh Army, Identification Guide. USAREUR PAM No. 30-60-1, 3 Parts (9 Volumes), (APO New York 09403: 30 September 1972 - 30 July 1975).

[3]A.P. Belokon' and V. I. Kalaida, Inzhenernoe obespechenie marsha i vstrechnogo boia motostrelkovogo (tankovogo) batal'ona, (Moskva: Voenizdat, 1975), p. 96.

[4]Pliaskin, et al., p. 56. Russian expansions of these abbreviations are not certain.

[5]Ibid., pp. 53-54, 117-119. Expansion of "ITB" uncertain.

[6]E. Podkopaev, "Ratsionalizatory predlagaiut," Voennyi Vestnik, No. 3 (1976), pp. 99-100.

[7]V. Novosel'tsev, "Protivodesantnye zagrazhdenie," Voennyi Vestnik, No.10 (1976), pp.104-106. For details of mine characteristics see, Identification Guide, Part Three, Vol.2, "Mine Warfare and Demolition Equipment."

[8]V. S. Chekhalin and B. V. Varenyshev, Fortifikatsionnoe oborudovanie mestnosti, (Moskva: Voenizdat, 1974), p. 17.

[9]Pliaskin, et al., p. 59.

[10]Ibid., p. 57. Expansions uncertain, except that "L" = Light, "S" = Medium, and "T" = Heavy.

[11]Ibid., p.46. Expansions of BAT, PKT (puteprokladchiki, or "roadlayers"), OL-T, OS-T and OT-T (artillery tractors with bul'dozernoe oborudovanie, "bulldozer equipment") are uncertain.

[12]M. Makarov and V. Krivilev, "V zonakh pozharov i razrushenii," Znamenosets, No.6 (1976), pp.14-15.

[13]Belokon' and Kalaida, pp.22-26; and V. Krasnikov and L. Titov, "Marsh v rasputitsu," Voennyi Vestnik, No.4 (1976), pp.101-103.

[14]Pliaskin, et al., p.36. U.S. data credit the KMM with a 15-ton carrying capacity.

[15]A. Shakshirov, "Obespechivaia prodvizheniia voisk," Voennyi Vestnik, No. 3 (1977), p. 101. Designation drawn from N. Liubchenko, "Mosty mozhno stroit' bystree," Voennyi Vestnik, No.2 (1978), p. 87.

[16]M. Zavadskii, "Iz opyta stroitel'stva nizkovodnikh mostov," Voennyi Vestnik, No.4 (1974), pp.105-106.

[17]Pliaskin, et al., p. 47.

[18]Ibid., p.49.

[19]Defense Intelligence Agency, Soviet and Warsaw Pact River Crossing: Doctrine and Capabilities, DDI-1150-13-77, p. II, q.v.

[20]A. Poliakov, "Most ukhodit pod vodu," Krasnaia Zvezda (1 July 1977), p. 1.

[21]PKP -- plavaiushchii pritsep, amphibious trailer. Full expansion uncertain.

[22]For information on engineer support above division level, references may be found in U.S. Army Intelligence Center and School, Handbook on the Soviet Ground Forces, SupR 69720, (Fort Huachuca, Arizona: August, 1976), p.184 ff.; and Department of the Army, Handbook on Soviet Ground Forces, FM 30-40, (Washington: U.S. Government Printing Office, 30 June 1975), p. 6-75. Friedrich Wiener, The Armies of the Warsaw Pact Nations, (Vienna: Carl Ueberreuter, Publishers, 1976), p. 66 ff., may also be used, with reservation.

[23]S. Masterkov, "Bez svertyvaniia boevogo poriadka," Voennyi Vestnik, No.11 (1976), pp.93-95.

[24]Some sources indicate an additional combat engineer, or sapper, company, or an additional specialized (supply support) company, bringing the total to six companies.

[25]V. Makagonov, "Desantnaia pereprava," Voennyi Vestnik, No.6 (1975), pp.93-94.

ENGINEER SUPPORT TO THE DEFENSE

[1]Pliaskin, et al.,p.228.

[2]Ibid., pp.254-256.

[3]It seems that the nature of the defense is such that there is essentially nothing more important to which the commander must devote attention. It must be assumed that the NIS is called upon for recommendations and advice, but engineer measures are so fully a part of the defense that it is the commander's function to know how to skillfully employ all the assets at his disposal. Pliaskin does not even mention the NIS with regard to defense.

[4]Basic terminology for shelters (ukritiia): a simple troop shelter, shchel'; a light bunker with a protected entrance, blindazh; a bomb shelter 6x18 meters, for 8-25 personnel, including collective antichemical and antiradiation protection, ubezhishcha;trench, weapon pit, or revetment, okop; foxhole or small trench, iacheika; ammunition storage niche or recess, nisha. Applied to vehicles, the general term ukritiia means a below-ground level shelter with no cover, or a cover over the motor of soft-skinned vehicles (not to include "covers" used for camouflage purposes). Chekhalin and Varenyshev, pp. 58-66.

[5]Pliaskin, et al., pp.233, 237-244.

[6]Ibid., p.9.

[7]Ibid., pp.245-254.

[8]A.A. Beketov, A.P. Belokon' and S.G. Chermashentsev, Maskirovka deistvii podrazdelenii sukhoputnikh voisk, (Moskva: Voenizdat, 1976), pp.5-13.

ENGINEER SUPPORT TO THE OFFENSE

[1]Pliaskin, et al., p.152.

[2]Ibid., pp.100-106.

[3]Ibid., pp.107-110.

[4]Ibid., pp.111, 113.

[5]Ibid., pp.115-118, 122.

[6]Ibid., p. 132.

[7]V. Molzinskii, "O podvizhnom otriade zagrazhdenii," Voennyi Vestnik, No.11 (1977), p. 102.

[8]Pliaskin, et al., p. 134.

[9]A. Limno, "Kak deistvovat' podvizhnomu otriadu zagrazhdenii?", Voennyi Vestnik, No.10 (1976), p. 102.

[10]Pliaskin, et al., pp.133-139.

[11]Molzinski, p. 105.

[12]M. Zlatkovskii, "O podvizhnom otriade zagrazhdeniia," Voennyi Vestnik, No.9 (1975), p. 97.

ENGINEER SUPPORT TO THE MARCH AND MEETING ENGAGEMENT

[1]Pliaskin, et al., p.95.

[2]Ibid., p.96.

[3]Ibid., pp.80-82.

[4]Ibid., pp.83-84.

[5]Ibid., pp.85-86.

[6]Ibid., p. 113.

[7]A.Piganov and E. Zavgorodnii, "Chtoby bystree prokladyvat' puti," Voennyi Vestnik, No.3 (1975), p.114.

[8]E. Skorupo, "Preodolevaia zagrazhdeniia," Voennyi Vestnik, No.6 (1975), p.90.

[9]G. Kisaretov, "Uchenie s dorozhnoi rotoi," Voennyi Vestnik, No.7 (1977), pp.108-110; and Pliaskin, et al., p.86.

[10]Makarov and Krivilev, p. 14.

[11]Pliaskin, et al., p. 87.

[12]Ibid., p. 140.

[13]Ibid., p. 141; and Belokon' and Kalaida, pp. 31, 79.

[14]Belokon' and Kalaida, p. 67.

[15]Ibid., p.71; and Pliaskin, et al., p. 73.

[16]Pliaskin, et al., p.91.

[17]Ibid., pp.140-142.

[18]For details of engineer support in special conditions, see: V.K. Shamshurov, Inzhenernoe obespechenie boevikh deistvii noch'iu i v osobykh usloviakh, (Moskva: Voenizdat, 1969).

RIVER CROSSING OPERATIONS

[1]Defense Intelligence Agency, p.1.

[2]I. F. Lysukhin, Inzhenernoe obespechenie forsirovaniia rek, (Moskva: Voenizdat, 1968), pp. 5-14.

[3]A. A. Sidorenko, Nastuplenie, (Moskva: Voenizdat, 1970), p. 189.

[4]The Soviet terms are pereprava s khodu (crossing from the march) and pereprava s planomernoi podgotovkoi (crossing with deliberate preparation). The general term pereprava (crossing) is used to describe both an operation and a physical location. Any number of crossings may be included in the uchastok forsirovaniia (crossing sector, although the term is more accurately translated, "sector of forcing" or "assault crossing sector"). The desantnaia pereprava (also "assault crossing") is the actual assault phase of the river forcing operation. See below in text.

[5]E. Aleksandrov, "Tekhnika pereprav," (two-part article), Voennye Znaniia, No.2 (1977), p.39, back cover; No.3 (1977), p. 39, back cover.

[6]Lysukhin, pp.57-58.

[7]Ibid., p.64. It is of interest to note that the author cites the wide experience that U.S. forces have had snorkelling European rivers with the M-60 tank -- including the Rhine River near Koeln.

[8]MTU, TMM or KMM may be emplaced underwater or to reinforce weak bottoms and create shallow fords across the channels of rivers which would otherwise be beyond the spanning reach of these bridges, and thus require ponton bridging.

[9]Lysukhin, p.127.

[10]Sidorenko, p.187.

[11]Lysukhin, p.67.

[12]Pliaskin, et al., pp.205-206.

[13]Lysukhin, p.103.

[14]Ibid., p. 111.

[15]Ibid., pp.117-120; and Pliaskin, et al., pp.157-161, q.v. for details of required characteristics and limitations of terrain at the types of sites.

[16]Pliaskin, et al., pp.159-160.

[17]Ibid., pp.169-170.

[18]Ibid., p. 171.

[19]I. Vas'ko and A. Tyshchenko, "V interesakh peredovogo otriada...", Voennyi Vestnik, No.5 (1974), p. 103.

[20]Lysukhin, p. 134.

[21]Ibid., p. 147.

[22]Ibid., p. 148.

[23]Ibid., pp.170-176.

[24]I. Bevz, "Cherez shirokuiu vodnuiu pregradu," Voennyi Vestnik, No.5 (1977), p. 103.

[25]I. Anishchenko and V. Ermakov, "Ofitsery vyshli v pole," Voennyi Vestnik, No.11 (1974), pp. 104-108. This article represents the sole clear example of non-divisional engineer support to maneuver units in four years of this journal's issues.

COMMENT AND CONCLUSION

[1]S. Aganov, "Inzhenernoe obespechenie -- na uroven' sovremennikh trebovanii," Voennyi Vestnik, No.12 (1977), pp.15-19.

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