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CAMPAIGN AGAINST RUSSIA

(Employment of Second Army Engineers)

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CAMPAIGN AGAINST RUSSIA

Table of Contents

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[2] As the Second Army Engineer, I participated in the Russian campaign from June 1941 to April 1943. My experiences during that time had to be compiled from memory, because I had no reference sources at my disposal. I am therefore unable to supply exact dates, place names, or unit designations, particularly since order of battle and sector boundaries changed almost daily. Information gathered from personal experience has partly been supplemented by data from those experience reports to which I had access as commandant of the engineer school at DESSAU/ROSSLAU from April 1943 to April 1945.

I. Route of Advance of Second Army.

Second Army advanced along the route traced on the enclosed map.* Headquarters were located at the following places, each of which was at the time situated approximately in the center of our army sector: POZNAN, WARSAW (Jun. 1941); SIEDLCE, MIEDZYRECZ, SLONIM, MINSK (Jul. 1941); BORISOV, MOGILEV, GOMEL (Sep. 41); CHERNIGOV, ROSLAVL, BRYANSK, OREL (Oct. 1941 to Jan. 1942); LGOVO, KURSK, stud farm near GORSHECHNOYE, ... [unknown], (Jan. to Oct. 1942); sanitarium for mental disorders near KURSK (Oct. 1942 to Jan. 1943); LGOVO, SUDZHA, BELOPOLYE, KONOTOP (Jan. to Apr. 1943).

The following major rivers had to be crossed during the course of these movements: BUG, NIEMEN, BEREZINA, DNEPR, DESNA, OKA, SEIM, DON, OSKOL, SOSNA, and PSEL. As a result, extensive experience was gathered in the technique of river crossings.

II. Organizational Problems.

Second Army could make no preparations whatever for the campaign against Russia because the campaign proper, and the outbreak of war came as

*Ed: No maps are appended to the German text.

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[2] a complete surprise. At that time, Second Army Headquarters was in MUNICH, and served as training headquarters for newly activated units. Upon the beginning of the Russian campaign this headquarters was immediately transferred to POZNAN and WARSAW.

As far as materiel and equipment were concerned, Second Army found itself similarly unprepared for a campaign against a Russia whose natural obstacles had caused the defeat of the superbly equipped armies of Napoleon in 1812.

The scorched-earth policy of the enemy made it extremely difficult to provide even adequate billets and working facilities for the large headquarters organization.

A headquarters of this size has to be equipped in a way that it is always able to function without having to depend on facilities available in towns and villages. For this purpose, it must have trailer caravans, tents, its own lighting equipment (several generators), and its own water supply.

Headquarters of the Second Army Engineer, for example, was only able to function properly because at the beginning of the campaign it had succeeded in securing a lighting generator that supplied power also for other small headquarters sections, and had captured several Russian trucks that could be used for transporting desks, chairs, and other office equipment.

The following were our experiences regarding the Corps of Engineers:

The army and corps engineers, as well as the commanders of the divisional engineer battalions, passed the test of the Russian campaign with flying colors, and proved that they performed a vital function. Only by virtue of a steady flow of information about data procured through engineer reconnaissance was the army engineer in a position to propose and prepare the

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[2] necessary engineer missions in time. Telecommunications with engineer headquarters at lower levels were a very difficult matter, because telephone circuits to the corps and divisions were continuously busy with conversations dealing with tactical problems. For that reason, the army chief signal officer introduced a timetable system. At certain hours, mostly at night, the wires
[3] were reserved for engineer reports. Although that system proved its worth, it nevertheless failed to allocate sufficient time for the large number of messages.

It is considered necessary that every army engineer be equipped with a heavy-duty radio set (with a range of approximately 200 kilometers) so that he may transmit urgent orders to the engineer units that are scattered throughout his army sector.

The army engineer should furthermore have special vehicles with cross-country mobility at his disposal, so that he may intervene in person at points at which major commitments or trouble shooting by engineer forces are required. He must not, as heretofore, be dependent on vehicles from the GHQ motor pool.

The headquarters T/O of every engineer must include a special officer in charge of construction of field fortifications.

Each army should have among its components a GHQ engineer regiment which is directly subordinate to the army engineer. The regiment should consist of one combat engineer battalion, one engineer bridging battalion, and one engineer construction battalion. The German Signal Corps had adopted that system, and the GHQ signal regiment which was directly subordinate to the army chief signal officer proved its worth.

As in the case of the signal corps, engineer supply should be controlled by the army engineer and not by the G-4. The latter should only be in charge

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[3] of supply procurement for army; distribution and transportation of supply to lower levels should be in the hands of the army engineer. For that purpose, he should have at his disposal a special transportation pool, the vehicles of which may also be used to supplement those of the subordinate engineer forces. The Second Army Engineer had succeeded in capturing the equipment of two Russian motorized bridge trains. Although their bridge-carrying vehicles were not in usable condition, their trucks were in working order. The latter were used to form an engineer supply train which proved to be particularly useful. Prior to the formation of that train, shipments of engineer supply had always been neglected in favor of rations, ammunition, etc.

Complete motorization of engineer forces -- and above all of GHQ, bridging, construction, and road construction engineer forces -- was of particular necessity in the vast spaces of Russia. Since engineer forces were necessarily employed for a variety of tasks, our lack of motorization proved to be a great disadvantage. During an advance the engineer troops could either work or march, but were unable to do both at the same time. In 1941, for instance, the construction engineer battalions lagged more than 200 kilometers behind, and tried to catch up for days, while they were urgently needed at the front. Only after the captured engineer supply train had been put in service was it possible to gradually move them up front in a leapfrog fashion. Later, too, the commitment of non-motorized engineer units was a particularly difficult and tedious task.

III. General Tactical Problems.

A. Sparse and bad road facilities in Russia, as well as difficult weather conditions made any estimate of time and space completely unreliable.

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[3] Consequently, local commanders in that country should be given more of a free hand than those in other theaters of operations.

B. Higher echelons should issue orders that are worded more along the lines of guiding directives than in inflexible terms of rigid timetables. The standing Fuehrer Order that no evasive action may be taken without Hitler's express authorization resulted in grave consequences particularly in Russia. The Fuehrer's orders approving evasive action usually came too late. A case in point was the period from January to April 1943, during which Second Army lost almost all its equipment as the result of that practice. VORONEZH had to be held despite repeated and timely warnings by the Commanding General of Second Army with regard to the protection of the right flank, and could be evacuated only on Hitler's order. The order, however, came too late, and the bulk of the army was cut off by the Russian break-through from the north and the simultaneous enemy attack from the west against KASTORNAYA (halfway between VORONEZH and KURSK).

After approximately six weeks, the remnants of the army, with very little materiel left, succeeded in making their way to the covering position near SUMI.

C. The following peculiarities of the Russian mentality were noticed time and again:

The Russians could withstand frontal attacks very well. However, they were as a rule highly vulnerable on their flanks, in large- as well as small-scale operations. For instance, they gave up the defense of KIEV only after Second Army had advanced through CHERNIGOV toward the south, and thereby threatened the Russian right flank.

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[4] The Russian command was very clumsy and highly inflexible, particularly during the early days of the campaign.

On the other hand, the Russians were very adept at retrograde movements. They knew how to take advantage of the vastness of their country, ruthlessly scorching the earth and using the civilian population.

The Russians were experts in the construction of field fortifications, and especially in the art of camouflage. In the positions proper, they observed strict telecommunications discipline, particularly in the most advanced lines.

Before an attack, the Russians continuously carried out reconnaissance in force along the entire front, and directed their subsequent attack against the weakest spot -- primarily the unit boundaries. They very cleverly assembled forces for an attack by continuously infiltrating individual soldiers, and concealed their assembled forces extremely well.

The Russians were masters in the art of improvisation, and ruthlessly took advantage of the fact that the people required little in the way of food and shelter.

IV. Engineers in Combat.

A. The German engineer forces are frequently referred to as technical combat troops. This designation caused many a commander to commit disastrous mistakes. The engineers were employed like infantrymen, and suffered heavy losses because they were not equipped with the heavy weapons of the infantry. The divisions thus lost an entire arm for employment in technical engineer missions, and the final result was generally of far less value to the division than would have been the case had the engineers been

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[4] employed for technical assignments.

Especially the GHQ engineer forces that had been put at the disposal of subordinate units were often committed as infantry in order to relieve the battle-weary infantry. A corps crossing the BEREZINA, for example, experienced the serious repercussions of this mistake.

In 1944, when the engineers -- as a last resort -- had to be committed as infantry despite strictest orders to the contrary from higher headquarters, they put up a good fight, suffered heavy casualties, and earned many Knight's Crosses. On the other hand, Knight's Crosses were rarely bestowed for missions limited strictly to engineer tasks. For that reason, the ambitious engineer commanders were wont to have their units committed as infantry, although there were always important technical tasks for engineer forces.

The German Corps of Engineers had been trained to use its equipment (charge carriers, explosives, mines, flame throwers) in support of infantry operations, and primarily in the removal of obstacles (pillboxes). Engineers were particularly useful in combat patrols. However, one mistake was repeated time and again: the engineers were committed and assigned to the infantry in detail, instead of being employed in compact engineer platoons or companies. If engineers are committed in detail, neither personnel nor materiel replacements are assured in the event of losses. Well-coordinated platoons or companies take that contingency into account from the very beginning. During Second Army operations in Russia for example, the commitment of engineers in compact units proved highly successful in the capture of the many concrete pillboxes along the BUG River and the PRIPET Marshes.

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[4] Particularly objectionable was the employment in detail of charge carriers (Goliath*).

During the Russian campaign, the engineers more than once had to engage in combat at points remote from the main battle front in order to reach the objective of their technical mission, e.g., the demolition of an enemy-held bridge. For this type of mostly brief infantry combat the engineers were well equipped and trained. In Second Army, engineer operations of that nature were always successful.

For antitank warfare, the engineers were equipped with T mines and sticky antitank charges.

T mines were never available in sufficient quantities. During position warfare, for instance, the divisions needed approximately 10,000 to 15,000 T mines a month for an average frontage of 20 kilometers. However, only a maximum of 3,000 to 4,000 T mines could be made available even at focal sectors. The shortage of transport facilities made shipment of that small quantity of mines from ammunition dumps or engineer depots to the front particularly difficult. In most instances, days and even weeks passed before the requisitioned mines could be planted in the front lines.

The Russians apparently had to contend with the same difficulties. According to PW statements, they solved the problem in a very
[5] primitive fashion. Every replacement going to the front was required to carry two antitank mines. Subsequently, the Russian engineers laid the mines in the forward zone according to a previously drawn-up mine plan -- a method similar to that employed on the German side (plotting procedure).

During 1944 and 1945 the Russians also laid hasty mine fields in concentrated patterns during mobile warfare, in order to block German tank

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*Ed: Remote-controlled demolition vehicle.

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[5] attacks. According to the experience of our army in southern Russia, the Soviets in the Southern Ukraine immediately secured with a mine belt the positions they had captured after a successful armored thrust deep into our lines, blocking all roads and avenues of approach with antitank mines. They used as many as 20,000 mines in one day.

The German counterattacks faltered and failed in the Russian mine fields.

We replied with a similar method. Whenever we anticipated an armored attack, we held in reserve one or more motorized engineer battalions equipped with a large supply of T mines. As soon as the probable direction of the armored attack was established, we guarded against a breakthrough of enemy tanks by reinforcing existing mine fields with mines scattered after only a quick survey, or by hastily planting behind our lines mine barriers perpendicular or parallel to the probable direction of attack.

In 1944 the lack of sufficient numbers of engineer forces made it necessary to authorize also other branches of service to lay mines in stray patterns. However, their personnel was required to first undergo thorough specialized training. A two-week special training course was deemed necessary by the engineer school at DESSAU/ROSSLAU.

Without this thorough training, the non-engineer lacked confidence in the "treacherous" mine, and the difficult procedure of laying mines entailed more disadvantages than advantages.

During the winter of 1941-42, for instance, a division south of OREL had members of all arms lay stray mines in front of its position, since its engineers were committed in another sector. The other arms, however, had had no special training, and a surveying of mines was therefore

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[5] out of the question. In the summer of 1942, when the division was to join in the offensive against VORONEZH, it became trapped in its own mine fields and suffered heavy losses.

In position warfare it was therefore customary to plant T mines only according to a detailed mine plan (plotting procedure). The survey was usually very difficult because the mines could as a rule be laid only during darkness. Planting of mines in front of wire entanglements -- a frequent practice during the early days of the war -- was senseless, because the Russians cleared these mines almost every night. Therefore, the mines had to be installed between the obstacles and the main line of resistance, or even farther back. It became more and more apparent that T mines are best laid deep in the battle position as frontal or flank protection for heavy weapons, particularly artillery and AT guns. Time and again we were to experience proof of that fact.

Of course, the infantry in the most advanced lines was thus left without passive antitank defenses, and regimental commanders objected to this method of mine laying. For that reason, the installation of mines was not to be left to the discretion of infantry regimental commanders, but had to be carried out according to a plan specified in every detail by the divisional commander after consultation with the antitank officer and the division engineer.

The other antitank weapon of the engineers, the sticky hollow charge, was available only in very small quantities and was seldom used. The only instance in which I personally witnessed successful employment of that weapon was after the break-through of enemy tanks near KASTORNOYE (halfway between VORONEZH and KURSK) in January of 1943.

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[5] Subsequently, the sticky hollow charge was replaced by the Panzerfaust[1] and the Panzerschreck[2].

The T mine also was used as an active antitank weapon. Equipped with a special igniter, and detonated at the base of a tank turret, it ripped off the turret. By the same token, two loosely connected T mines thrown over a tank gun blew the barrel to bits. During the Russian campaign, however, that method of employing T mines was used in only a few instances by Second Army.

] B. Pioneers[3].

The pioneer platoons (later on, companies) of the infantry regiments, and the motorized pioneer platoons of the tank battalions, reconnaissance battalions, and motorcycle battalions were indispensable in the East. In several details, however, they needed improvement.

An exchange of commissioned and noncommissioned pioneer and divisional engineer (Black Engineers[4]) officers would prove very instructive for both parties concerned. The division engineer has to take a strong hand in the training of pioneers, and must assist particularly in equipping them with the necessary expedients (duckboard treadway bridges, mine detectors, etc.).

V. Specialized Engineer Operations.

A. River Crossings:

Crossing the uncontrolled Russian rivers proved technically not so difficult as had been anticipated, because we had experienced similar

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[1] Ed: Recoilless antitank grenade and launcher, both expendable.

[2] Ed: Weapon similar to the American Bazooka.

[3] Ed: Members of branches other than the Corps of Engineers, who had received a certain amount of specialized engineer training.

[4] Ed: So called because they wore black piping on their shoulder straps, identifying them as belonging to the Corps of Engineers.

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[6] conditions during the campaigns against Poland and Serbia. In the winter, however, the crossings were that much more difficult. Almost every river crossing resulted in serious traffic jams, and only our air supremacy at that time saved us from heavy losses. For that reason, traffic control is one of the most important problems in each river crossing. Engineer forces, however, should not have to bother with traffic control; that problem should be a matter for the tactical command. A special traffic-control headquarters must be organized and clothed with far-reaching authority. In the case of major river-crossing operations, at least a divisional headquarters should be established for that purpose.

The line of assembly should be as far from the river as possible (3 to 5 kilometers; for motorized divisions and armored divisions, up to 20 kilometers). The following procedure proved successful: Troops about to effect a crossing were formed into march units composed according to tactical considerations, and concentrated in special assembly areas <u>off</u> the main route of approach. They advanced only upon orders of traffic-control headquarters, and had to cross the bridge within a precisely specified time limit. This was the only way to avoid traffic jams.

In a cross-river <u>attack</u>, surprise was always the decisive element. For initial crossings we preferred technically unfavorable sites away from roads, because the enemy least expected attacks at those points. Secrecy, strict reconnaissance discipline, and definite orders against passing beyond a certain line during motorized reconnaissance were absolutely essential. To avoid any undue noise or confusion at the river, co-ordination between the forces about to cross and the engineers with their ferrying facilities had to be established long before the troops reached the crossing site. Assault boats proved particularly well suited for crossing wide rivers,

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[6] while pneumatic boats were indispensable in the case of smaller rivers, or for surprise crossings at night.

Engineers assigned to ferrying service could not be employed at the same time to clear away obstacles. For that duty, engineers with special equipment had to be employed from the very beginning.

1. Military Bridges.

Bridge trains were always in short supply during the Russian campaign. The time-honored principle that each bridge construction job must be backed up by equipment reserves of at least 50 per cent never could be translated into practice.

Only our air superiority at the time kept the number of breakdowns low. The army engineer had to calculate almost to the last meter how much engineer materiel he could allocate to the several corps.

Geographic data of military interest (Red Book) and a very exact interpretation of aerial photographs provided excellent reference material. Very close co-operation between the engineer and the air support commander with Army was therefore extremely necessary.

In many instances the corps had to postpone river crossings by one or two days for lack of sufficient bridging equipment.

Every military bridge had to be replaced as soon as possible by an emergency bridge in order to make the military bridging equipment available to other corps. Even in the absence of immediate need, however, none of the corps wanted to return military bridging equipment voluntarily, despite the fact that it was GHQ property. Strictest orders by
[7] the Commanding General or Chief of Staff of Second Army were therefore necessary.

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[7] B, K (for light tanks), and J (for heavy tanks) equipage generally proved equal to demands in Russia. Desirable technical modifications will be dealt with in later pages.

Entirely inadequate was the mobility of the train for B equipage. Insofar as the specified prime movers (8-ton medium half-tracked prime movers, 3-ton heavy trucks) were available, mobility was possible even in Russia, although a normal and exact timetable could not be followed. A certain amount of leeway had to be allowed for right from the beginning.

However, since only 20 to 30 per cent of the towing vehicles were available, and since the tow trucks (1 1/2- to 2-ton civilian trucks) were about 50 per cent too light, every movement of a B-type bridge train was purely a matter of luck. On good roads they could reach their destination in time by shuttling back and forth; under bad and difficult road conditions a delay of one to two days had to be anticipated.

From a psychological point of view, the term "train" was not a very fortunate choice, because that term applied merely to rear-echelon transportation units. The resultant improper classification affected decorations, promotions, leave, etc. The term "engineer bridge construction company" would have been more appropriate, because particularly these highly conspicuous vehicles which frequently had to drive up to the lines under enemy fire suffered serious losses. In order to obtain an adequate evaluation of these units, the engineer in each instance had to intercede with higher headquarters.

So far as prompt commitment was concerned, the decisive factor was proper motorization. One-third of the vehicles should be tracked prime movers, and the remainder heavy trucks corresponding to the carrying capacity of the bridge vehicles. These trucks must have enough space not

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[7] only for small equipment, fuel, and quartermaster supplies, but also for bridge-construction crews.

The supply train of headquarters of the army engineer must contain vehicles of the type mentioned above, so that prompt assistance may be rendered in case of losses. At the beginning of the Russian campaign, the transportation personnel was not trained in bridge construction, but was only supposed to maintain equipment. That arrangement was unsuccessful in the East.

The practice of attaching a platoon of trained transportation personnel that later was adopted for the J-type bridge trains, should also be followed in the case of the B-type bridge trains. This platoon could also take care of the maintenance of equipment.

In almost every instance, the shortage of engineers during the Russian campaign made it necessary for the untrained, limited-duty transportation personnel of the bridge trains to dismantle and load bridge equipage. Frequently they even had to build landing stages and small bridges. That state of affairs gave rise to serious difficulties.

a. Experiences gained during the Russian campaign revealed the necessity of the following technical modifications to be considered in designing new equipage:

(1) Due to the fact that the rivers are not artifically controlled, the river beds are very muddy in places, especially along the banks. For that reason, posts of fixed trestle bents must rest on broad footings. Standard footings did not give enough support. It was even necessary to add stability by means of special mudsills.

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[7] Our neglect to provide for safeguards of this type placed us at distinct tactical disadvantage in the following instance:

After an attack across the DNEPR, a 24-ton military bridge built from B equipage was to be kept open for a surprise crossing and subsequent break-through of an armored corps. Because of the great importance of this mission, the bridge was especially tested for load capacity and stability. The trestle bents of the abutment span stood on firm gravel, resting on the old-fashioned standard footings.

As soon as the first tanks drove onto the abutment span, the trestle bents settled, and the tanks crashed into the river. Repairs took six hours, since there was no possibility of building a new abutment span to the left or right.

Tactical surprise had become impossible as the result of this seemingly insignificant technical breakdown.

[8] What had happened?

Beneath a layer of about 20 centimeters of gravel was a deep layer of mud. The posts resting on the narrow old-type footings simply sagged through that layer.

Surprises of that and similar nature had to be expected in the construction of bridges in Russia. Only engineer officers seasoned by the campaign in the East were equal to those difficulties.

(2) The irregular profile of shoals in the Russian rivers, and the irregular rise and fall of the water level required that the floating spans of a bridge be readily replaceable with stable supports (trestle bents) without the necessity of major, time-consuming rearrangements. The B equipage therefore had to be modified accordingly.

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[8] (3) Since B equipage was standard combat equipment in the German Army, and thus available in the largest number, it happened very frequently in Russia that tanks had to cross B bridges in the sector of an infantry division.

At the beginning of the Russian campaign, 8-ton and 16-ton bridges were standard types of construction. Later the B equipage was modified to permit gross load carrying capacities of 20, 24, and 30 tons, and the roadways were widened from 1.90 meters to 2.36 meters. For that purpose the trestle bents had to be reinforced, the caps doubled, the number of stringers increased, and the curbing renewed.

(4) The sandbars and the irregular water level of the Russian rivers also forced us to do away with the deep-draft outboard motors which constantly became clogged with sand. Shallow-draft assault-boat motors and assault boats were introduced as substitutes.

(5) Our K equipage (light bridging equipment for tanks) was very successful from a technical point of view. The trucks that carried this type of equipment had the advantage of greater mobility than the vehicles and heavy trailers for the B equipage, and were therefore better suited for our armored divisions. On the other hand, they could not carry personnel -- a particular necessity in the Russian campaign.

The ever increasing overall width of tanks and assault guns made it necessary to remove the curbing. A single center curb replaced the former curbing along both sides of bridges.

The K equipage is not suited as standard equipment for infantry divisions, because the floating equipment -- especially the K ferries -- is too unwieldy.

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[8] (6) I was unable to gather any personal experiences regarding the J equipage (heavy bridging equipment for tanks). According to experience reports it proved rather successful, leaving room only for a few minor improvements.

(7) The engineer depots of the armies comprised the LZ [light sectional] equipage and the trailers of the B equipage, without prime movers.

The LZ equipage proved equal to all demands, and was indispensable for building bridges with a span of 45 to 50 meters in the shortest possible time. On the DON and SEIM Rivers this equipage was repeatedly used with success.

Curiously enough, the Russians left the piers of most bridges intact, and blew up only the spans.

The lack of prime movers in the engineer depots proved to be a great handicap. The employment of that depot equipage was
[9] very difficult and tedious because it could only be shuttled back and forth with the aid of prime movers from other units. (The T/E of the chief engineer officer did not provide for a motor train.)

As a result, great quantities of GHQ bridging equipage fell into the hands of the Russians during withdrawals.

b. Russian bridging equipment was captured only once in the Second Army area, and had been almost completely destroyed by the Russians. This bridging equipment was similar in design to the German B equipage. Like the German K equipage, it was loaded on special trucks. Its gross load carrying capacity approximated 20 tons. The large pneumatic floats used by the Russians had a substantial gross load carrying capacity, and were very well suited for the construction of light bridges (2 to 4 tons).

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[10] If necessary, the pneumatic ponton bridges could be reinforced with expedients to carry gross loads up to about 20 tons.

For armored divisions, the Russians have a special type of equipage. Details are unknown to me.

A very unique contrivance of the Soviets is their submersible bridging equipment, which can be lowered or raised by flooding or pumping out watertight compartments. The exact locations of bridge sites were thus well concealed against enemy air observation.

The Russians were also well trained in the construction of improvised underwater bridges.

So far as the number of bridge trains is concerned, the Russians must have had a multiple of the equipage available on the German side.

The following example corroborates that assumption:

During the German withdrawal across the lower DNEPR in 1944, the German forces were able to construct only seven bridges in one sector with a river frontage of approximately 500 kilometers. The pursuing Russians, on the other hand, quickly built 57 bridges and three foot bridges in a small sector with a river frontage of approximately 350 kilometers.

2. Emergency Bridges.

In Russia, almost all improvised bridges were built of wood, because steel was found only in small quantities. Every military

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[10] bridge was usually replaced first by an improvised, non-floodproof bridge, which at a later date was replaced by a permanent, floodproof structure. Two-lane bridges always were to be preferred types of construction. GHQ engineers, bridge construction engineers, or perhaps several construction battalions were generally assigned the construction of the first improvised bridges. Floodproof, permanent bridges were built by bridge construction battalions and the Organization Todt.

The civilian population was enlisted as paid auxiliary personnel.

In the spring of 1942, a division had to cross the SEIM on an eastward march from KIEV. We expected the floods to have receded by that time. Our presumption proved wrong, however, and since no floodproof bridge was available we quickly had to build a low emergency bridge.

No engineer personnel of any sort was available, because all of them had been committed at the front.

There was no alternative but to bring an officer and a small supervisory staff back from the lines, and have them build the 180-meter-long bridge and the 400-meter-long corduroy road with the help of civilians.

The crossing was completed in five days with the help of 500 women volunteers. The women were well paid and fed, and performed the heavy work in the best of spirits. Several photographs, which I unfortunately no longer have in my possession, showed their cheerful faces

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[10] and the colorful scene.

The transport of timber and the procurement of nails and strap iron always caused particularly great difficulties. Flatcars for the transport of timber therefore are more than ever essential items of engineer equipment.

Timber-and-nail stringers had to be substituted for the unavailable long steel T beams.

A special problem was the protection of the bridges against freshets and ice floes. The normal high water mark had to be determined by questioning the natives, and the height of the bridge set accordingly.

The ice fenders that we built during the early days were too weak. As a result, many bridges were torn away. Ice fenders must be much sturdier than the bridge itself, and their proper placement is an important point. If they are too far from the bridge proper, new ice floes may form between ice fenders and bridge. If the distance is too short, the piers will be washed out by the scour. We had to gather experience in that field. Wherever Russian hydrographic stations were still functioning, we had to enlist their services.

During the first winter, only few bridges withstood the ravages of the ice; later, things improved.

3. Bridges over Ice.

Since most of the rivers in Russia were icebound during

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[10] the winter, men and materiel crossed over the thick ice covers. The roadways were reinforced by blocks of ice. The flow of traffic frequently had to be shifted to new roadways. As soon as the ice wore thin, we reinforced the roadways with rafts.

The time of the spring thaws was of tactical importance, and had to be predetermined. In the spring of 1943, for instance, a corps was ordered not to withdraw behind the SEIM until the river began to carry ice floes. That time could be correctly anticipated by questioning the local inhabitants, due to the fact that the river regularly opened three days after its tributaries. For that reason, a warning system had to be set up. An improvised bridge could not be built, because the SEIM was over 20 meters deep at that particular point.

B. Road Construction.

1. Muddy Season.

During a military conference in MOSCOW in 1941, Marshal Timoshenko reputedly told Stalin that, "The muddy season even more than the winter will help to destroy the Germans."

The term muddy season was generally something new to the German Army. The muddy season in its severe aspects sets in after night frosts and warm days in the fall, and during the spring thaws -- especially in the black-soil region of the Ukraine.

[11] It slowed down our movements to an extraordinary degree, particularly during fall of 1941, when everything was still new to us. In the Second Army sector alone, a very high percentage of the tanks and trucks

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[11] of Panzer Corps Guderian bogged down in the mud west of the line BRYANSK---OREL---KURSK, and subsequently was put out of commission by the sudden cold wave of minus 35 degrees C.

How can the muddy season be mastered?

In the fall of 1941 we thought we could continue our movements even on unpaved roads -- which were the most common ones -- by brute force alone, and employed every last one of our tracked prime movers. However, the types of caterpillar tractors in use at that time were not equal to the task. The roads had turned into such a sea of mud that even standard tanks could not negotiate them for any length of time.

The result of this hell-bent undertaking was that the tanks and prime movers did get ahead for a short while, but then bogged down completely. By now, the roads had been ploughed up to such an extent that after they had dried up they were just about impassable for conventional vehicles.

The Russians were fully aware of these consequences, and had prohibited any kind of traffic on unpaved roads during the muddy season. Tracked vehicles like tanks and prime movers had to drive alongside the roads. So far as I know, these vehicles could be put on special, wide mud tracks. Only during night frosts was a light volume of traffic permitted on the roads.

At a later date we too introduced wider, interchangeable tank tracks and tracked vehicles (Maultiere) especially designed for service in Russia.

We subsequently adopted in principle the Russian method of preserving the roads during the muddy season.

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[11] During the muddy season we erected barriers and stopped all traffic on the roads so that they might be in serviceable condition after the muddy season. The worst period of the muddy season itself -- the time during which all movements were completely paralyzed -- generally lasted for only about two weeks. Foresight had to be used to supply the troops with rations and ammunition. Large-scale troop movements were not possible during that time. Small-scale traffic proceded alongside the roads, and was regulated along the lines of a block system.*

For that purpose, the army engineer indicated the condition of roads in the army sector by marking them in different colors on a special road chart. Changes in road conditions were entered daily.

The Second Army Engineer assigned the construction battalions and elements of the Organization Todt under his command to maintenance and repair of roads that were under the jurisdiction of Army. In the corps sectors, the corps were responsible for that job, although in many instances the Second Army Engineer also took charge of maintenance and repair of roads under corps jurisdiction.

On the average, a construction battalion (four companies) was able to maintain approximately 50 kilometers of road. Changes in road conditions had to be reported every day before 0800, so that a new road chart could be distributed at 0830. In order to permit easier interpretation, the roads were classified by small and capital letters.

The individual control points were interconnected by telephone, and only the strictest discipline made possible a smooth flow of traffic.

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*Ed: Railroad terminology; vehicles are permitted to move into a new section after signals indicate that the preceding vehicles have moved out.

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[11] Grading machinery moved in to level the roads as soon as the muddy season drew to an end. Paid civilian volunteers (women), too, were employed to the largest possible extent for drainage work and further maintenance.

[12] 2. Winter Road Service.

The advent of winter brought serious traffic problems on the completely snowbound roads behind the front. A special winter road service had to be set up which, in the Second Army Area, was directed by the Army Engineer.

The road-clearing and maintenance service was set up along lines similar to the maintenance organization during the muddy seasons.

The construction and road-construction battalions were assigned to the several roads in a manner that about every battalion was responsible for keeping approximately 50 kilometers of road open for traffic. Paid civilian volunteers were to the largest possible extent enlisted for road-clearing work.

Rest stations along the roads provided warm quarters and rations for individual drivers and small units, whenever the blizzards forced them to stop. Telephone lines had been laid along the winter roads, so that Second Army Headquarters could receive accurate information about road conditions.

Road condition reports arrived up to 0800, and the army engineer published a reliable road chart daily at 0830.

Every traffic control officer was supposed to have at his disposal one motorized snowplow. The army engineer kept two or three motorized

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[12] snowplows in reserve, which were also given on temporary loan to accompany important troop movements.

In the vicinity of villages, the traffic control officers employed horse-drawn snowplows.

The winter roads did not necessarily follow the course of the summer roads. The winter roads had to be laid out in a way that reduced to a minimum the danger of their becoming snowbound. They had to lead over windswept heights and had to by-pass inhabited localities. Straw bundles on wooden poles marked the way. After a blizzard it was usually more expedient to move these markers to places that had been blown clear by the wind, than to clear the old roads.

Shortly before the onset of winter we had to set up snow fences. In most instances we could use snow fences that had remained in place from before the war, otherwise we had to make our own for the new winter roads. They were fashioned of wicker- and latticework, approximately 1.20 to 1.50 meters high. Important was the location of snow fences. They had to be set up along both sides of the winter road, at a distance of approximately three to four times its width -- generally at a distance of 15 to 20 meters. After a blizzard they had to be moved atop the snowdrift that had formed behind the fences.

In the absence of snow fences we improvised snow blocks measuring about 1.20 to 1.50 x .50 x .50 meters, and after each blizzard replaced them with new blocks. These improvised snow fences were used in numerous instances. However, that expedient requires a large working force, and is practicable only in the vicinity of inhabited localities.

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[12] Just as the Russians ruthlessly drafted large numbers of civilians for labor service, so did we recruit them for our projects, but on a voluntary basis.

Particularly if we paid compensation in the form of victuals did the women like to volunteer for winter road service.

During my many inspection tours I noticed only cheerful, laughing women shoveling snow even during the most bitter cold.

[13] By means of this rigid organization of winter road service, and by means of large-scale employment of construction units and civilians (mostly women), we were able to keep the winter roads open and passable except for the hours marked by very severe blizzards.

3. Construction of Emergency Roads.

Emergency roads had to be built primarily to provide near- and far-shore approaches to bridges, and detours over impassable terrain.

Due to the lack of stone and gravel in Central Russia and the Ukraine, no concrete or paved roads could be built. The standard expedient thus was the corduroy road.

The important thing in the construction of corduroy roads was the selection of heavy logs (approximately 20 cm. in diameter), which then had to be arranged in several layers. The roadway had to be built like that of a bridge, with stringers, double flooring, and curbing. The curbing had to be lashed down with wires, not nailed.

The flooring had to be covered with a layer of sand (not soil), or -- if sand was not available -- with cinders or brick waste.

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[13] Time and labor forces permitting, the top layer of flooring had to be planed off.

Only corduroy roads built in that painstaking manner held up under sustained use.

Particularly difficult to overcome were the many small stretches of swampy ground that could be encountered on almost every Russian road. These were the very places at which the heavy supply convoys -- and especially the heavy trucks of the long-distance convoys (GHQ transport regiments) -- sank in, and regularly caused serious traffic tie-ups that lasted for hours or even days.

The same mistake was made time and again: The convoys were in too much of a hurry to wait for the road to be put in serviceable condition with a corduroy top, and thought they could force their way through.

The weak stretch of swampy ground that could have been improved in a relatively short time before the surface had completely caved in, was now ploughed up to such an extent that its repair was a major project.

As a result, the road was out, a by-passing impossible, and a serious traffic bottleneck had been created.

In many instances it was impossible to repair a road in time, because the road construction engineers were not motorized and therefore arrived too late at the danger points.

Generally speaking, one of the above-mentioned corduroy roads sufficed for purposes of repair. If the layer of swamp was too deep,

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[13] it sometimes had to be blasted out, or spanned by a regular bridge.

VI. Withdrawals.

My personal experiences in the commitment of engineers during retrograde movements are limited to the withdrawal of Second Army from VORONEZH (January to April 1943). However, a commitment of the engineers directed by army along the lines of a predetermined plan was out of the question during that retreat. After the Russian break-through near KASTORNOYE late in January 1943, the bulk of Second Army was cut off, and had lost almost all of its vehicles. Only the soldiers were able to fight their way back with a minimum of materiel.

A withdrawal from the bridgehead of VORONEZH had originally been planned for the fall of 1943, and all preparations for that move had been made systematically and on schedule.

[14] An order of the Fuehrer -- probably in connection with the battle of STALINGRAD -- reversed that plan, and VORONEZH was to be fortified and held at all cost. Any preparation, even of theoretical nature, for a retrograde movement was prohibited.

When Second Army subsequently was forced to withdraw, it was too late to prepare measures for the commitment of engineers. Moreover, there was a shortage of explosives and vehicles. Local commanders had to improvise demolitions, and had to blow up bridges with abandoned aerial bombs.

Through an experience report of Army Group Center, however, I am informed about details of one planned withdrawal: OPERATION BUEFFEL at SMOLENSK (1943?). These experiences were used as the basis for

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[14] instruction at the engineer school.

They included the following points:

A. The divisions were assigned accurately plotted corridors of withdrawal in which to prepare demolitions.

B. The corridors were subdivided into demolition sectors.

C. The armies established the following three priorities for denial operations:

First priority: Demolition of items of strategic importance to the enemy (railways, bridges, large quartering facilities).

Second priority: Demolition of items the destruction of which handicapped enemy operations (economic facilities, gas works, electric power plants, water systems).

Third priority: Demolitions that facilitated the withdrawal of our troops (small bridges, observation posts, abatis, etc.).

On the basis of these priorities, the divisions worked out detailed timetables that contained a breakdown of the number of individual demolition projects, and precisely calculated figures for labor, time, and explosives needed for each separate project. These timetables had to be checked and approved by Army.

Demolitions of first and second priority were usually carried out by GHQ engineers, railway engineers, or technical battalions. Demolitions of third priority were carried out by divisional engineer forces.

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[14] The engineers were usually committed in leapfrog fashion: one detail prepared the charges, another fired them or marched on to the next objective.

This method of commitment proved highly effective during OPERATION BUEFFEL, and later was successfully adopted also by other army groups (for instance, by Army Group North).

VII. Field Fortifications.

Our experience during position warfare in Russia proved that in a free choice between a reverse slope position and a forward slope position, the former was unquestionably preferable. The main line of resistance is to be located approximately 200 to 300 meters behind the crest. Outposts, infantry heavy weapons, and artillery forward observation posts are to be located atop the crest. Main observation posts are to be set up in the rear, at the flanks.

Important was the depth of the battle position. The position usually consisted of a first line of resistance, and 200 or 300 meters to the rear a second line, antitank ditches, and positions for the immediate protection of our artillery.

[15] A dummy position -- in many instances in the center of the battle position -- was occupied by only a few sentries. However, ditches and obstacles had to be simulated as if they were really part of the battle position. This dummy position also served as a trap, to facilitate penetrations of enemy forces with a view to destroying them in a prepared flanking thrust.

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[15] The large frontages (20 to 30 kilometers) of division sectors in Russia forced us to adopt a strong-point method in manning them. However, the strong points had to be interconnected with trenches. These trenches likewise had to have clear fields of fire, and had to be manned by a few sentries.

Every strong point consisted of several machine-gun nests, squad trenches, observation posts for heavy weapons, and a command post. It had a special strong-point commander, and a sufficient supply of ammunition and rations to hold out for several days.

The trenches were narrow and deep (maximum width at top - 1 meter; depth - 1.70 meters), and interconnected by short zigzag bays of 8 to 10 meters length that met at obtuse angles. Neither parapets nor paradoses were built. The trenches had fire steps and several dugouts for riflemen and ammunition. The front trenches had no cut-and-cover shelters, only dugouts as protection against light artillery fire and bad weather. Small ladders were available for patrols and sorties.

The connecting trenches with the second line, and the second line proper had cut-and-cover shelters for living quarters, preferably with two exits and air locks. Time, available labor, and the level of ground water permitting, we built deep cave shelters with two exits. Between the first and second line -- adjacent to the connecting trenches -- foxholes could be dug for cover against tanks passing overhead. In specially prepared positions these foxholes were circular concrete pits, known as Koch pits*

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*Ed: Presumably a pun: literally a cooking pit, at the same time an allusion to the regional Nazi party leader [Gauleiter] of East Prussia, Koch.

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[15] in East Prussia. These pits could also be used as flanking machine-gun emplacements.

Notable was the standard practice of employing open firing positions. Embrasures proved impractical, because the enemy easily recognized and subsequently destroyed them.

A good position was distinguished by camouflage against ground or aerial observation. The importance of camouflage could never be overemphasized and the Russians were past masters of the art.

Well-camouflaged low wire obstacles (trip wires, wire foot snares) were built around the strong points. Higher obstacles were built in front of the connecting trenches between the strong points. The double-apron fence known from World War I was the standard type of obstacle.

In the trenches we built collapsible obstacles for the protection of sentries against ambushes at night. These obstacles were folded away during daytime and set up at night, and were rigged to set off an alarm or hand grenades.

So far as mines are concerned, we generally planted a barrier of T mines and antitank [Riegel] mines in the depth of the battle position. In front of the main line of resistance -- and even in front of the obstacles -- we planted S mines and our small box mines. Planting mines interconnected with trip wire in front of the obstacles proved unsuccessful, because the Russians spotted the wires and had their reconnaissance patrols remove them at night.

Truly remarkable was the sure-footed manner in which the Russian reconnaissance patrols night after night sneaked through our mine fields or removed the mines. Although they suffered a few casualties, they succeeded very often in penetrating into our most forward trenches.

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[16] During the last year of the war we used our mine sound detector as a means of defense against enemy reconnaissance patrols. Experiments with the detector at ROSSLAU turned out rather favorably; however, I have no knowledge about the practical application of this method.

Permanently emplaced flame throwers (captured Russian material) were frequently used to reinforce the front lines. These flame throwers were effective, but often failed to function because concentrated enemy artillery fire cut the ignition lines. Later we also installed self-firing recoilless antitank grenade launchers [Panzerfaust] interconnected with trip wires. I have no information concerning their practical application.

So long as at least a minimum of the necessary labor was available, we built antitank ditches in the line -- commonly known as the tank-trap line -- ahead of the positions protecting our artillery. We built triangular and rectangular antitank ditches of at least 2.50 meters depth and 4 to 5 meters width, often with the help of power shovels. During the winter these ditches were reinforced with snow walls. The improvised bridges over the ditches always had to be rigged with demolition charges, and demolition details had to be ready to blow them up at a moment's notice, because Russian tanks often succeeded in crossing bridges that had been left intact.

Whether the cost of time and labor expended for the construction of antitank ditches was commensurate with their effectiveness as a defense is open to question. In any event, they always lent a certain amount of moral support.

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[16] The time needed for the construction of a prepared position -- including antitank ditches and obstacles -- varied in Russia, depending on the terrain, fields of fire to be cleared, transport facilities, etc. An average of from 350,000 to 400,000 man days had to be counted on for the complete construction of a position over a division frontage of about 25 kilometers.

In Russia, all villages in the depth of the army area were -- in addition to the actual position -- transformed into strong points in order to stop deep enemy penetrations, and for protection against partisans. Well-camouflaged small strong points outside of the villages were of particular importance as flank protection.

During World War I, tunneling operations had been very extensive at our Western Front, whereas in Russia they had hardly been in evidence. The same was true in the late war. In the Second Army sector the Russians tried tunneling only twice, in order to blow up immobilized, dug-in tanks that served as advance observation posts. With its listening devices, an engineer sound locator platoon was able to ascertain the exact progress of the tunneling operation.

The tunneling methods of the Russians were very primitive. The shoring was strictly improvised, and operations were directed from above ground. Despite their inexperience, our engineers were thus able to destroy the tunnels by setting off countercharges shortly before the Russians reached our observation posts.

VIII. Employment of Railway Engineers.

Railway engineers were not under the jurisdiction of

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[16] the army engineer. They received their orders from the chief of transportation, but were dependent upon co-operation with the engineers.

Their main task was the repair of destroyed railway bridges. They used prefabricated bridging equipment almost exclusively, with very satisfactory results. An important task was the conversion from Russian to German track gauge. The ties could be retained, because the German gauge was narrower. Conversion took an amazingly short time, and offered no difficulties whatsoever.

In the Second Army sector, near VORONEZH, the railway engineers augmented transport facilities by building a cableway from
[17] the western to the eastern river bank [sic] for the supply of troops during floods. The equipment stood the test, but not enough was available. Instead of the required 2,500 meters, only 700 meters were delivered.

During retrograde movements, the railway engineers had to co-operate with the engineer field forces in destroying railway bridges, tracks, and terminal facilities.

The railway engineers were well equipped, and effectively organized.

In conclusion, we may state that the adverse forces of nature very <u>substantially</u> affected tactical measures in the vast and desolate spaces of Russia, above all during wintertime. A numerically strong force of technical specialists, particularly engineers, was therefore of the essence in the Russian campaign. That force was not always at our disposal in sufficient numbers, and was inadequately equipped

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[17] and not mobile enough for the vast distances.

Concentrated at points of main effort, however, and supplied with improved and augumented equipment and motorization, the technical troops surmounted all difficulties. As a result, the tactical commanders were assured full freedom of decision and movement, as proved by the spirited attack of Second Army on VORONEZH in the summer of 1942.

In recognition of these facts, the Supreme Command also increased the quota of engineer replacements, which up to that time comprised only 6 per cent of the German military forces. In 1945, 11 per cent of the recruits were to be assigned to the engineers. I consider even that number too small for our machine age. In my opinion, from 15 to 20 per cent would be the minimum requirement.

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