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MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Engineer Support for the Actions of Missile Large Units and Units in Offensive Operations

1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article is divided into three sections, the first defining the responsibilities of the chief of engineer troops of a front and army regarding engineer support for an offensive operation and for the actions of rocket troops. The next part discusses the importance of reconnaissance and route preparation for the timely relocation of missile siting areas. The last describes the most effective means and methods to be employed in moving rocket troops and their equipment over water obstacles. This article appeared in Issue No. 1 (68) for 1963.

2. Because the source of this report is extremely sensitive, this document should be handled on a strict need-to-know basis within recipient agencies. For ease of reference, reports from this publication have been assigned

John N. McMahon

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SUBJECT

MILITARY THOUGHT (USSR): Engineer Support for the Actions of Missile Large Units and Units in Offensive Operations

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 1 (68) for 1963 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article is divided into three separate sections -- each one written by a different author. General-Mayor of Engineer Troops V. Bystrov first defines the responsibilities of the chief of engineer troops of a front and army regarding engineer support for an offensive operation and for the actions of rocket troops. Colonel V. Zakharov then discusses the importance of reconnaissance and route preparation for the timely relocation of missile siting areas of the rocket troops. He also stresses the need of the latter for armored personnel carriers to ensure rapid movement and protection. Finally, Colonel V. Bayev describes the most effective means and methods to be employed in moving rocket troops and their equipment over water obstacles.

End of Summary

Comment:

The articles referred to in the text which appeared in Issue 3 (64) for 1962 are all part of a four-part article which was disseminated as [redacted] (IRONBARK). The 1961 article cited was disseminated as [redacted] (IRONBARK).

Engineer Support for the Actions of Missile Large Units and Units in Offensive Operations

by
General-Mayor of Engineer Troops V. BYSTROV
Colonel V. ZAKHAROV
Colonel V. BAYEV

In their article under the same title,* General-Mayor of Artillery L. BLAGORAZUMOV and Engineer Colonel V. KAZIN quite correctly, in our opinion, have pointed out the ever-increasing gap between the low performance and inferior transport speed of the basic engineer vehicles used to accomplish the engineer tasks for the support of rocket troops and the high level of mobility of the very same rocket troops. They also note that these tasks can be carried out only during the preparation period for an offensive operation and only with considerable difficulty in the course of the operation.

We believe that the problem of the low mobility of engineer troops has not been stated emphatically enough. The article lists the most modern engineer equipment means (the MDK excavating machine, the BAT artillery tractor dozer), recommending that they be transported on heavy-duty trailers. The organic engineer subunits of the rocket troops have been or soon will be equipped with the vehicles indicated above. Regrettably, however, these subunits carry out only a part of the work for the engineer support of the rocket troops, whereas the principal and greater amount of the work must still be carried out by engineer troops of army and front subordination. The latter troops, as concerns the qualitative make-up of the engineer vehicles they presently have in service, absolutely do not conform to the movement capabilities of the rocket troops.

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* Collection of Articles of the Journal "Military Thought," No. 3 (64), 1962.

The fact of the matter is that at the present time there are in the armies and in the military districts almost no engineer-road or engineer-position preparation units in constant combat readiness. And in the event of their deployment or activation, such vehicles as the BAT artillery tractor dozer will most often be replaced by bulldozers from the national economy, which will require additional heavy-duty trailers and prime movers. In connection with the fact that practically all road clearers and excavators are to be replaced by equipment from the national economy, the marching speed of the above-indicated units will be extremely low and consequently they will not, from the engineer standpoint, support the relocation of the rocket troops. This is an extremely important problem and its solution cannot be postponed.

Engineer support of the combat actions of rocket troops is, as is well known, one of the central tasks in the overall system of measures for engineer support of an offensive operation of a front and army. And the authors are right in saying that as a result of our troop and command-staff operational exercises, our rocket troops and army and front staffs have already accumulated definite experience. Accordingly, the proposal of comrades BLAGORAZUMOV and KAZIN sounds rather strange, that is, to remove everything pertaining to engineer support from the sphere of competence of the commanders of missile large units and units and to accomplish this task by organizing in the armies and in a front special operational engineer groups whose activities are to be controlled by the chief of the engineer troops of an army or front.

This proposal, in our opinion, is incorrect, since instead of the purposeful fulfilment of those engineer measures that are specific for each missile unit and large unit, it will only lead to confusion and, in the final analysis, to non-fulfilment of tasks.

As far as we know, engineer support of rocket troops is carried out in accordance with the following principle. All engineer work inside the siting areas and the preparation of the roads leading from them to the main routes of a front or army are carried out according to the orders of the missile unit and large unit commanders by the forces and means of the organic and attached engineer units and subunits. All work to prepare the

main routes on the axis of movement of the rocket troops and for the delivery of missiles from the missile rear services, and also for the relocation of the latter, is accomplished by front or army forces and means under the overall direction of the appropriate chief of engineer troops or chief of the military transportation service.

Accordingly, the obligations of missile unit and large unit commanders and of the corresponding engineer chiefs are absolutely clear, and the organization of cooperation is simple. The commander of a missile unit or large unit, through the chief of the engineer service (but if there is no such chief, then he himself) assigns specific tasks to the commanders of the engineer subunits for the preparation of the siting area, summons a reconnaissance group there in advance, and then sends out the engineer subunits subordinated to him, so that when the missile unit begins to shift location, the new siting area is ready. Under this situation, the commanders of the missile units and large units bear full responsibility for the timely preparation of the next siting area.

But the proposal of the authors of the article takes this responsibility away from the commanders of missile units. Their organic engineer subunits are transferred to the operational engineer group which is led by an officer from the organization of the chief of engineer troops. The officer in charge of such an operational engineer group is confronted with many difficulties: how to maintain continuous and reliable communications with the commanders of the missile units and of the air defense units positioned in the common siting area; how to organize without loss of time the reconnaissance of the new siting areas and assign tasks to several subunits and sometimes even to the crews of engineer vehicles; with the help of which communications means are the subunits of this improvised group to be controlled.

This list of difficulties, still far from complete, shows that the problems of engineer support of the rocket troops will not be solved more efficiently with the aid of this group. It is more reliable, in our opinion, to leave the necessary forces and means subordinate to the commanders of the missile units and large units.

At the same time, a front and army may require a large number of such operational groups, and the chief of engineer troops of a front will be in no position to allocate from his organization the required number of experienced and expert engineer officers, nor will he also be able to direct these operational groups dispersed over a large territory. It will be an extremely complex matter to exercise control with the help of any improvised groups that have not been provided with organic means of communication and transportation. And the proposal to provide every officer in charge of an operational engineer group with an MI-1 helicopter, even when helicopters are allocated from the complement of a front helicopter regiment (the chief of engineer troops of a front does not have any helicopter units at his disposal), leads to complexity in organizing basing and refueling, providing their crews with weather reports, etc.

It would be considerably easier, in our opinion, for the commander of a missile large unit or unit to solve all of these problems with a special-purpose (one-time) utilization of the helicopters in order to conduct reconnaissance of the new siting areas.

As a basis for one of the arguments in favor of their proposal concerning the necessity of organizing operational engineer groups, the authors of the article cite the uninterrupted control exercised by the chief of engineer troops over the actions of the operational groups subordinated to him and over the maneuvering of the forces and means allocated to these groups, as a result of which he will be able in essence, though not formally, to be responsible for the engineer support of the actions of the rocket troops and the air defense troops of the ground forces in the operation.

We must take issue with comrades BLAGORAZUMOV and KAZIN because we believe that at the present time the chief of engineer troops of a front or army bears responsibility in essence, though not formally, for the fulfilment of all measures of engineer support for an offensive operation of a front and army in general, and for the engineer support of rocket troop actions in particular. It is his responsibility to see that the engineer forces and means detailed to the branch arm units and large units arrive on time at the appointed areas in compliance with the engineer support plan of the operation and that they fulfil on

time the tasks assigned to them. It is for this that the chief of engineer troops organizes supervision and monitoring.

But to charge the chief of engineer troops of a front or army with direct supervision over the preparation of the rocket troop siting areas signifies a somewhat incorrect appreciation of the nature and extent of his work. Such a proposal will only worsen the state of affairs, if only because of the drastic increase in all types of coordinations.

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The experience of many exercises has shown that the success of the actions of missile large units and units of a front will depend to a considerable degree upon the timely and skilful fulfilment of the engineer measures directed toward ensuring the survivability and mobility of these units. However, the existing methods and means of fulfilling the principal tasks of engineer support for the actions of missile large units and units, in our opinion, do not fully correspond to the nature of the offensive operation nor to the methods of the combat employment in it of rocket troops.

Missile large units and units as yet have in their complement insufficient engineer forces and means for the timely and efficient fulfilment of the principal engineer support tasks in the preparation for, and especially during, an offensive. Thus, in the complement of the operational-tactical missile brigades of an army and of a front there is an engineer-combat engineer company, which in numbers and equipment is only slightly superior to the combat engineer company of a motorized rifle regiment.

In our opinion, the problem of engineer support for the actions of missile large units and units has for the present not yet been resolved fully and requires further extensive discussion in the military press and in the appropriate theoretical science conferences and it requires verification of the recommendations developed in the course of tactical and special exercises.

The overall purposes of engineer support for the actions of rocket troops of a front in an offensive operation are well known. The experience gained in exercises over a number of years

has shown that in order to achieve these purposes it is necessary to conduct timely engineer reconnaissance of the movement routes and of the primary and alternate siting areas, to prepare and maintain in a serviceable condition the necessary number of routes, to prepare from the engineer standpoint the primary, alternate, and dummy siting areas, and to thoroughly camouflage them from the enemy's modern means of detection.

In order to arrive at a correct decision on the overall organization of engineer support for the actions of rocket troops, and especially concerning the preparation of movement routes and new siting areas for them, it is very important to receive within the shortest possible time limits sufficiently complete engineer-reconnaissance data on the following subjects:

-- the overall condition of the routes allocated for the regrouping and maneuvering of the missile large units and units (width of the roadway, types of road surface, load-carrying capacity and condition of bridges across water obstacles, highest slopes downhill and uphill, minimum radii of curves, and the nature and extent of the reconstruction work on the damaged sections);

-- the possibility of and conditions for constructing bypasses on those sections of the routes which do not provide for the passage of heavy and oversized equipment and on those sections against which enemy nuclear strikes are most probable (various types of defiles, major populated areas, etc.);

-- the natural protective camouflage characteristics of the terrain in the vicinity of the movement routes of the rocket troops and in their siting areas;

-- the possibility of and conditions for the use of means of mechanization in engineer work (the nature of the soil, the level of the ground water, etc.).

In the course of a front troop offensive advancing at a rate of up to 100 kilometers per 24-hour period, the reconnaissance of the movement routes and siting areas for each missile large unit should not, as a rule, last longer than two hours. Otherwise there will be little time left to arrive at a decision and to deploy the necessary forces and means. The practice of exercises in recent years has shown that the conduct of engineer reconnaissance within a period not exceeding two hours over 120 to 250 kilometers of routes and of a missile large unit's siting

area, covering an average area of 1,500 to 1,750 square kilometers, is possible only if the reconnaissance subunits or the reconnaissance groups have MI-4 helicopters at their disposal.

At present an operational-tactical missile brigade has two MI-1 helicopters and an MI-4 helicopter. Taking into consideration the fact that the reconnaissance of movement routes and new siting areas is conducted, as a rule, independently by each missile battalion of the brigade, it would be most desirable if the brigade had no less than two MI-4 helicopters and one MI-1 helicopter.

The success of the forward movement of the missile large units and units of a front to their siting areas is largely determined by the timely preparation of the necessary number of routes, the number depending on the strength of the rocket troops, their schedule for shifting siting areas, and the overall rate of advance. And these very conditions determine the time allowable for the engineer preparation of the siting areas.

Appropriate calculations have shown that to avoid having missile large units and units lag behind the advancing troops of a front, it will be necessary for the army and front missile regiments and also for the army mobile missile technical bases to relocate once a day, and for front separate missile battalions, cruise missile air regiments, and certain mobile missile technical bases to relocate once every two days, and sometimes once every three days.

According to the experience of exercises, in order to ensure timely shifts in siting areas, it is necessary, during the time missile equipment is being moved, to allocate and prepare out of the total road network of a front two routes for each army and front missile brigade and one route for each surface-to-air missile regiment, mobile missile technical base, and cruise missile air regiment. In all, we need for this purpose in the front offensive zone 10 to 12 routes, of which two to three routes will usually be prepared by the first-echelon armies within their own offensive zones and four to six routes will be prepared by the front. In order to prepare and maintain a single route 100 to 120 kilometers long under average rough terrain conditions, one engineer-road company will suffice.

Consequently, an army of the first echelon of a front should, on the average, detail one engineer-road battalion to carry out this task and a front should detail up to two engineer-road battalions.

For the purpose of creating more favorable conditions for the movement of missile large units and units, the routes selected and prepared for them must be distant from the most probable targets of enemy nuclear strikes and from the roads on which the main forces of the front troops move and on which the main bulk of the materiel and technical means are delivered to the troops.

We have to agree with the view of General-Mayor of Engineer Troops D. ZABOLOTSKIY and Lieutenant Colonel V. GAVRILIN* that, as a rule, the routes for the delivery of missile warheads and propellant should be prepared and maintained in good condition by forces and means of the road units of the army and front rear services. Furthermore, in accordance with the actual situational conditions, it is necessary to foresee granting the rocket troops preferential rights to unobstructed movement on any roads of army and front significiance, and this should be indicated in the road support plans of the front offensive operation.

Also correct, it seems to us, is the view of comrades ZABOLOTSKIY and GAVRILIN concerning the preparation of the routes within the siting areas of missile large units and units by their own organic forces and means. According to exercise experience, in order to support their deployment, army and front rocket troops in new siting areas must have road networks of the following general lengths: a front (army) missile brigade -- 200 to 250 kilometers, a front separate missile battalion -- 50 to 60 kilometers, a cruise missile air regiment -- 140 to 150 kilometers, a surface-to-air missile regiment -- 110 to 120 kilometers, and a mobile missile technical base -- 40 to 50 kilometers.

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* Collection of Articles of the Journal "Military Thought", No. 3 (64), 1962.

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When preparing these routes we should exploit to the maximum the roads, forest tracks, paths, and terrain sectors that permit the movement of missile equipment. Under conditions of the Western Theater of Military Operations and according to the data of many exercises, up to 80 percent of the routes mentioned above can be made to coincide with the existing road network and only 20 percent will have to be newly laid down.

Using their organic engineer troop subunits, missile large units are capable of preparing within 10 to 12 hours the number of routes they lack for their deployment in the new siting areas. This time period does not fully meet the conditions of an offensive operation and has to be shortened to six or eight hours. To do this, we must additionally include in the complement of the engineer-combat engineer companies of the operational-tactical missile brigades two to three road clearers, no less than two bridge layers, and a set of light standard sectional road and bridge structures.

In a present-day offensive operation it is very important to ensure the high survivability of the battle and march formations of rocket troops. This can be achieved by carrying out a system of measures which takes into account the conditions of the operational situation, namely, by skilfully and as fully as possible exploiting the natural protective and camouflage characteristics of the terrain, by extensively dispersing missile large units and units, by periodically changing the primary and alternate siting areas, and by constructing in the siting areas shelters for personnel and for combat and transport equipment.

Dispersing the troops and constructing the necessary shelters for them, as we know, are not ends in themselves and are justified only if they contribute to a considerable reduction of the possible losses in personnel and in combat and transport equipment from enemy nuclear strikes.

In this connection, it is appropriate to raise the problem of how the nature of the engineer preparation of the siting areas of the rocket troops and the extent of their dispersal are to be determined in accordance with the maximum acceptable limits of troop losses, should the enemy deliver nuclear strikes against them. The research we have carried out, which we regrettably cannot discuss at length in these brief comments, has shown that

linear programming methods will permit us to successfully solve this task, find the most efficient solutions to this problem, and ensure antinuclear protection of the troops under any situational conditions.

The types of personnel and equipment shelters we use, and also the resistance of the equipment itself, are very important in ensuring that rocket troops in their siting areas, and particularly while in movement, are reliably protected against the enemy's modern means of destruction.

As mentioned previously, the average time for the engineer preparation of the siting areas of missile large units and units in the course of an offensive should not exceed six to eight hours. During this time, and while utilizing industrially manufactured sets of structures and highly efficient earth-moving equipment, we will be able to construct only approximately 45 percent of the required shelters. At the same time, it will be necessary to have a second set of industrially manufactured structures and a large number of trucks to transport them to the new siting area.

Moreover, using shelters from the industrially manufactured sets will not provide rocket troop personnel, who are underway, with protection against enemy means of mass destruction.

Thus, the use of industrially manufactured structures in the preparation of the siting areas of the rocket troops does not adequately solve the problem of providing their personnel with adequately reliable protection against the enemy's modern means of destruction nor the problem of preparing the siting areas within the required time limits. The article referred to is absolutely correct in pointing out that the organic forces and means of the missile large units and units must be charged with accomplishing this task, since in the course of highly mobile combat actions the chief of engineer troops of the front will actually be unable to direct at first hand the timely preparation of the considerable number of siting areas in the entire offensive zone of the front.

In our opinion, to solve the given problem it is necessary: to allocate the BTR-50PK armored personnel carriers with special anti-neutron linings and filtration-ventilation units to the

primary rocket troop subunits as a means of movement and protection, to make the key assemblies and vehicles of the rocket troops more resistant, and to provide missile large units and units with the required amount of highly efficient engineer equipment.

The presence of such armored personnel carriers in the rocket troops will make it possible for the personnel of a missile unit to be provided within approximately 1.5 hours after arrival in a new siting area with adequately high protection against the casualty-producing effects of nuclear and chemical weapons, bacterial means, and conventional types of armament. In terrain with superior protective and camouflage characteristics, armored personnel carriers with covered bodies do not need additional shelters. Because of this, the essential personnel of a missile large unit or unit, after the required dispersal and practically within the first minutes of arrival in a new siting area, will be protected against all of the enemy's modern means of destruction.

Using the machinegun armament of these armored personnel carriers, missile subunits and units will be able to more successfully combat enemy landing forces and sabotage groups in their siting areas and while they are on the march. While inside the armored personnel carriers equipped with special linings and filtration-ventilation units, the personnel of missile large units and units will be able to negotiate zones with high levels of radiation. The use of armored personnel carriers will also make it possible to considerably reduce the inventory of trucks now used to transport the personnel and the sets of industrially manufactured structures. And thanks to this, it will be possible to significantly reduce the length of the march columns of the rocket troops and also decrease their vulnerability on the march.

Armored personnel carriers with covered bodies should be provided first of all to the primary rocket troop subunits: the fire sections, the technical support platoons, the control system preparation teams, the control platoons and batteries, the staffs, and the meteorological stations. Shelters made of light framework structures (LKS) or covered slit trenches can be used for the other subunits.

According to our calculations, the requirements for armored personnel carriers (and light framework structures) might be as follows: for a launch battery -- 4, for a missile battalion -- 16 (2), for an operational-tactical missile brigade -- 58 (8), for a surface-to-air missile regiment -- 40 (4), and for a tactical missile battalion -- 7 (1). The allocation of this number of armored personnel carriers is wholly realistic and can be done at first even partially by drawing on the combined-arms large units and units. The need to solve this problem has long been coming to a head; this has been confirmed by the experience of a number of special exercises (for example, in the Transcaucasus and Baltic Military Districts) and, as is well known, has been rated positively by the commanders of many missile large units and units.

The protective characteristics of the shelters presently used in the inspection, fuelling, and missile mating points are very inferior and some of them, especially at the missile transshipment points, at the positions of the surface-to-air missile guidance stations, and at other points, have a configuration which significantly hampers the use of modern means of mechanizing engineer work. Therefore, a key problem, in our opinion, is that of making more resistant the missiles themselves and certain rocket troop assemblies and vehicles. We support the proposals of Engineer Colonel B. MIKHAILOV* and of General-Mayor of Engineer Troops D. ZABOLOTSKIY and Lieutenant Colonel V. GAVRILIN** concerning the hardening of missile materiel and, in particular, we propose that a detachable armored container for missiles be produced as an integral part of the ground transporter. Inside it a missile would be in protected condition while being transported and while at the inspection and fuelling points. Accomplishing this measure is completely feasible from a technical viewpoint. It would lead to a sharp reduction in the

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* Collection of Articles of the Journal "Military Thought," No. 6 (61), 1961.
** Collection of Articles of the Journal "Military Thought," No. 3 (64), 1962.

vulnerability of missiles and considerably reduce the amount of engineer work when preparing siting areas.

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In the course of a present-day army offensive operation in the Western Theater of Military Operations the troops will have to make assault crossings over two to three water obstacles each day. Under these conditions, the successful accomplishment by missile units of their tasks will depend greatly on precise organization and a high level of technical execution of the construction of the crossings.

The material in military periodicals testifies to the fact that the opinions that have been formed on organizing the negotiation of water obstacles must be reexamined and that we must more concretely solve a number of technical problems through tactical-special exercises. However, one cannot be guided merely by the experience of such exercises in order to develop significant recommendations on the organization of crossings for rocket troops. In our opinion, these recommendations must be tested in various types of assault river crossing exercises with troops. The fact that at present we do not yet have a unity of views on the solution to the technical problems speaks out in favor of such testing. Thus, comrades Ye. KOLIBERNOV, V. DIMURA, and L. YEFIMOCHKIN the authors of one article,* recommend that lightweight trucks and cargo trucks be crossed without trailers on K-61 transporters. But V. ANDREYEV and P. RYUMIN, the authors of another article,** believe we can do without using the latter.

In our opinion, the categorical assertion of the authors of the first article is incorrect concerning the fact that of all the missile equipment, only the launchers based on the ISU-152 ["Joseph Stalin" assault gun] mount can be crossed on the GSP tracked self-propelled ferry. In actuality, only elongated trailer equipment cannot be crossed on the GSP tracked self-propelled ferry, all the rest can. And the recommendation on the time periods for crossing a reconnaissance group also needs refinement. It is wrong to allege that there is no need to carry this out before the troops occupy the terrain planned for

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* Collection of Articles of the Journal "Military Thought". No. 3 (64), 1962.
** Ibid.

the siting area. The latter may be located any distance away from the river and, therefore, it is simply unwise to defer crossing the reconnaissance group until the area is seized by the first-echelon troops.

The fundamental problem, in our view, in organizing the crossing of rocket troops with their complex and diversified equipment, is to determine the purpose and nature of the employment of the crossing means.

We support the view of the authors of the first article that in order to cross missile units, we should allocate special-purpose pontoon units and independent crossing sectors. However, this is possible only by increasing the organic number of assault river-crossing and pontoon bridge units in a front and in an army. The presently available organic means in an army will be put to work to support the assault crossing of the first-echelon troops. In our opinion, to reinforce an army with additional crossing means is economically inadvantageous and insufficiently rational.

Another approach is much more advisable -- that of improving the quality of the crossing means, allowing us to increase the rate of speed in crossing and to free a certain number of crossing means for the support of the rocket troops.

We frequently state that a crossing should proceed at the speed of the offensive, but for this it is necessary to have in the water an adequate number of crossing means. However, this speed can be achieved and maintained not through numbers, but by improving the quality of the crossing means. It is hardly possible to consider it normal when the speed in crossing bridges ranges from 10 to 12 kilometers per hour. And this at a time when it is foreseen that movement, even on a poor road, is to be at a speed of no less than 20 kilometers per hour.

The movement speed of assault crossing means in the water, ranging from eight to ten kilometers per hour, is also insufficient. Transport ferries under maximum loads move even more slowly.

In our opinion, the task of increasing the crossing speed of missile equipment over bridges and by flotation must be

accomplished by improving the design of the crossing means. It is well known that our pontoon sets have undergone major qualitative changes which have appreciably improved their characteristics. However, many problems remain unresolved. Up to now trucks have been merely transportation means. There are no attachments on them which would make it possible to mechanize the assembling of bridges and the towing of ferries and so eliminate the additional hauling of special towing launches having different capacities. Much time is as yet taken up performing various matings in the assembly of ferries. Mooring a ferry to a pier and casting off are also performed manually at relatively slow speeds. Without a doubt all of these processes must be mechanized.

It is well known that the selection of crossing points and the optimum positioning of landings are often decided without properly taking into account the capabilities of the crossing equipment. This quite tangibly affects the duration of a crossing. Locating equipment on a ferry in the most stable position is performed "by eye," on which much time is expended.

It seems to us that given the limited number of heavy loads within the total mass of equipment, there is no need to assemble ferries of maximum cargo-carrying capacity. In a missile brigade there are not very many heavy loads (launchers, excavating vehicles, artillery tractor dozers). To cross them it would be expedient to assemble 25-ton or maximum 30-ton transport ferries which are designed to have provisions for additional inflatable (from a compressor) rubber pontoons positioned in the spaces between the metal pontoons.

It seems to us that for the crossing of 40-ton loads (with the launcher and its missile weighing 38 tons), there is no need to assemble 50-ton ferries; it would be expedient to do away with one to two pontoon sections from their structure.

And one more minor comment. Frequently, due to a variety of causes, the launch motorman and the ferry commander work under conditions of limited visibility. Improving the conditions of their work would lead to a shortening of crossing times.