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Some Questions in the Control of Missile Large Units, Units, and the Artillery

At the present time it is generally recognized that the decisive role in routing the enemy in a modern battle and operation belongs to fire and primarily to nuclear/missile strikes. However, as was shown by the experience of many exercises that have been carried out, fire can have a decisive importance only under firm, continuous and exceptionally clear-cut control of the missile large units, units, and the artillery. The control of these weapons must be such that it would be possible to deliver powerful fire strikes against the enemy in the shortest possible time, during a highly dynamic offensive operation with high speed troop operations inherent in it, and with sharp changes in the situation.

The chief shortcoming in controlling missile large units and units, which was noted in a series of exercises, is that commanders and staffs spend much time, sometimes up to several hours, for the preparation of nuclear/missile strikes and the transmission of fire missions to those who will execute them directly. As a result of this, the strikes are delivered late and are not always effective, particularly against mobile targets.

With the aim of determining the most advisable methods of control, at one of the exercises which was conducted, a series of means of automation and mechanization was used for control at the level of the army corps, missile brigade, missile battalion and tank division, tactical missile battalion of a tank division, and artillery battalion. The exercise showed that even the use of means with slight mechanization increases to a considerable degree the reliability of control and decreases the time periods for delivering nuclear/missile strikes against the enemy.

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The purpose of this article is to make the experience of this exercise known to generals and officers who are studying problems of controlling missile units and artillery. Therefore, the positions set forth in the article should be adopted, in conformance with the specific situation, but some positions need further study and checking.

In the army corps and division, the control of missile units and the artillery in the exercise was carried out by the chiefs of artillery and their staffs on the basis of adopted decisions and instructions from the corps (division) commanding officer.

In taking into consideration the experience of previous exercises, the work of the artillery staffs was organized in such a way that the control of missile units and artillery was stable and continuous during the preparation for the offensive as well as during the course of it, and also when one of the control points was put out of action. For this purpose, two control groups were organized beforehand from the composition of the staffs. It was intended to use one of these groups for control from the command post and the other from the forward command post. The existence of two groups was also to have facilitated control when shifting command posts during an offensive.

Two mobile control points were prepared in the artillery staff of the army corps based in buses of the staff.

For control from the forward command post, the mobile point had a table for working on the fire control map, a signal-code device, an extension device of an R-118 radio set, a telephone apparatus linked with a secrecy device, a subscriber's set of the dispatcher's loudspeaker device (dispetcherskoye gromkogovoryashcheye ustroystvo-DGU), and telephone apparatus for wire communications. Besides the listed means, the forward command post had R-104AM, R-125, and R-118 radio sets. Control from the forward command post was carried out by the chief of artillery of the army corps, to whom a group of staff officers was subordinate, consisting of two officer-operators, an intelligence officer, and a signalman.

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At the corps command post, from which control was to be executed by the chief of staff of the artillery with one intelligence officer subordinate to him, there were R-125 and R-118 radio sets and also a secrecy (zasekrechivayushchaya - ZAS) device.

In the division, both mobile control points were mounted on armored carriers (BTR-50 PU) (Armored Carrier-50 Control Point (bronetransporter-50 punkt upravleniya)), and the radio means were housed in special radio vehicles.

The experience of the exercise showed that this organization of the work of artillery staffs is justified only when the control groups are staffed with the necessary number of officers and are supplied with technical means of control and communications. For example, in an army corps it is necessary to have in the composition of each of the control groups a minimum of two officer -operators, an intelligence officer, and a signalman, to control the missile brigade, the artillery of 3 or 4 divisions, the antitank reserve, and other weapons.

When this requirement was not met in the exercise because of the small size of the artillery staffs and also because of several other reasons, it led to the fact that in the army corps, control was actually carried out by the chief of artillery from one point, namely from the forward command post. With the relocation of the forward command post, the chief of artillery was forced to carry out control from short stops, which, naturally, did not ensure continuity of control to the proper degree, primarily control of the missile brigade.

The chief of staff of the artillery of the corps was limited in his means of control and therefore could not have timely information on the enemy, on the operations of friendly troops, and on the status, security, and missions of the missile units and the artillery. When the forward command post was put out of action, the chief of staff, who was at the command post, was not in a position to take control upon himself, which could lead to a complete loss of control at the most crucial moments of combat.

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The experience of the exercise also shows that control of the missile units and the artillery from the forward command post and the command post is not completely advisable. It is more advisable to control from one command post, and in the event it is put out of action to have a previously prepared alternate command post. In this case, the chief of artillery and the artillery staff of the corps (division) are located at the command post. In this, the work of the staff is organized in such a fashion that control is effective and guarantees the adoption of decisions and informing subordinates of their missions in the shortest possible time. Each officer of the staff must know his functional duties and have all the necessary means to fulfil them.

It is advisable to have one or two officers from the artillery staff and previously organized communications at the alternate command post, in the event control is transferred to it. During control from the command post, the communications means of the alternate command post must receive only, so that the staff officers are constantly abreast of the situation and know the position of the missile units and the artillery, their security, and the missions being accomplished.

The chief of artillery and the chief of staff of the artillery must also report to the alternate command post about all the orders given by them. The transfer of control from the command post to the alternate post can be carried out according to a previously established signal, upon the command of the chief of the corps (division) artillery or of the chief of staff of the artillery.

The control point of the chief of artillery is an inseparable component part of the command post of the corps (division) commanding officer. In order to guarantee effective use of the missile units and the artillery, the chief of artillery and his staff must be located in place, in the immediate vicinity of the corps (division) commanding officer; and in the event of a transfer, he must follow the vehicle of the corps (division) commanding officer, thus ensuring the capability for rapid preparation of the nuclear/missile strikes to be delivered in accordance with the decision made on them.

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The separation of the chief and the artillery staff from the corps (division) commanding officer and his staff during a shift of control points was one of the reasons for the delay in the timeliness of delivering nuclear strikes.

At the exercise which was held, the chief of artillery of the army corps and division did not possess specially equipped mobile control posts, which negatively affected control during the offensive. Control posts which are based in buses and armored carriers do not accomplish the task because they do not have the necessary control and communications means and, moreover, do not ensure convenience of work. Control and communications means must be located in a mobile point in such a way that preparing them for work takes a minimum amount of time and the work of one means does not hinder the work of the other.

Communications of the chief of artillery of the corps with the missile brigade was organized on a radio network with R-118 radio sets in which, besides the radio station of the brigade commanding officer, were included the radio stations of the staff of the brigade and of the missile battalions.

In addition, two radio networks with R-125 radio sets were organized by the corps headquarters to connect the artillery staff with the missile brigade.

Communications of the artillery chief and staff of the corps with the artillery chiefs and staffs of the divisions were organized with R-104 and R-108 radio sets.

Radio relay communications in the corps were organized toward the control points of the divisions and of the missile brigade. In this, one of the telephone radio relay communications channels of the forward command post with the missile brigade was made secure with a ZAS device.

The exercise showed that it was not advisable to

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include the radio sets of the commanding officer of the missile brigade and the commanding officers of the missile battalions in the radio network of the chief of the corps artillery because this leads to a severe overloading of this network. In the exercise the chief of the corps artillery did not in practice have any reliable communications with the commanding officers of the missile battalions on this network. The attempt of the staff to reduce the work load of the R-118 radio network by using ultra shortwave R-105 radio sets for communication with the commanding officer of the missile brigade also did not give the needed results because when on the march and after shifting control points, the distances between them exceeded the range of these types of radio sets.

It is most advisable to organize radio communications with missile units, particularly with the commanding officer of the missile brigade, in certain directions. In this, R-118 radio sets can be the basic means for radio communications in the army corps and higher. When the users were 70 to 80 kilometers from each other, these sets ensured good communications by microphone, audio telegraph, and printer.

A correct determination of the working frequencies for antennas of ground and space radiation has great significance for the stability of radio communications. In the exercise there were frequent instances when communications by R-118 radio sets were lost precisely for these reasons. Frequencies must be determined by the staff of the front, taking into consideration the specific conditions of the combat activities of the large unit (unit) and conforming to the distances over which stable radio communication must be maintained during the course of combat.

In the exercise, the chief and the staff of the corps artillery did not have independent channels for radio relay and wire communications with the ZAS device, and as a result there were instances of unjustified delay in transmitting orders and commands to missile units. Thus,

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for example, because communication lines were being used by the corps staff, a combat order for the missile brigade to prepare a nuclear strike was transmitted 15 minutes late. In another instance, for the very same reasons, an order for a brigade to move was delayed for 55 minutes. All this could result in the untimely fulfilment of assigned missions by the missile brigade.

The experience of this exercise, as well as of previous ones, once more showed that to ensure stable control of missile units, the chief of artillery must be given independent secure communication channels.

Of the communication channels having the ZAS device, the one most used in the exercise was the telephone communication channel. Radio relay communication channels proved to be less suitable for this purpose because even with the presence of ZAS, much time was lost in delivering telegrams to the communications center, which prevented staff officers from doing operational work. In order to decrease the time in using the telegraph communication channel, it would be advisable to have a teletype right at the mobile point of the chief of artillery.

It should be pointed out that one of the shortcomings in using the ZAS device was the tendency of the staffs to transmit information without proper processing, which led to a lowering of the requirement for brevity in orders. With this, control became less specific, and the time required to transmit information increased. The experience of the exercise indicates the need to formalize the most frequently encountered orders and reports in controlling missile units and artillery in order to make them as short as possible and in this way to reduce to a minimum the time needed for their transmission. In this connection, it is advisable for each level of control to work out and establish a list of the basic data needed to control subordinate large units (units and subunits). In particular, the artillery headquarters of the corps, as was shown by the experience of the exercise, must constantly have information about the location of launch batteries and how they are provided with missiles according to the periods of launching, about the availability and yields of the missiles in the technical support platoons of the battalions, and in the technical battery of the brigade, about the location of the brigade command post, and other information.

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Besides telephone and radio relay channels having the ZAS device, at the level of the artillery staff of the corps, missile brigade, and battalion, a signal-code device was used to transmit commands and individual messages. Experience from the exercise showed that the signal-code device is a very reliable means of communication. For example, in the exercise there was not a single instance when a transmission was distorted, and the artillery staff of the corps required an average of 1.5 minutes to inform the brigade of its missions.

In the exercise, the means of communication used allowed us to decrease by 5 to 7 times the time needed for informing the missile units of their missions in comparison with the time spent when using prearranged message codes. This, in turn, allowed the chiefs and staffs of the artillery of the army corps and division to control missile units and the artillery more effectively. The staffs were freed from the need to spend time on coding and decoding commands and orders and as a result of this could render their subordinate units more practical assistance in preparing and carrying out strikes.

The loudspeaker communication apparatus undoubtedly made for convenience in the work of the artillery staff of the corps. It allowed all the officers of the staff constantly to have knowledge of the situation and, in addition, in transmitting orders each staff officer could write down the part pertaining to him, enter the necessary information on the map, and prepare suggestions for the chief of artillery or orders for subordinate units.

When the corps commanding officer and the chief of artillery exercise control, while located at some distance from each other, there is a great need for technical means which would facilitate their contact. The result of the absence of such means is that in working out a decision for a nuclear/missile strike, the chief of artillery and the chief of staff of the artillery are frequently called to the corps commanding officer for joint work and because of this are not able to exercise direct control of the

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missile units for a prolonged period of time.

The experience of the exercise also indicated the need to have sound recording apparatus in the artillery staff. This would make it possible to free staff officers from writing down combat orders as they are received; much useful time is wasted on this. In particular, portable dictaphones capable of recording for 30 to 40 minutes can be used for this purpose. These same dictaphones could be used to record orders and commands transmitted over a telephone channel which has the ZAS device.

In selecting the yield of nuclear charges needed to destroy objectives (targets), the artillery headquarters of the corps used the P-1 graph. A device for planning fire was used for this purpose in the artillery staff of the division. This device had been suggested by the Military Artillery Academy (a description of the device is given in the Collected Works of the Academy, No. 36). In the course of the exercise, it was established that the device for planning fire allowed us to carry out the selection of the charge with the required yield in a shorter time than with the P-1 graph.

For working convenience, it is advisable to have a set of devices in the artillery staff which would embrace all existing yields of nuclear charges for a given type of missile.

With the existence of a device for planning fire, graphs, including the one proposed in the present Collected Works, can be used to evaluate the effectiveness of the firing, particularly in those instances when there are missiles with nuclear charges of different yields.

In the missile brigade two mobile control points were organized to control its fire and mobility.

The mobile control point of the commanding officer of the missile brigade which was mounted on the chassis of a GAZ-63 truck, had a table for working on the fire control map, had working places for the brigade commanding

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officer, two staff officers, and a duty telephone operator, as well as places for the telephone apparatus, portable components of the R-118 radio set and a loudspeaking device. Along both sides of the body of the truck snap-on (pristyazhnoy) tents were attached in which two sets of signal-code devices were located (for communication with the chief of the corps artillery and the battalion commanding officers) as well as working places for officers of the brigade staff.

The mobile control point of the chief of staff of the brigade was mounted on the chassis of the GAZ-63 truck with a trailer; it had a table for working on the fire control map, working places for the chief of staff, the staff officers, and the telephone operators, as well as places for the loudspeaker communication apparatus, portable components of the radio sets, and an illuminated diagram (tablo). The apparatus for the signal-coding device was located in the trailer. For fire planning at control points there were P-1 plotting boards, a set of stencils for plotting the radiation situation, and stamping-drafting sets.

In the exercise, a special place was given to organizing stable and continuous communications. Communications over different channels were organized for this purpose: with battalion commanding officers, over R-118 (in the network of the chief of artillery), R-104, and R-105 radio sets as well as over the radio relay channel; with the chief of corps artillery, over R-118 and R-105 radio sets and radio relay and telephone channels having the secrecy device.

Loudspeaker communications of the commanding officer and the chief of staff of the brigade were provided for communication with the operator working on the signal-code device, the vehicle where the ZAS device was located, the secret unit, the cipher section, and the commanding officer of the control battery.

In order to ensure continuity of control, the staff of the brigade was divided into two groups. One of these groups, consisting of the chief of the operations section,

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the chief of intelligence, the chief of the chemical services, the deputy chief of staff for topographical and meteorological support, and the chief of communications, was headed by the brigade commanding officer, and the other consisting of the deputy chief of the operations section, a staff officer, the deputy chief of communications, the commanding officer of the control battery, and an officer of artillery armament, was headed by the chief of staff of the brigade. The chief engineer of the brigade was also found here.

When located in place, the full complement of the staff was used for control, and the presence of two groups which had previously been organized out of its complement made it possible to ensure that missions would be accomplished at any time and, in addition, to organize a normal rest period for the personnel.

In shifting one of the brigade's battalions, the brigade commanding officer, with a control group, was moved forward to a new command post from which he organized control. At this time the chief of staff remained at the old command post and directed the brigade's fire until the commanding officer reached the new command post and control was organized there. The chief of staff was usually shifted simultaneously with the shift of the battalion which had remained.

The organization of control which was used in the exercise, on the whole, justified itself. At the same time, however, there were a number of shortcomings in the technical support of control. The mobile points themselves did not meet the requirements of control in modern combat and operation either by their size or by their cross-country ability.

The mobile points of the missile brigade must have high cross-country ability, have the essential devices for planning, and reliable means of communications that ensure steady control when located in place or on the move. The exercise showed the need to have at the mobile control point

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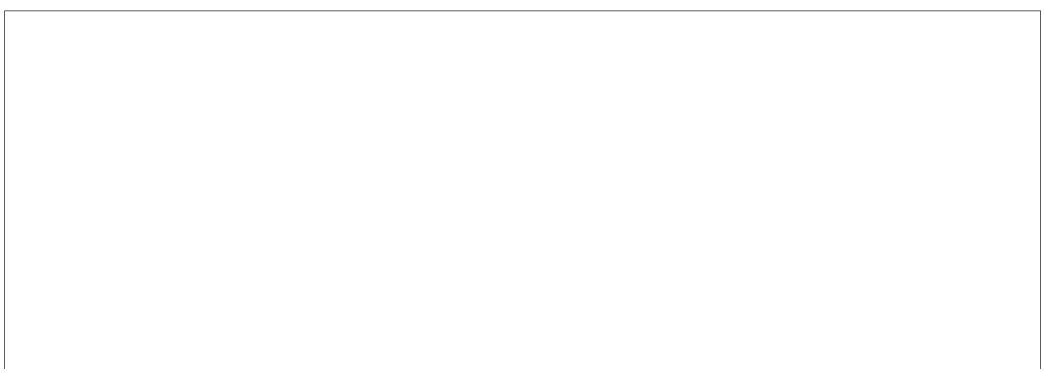

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a signal-code device, an illuminated diagram, a folding table for working on the fire control map, and also prepared places for telephone apparatus, portable components of the radio sets, and an apparatus for loudspeaker communication. As the means of control improve, there should also be an improvement in the equipment for the mobile control points.

Radio sets of the R-118 type best fulfil the requirements for controlling missile units during combat. The use of ultra shortwave radio sets is primarily possible when the brigade is located in place.

Taking into account the possible bounds of movement of missile units, radio sets which would ensure steady reception and transmission over a distance of not less than 150 to 200 kilometers under any conditions of combat activities, day and night, are essential for them.

As a rule, the brigade commanding officer received commands to prepare nuclear strikes from the chief of artillery of the corps by telephone through the secrecy apparatus and through the signal-code device. The missions were sent to the battalions by the signal-code device or by radio with the use of prearranged message codes. Use of secrecy communication channels and the signal-code device made it possible to decrease the time of sending missions to the battalion by 2 to 2.5 times in comparison with previous exercises. A sharper decrease in the time for preparing nuclear strikes, as was shown by the exercise, can be achieved only when the conversation secrecy device is found at all levels of control right up to the missile battalion and battery inclusively. In this instance, the chief of artillery could, by using secure channels of communication, transmit commands for the preparation of a nuclear strike directly to the battalion, bypassing the brigade commanding officer, and when necessary to the battery, particularly if it is on duty.

To increase efficiency in the work of the missile brigade staff, there must be a further improvement in devices for controlling the fire of the missile units.

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To determine the effectiveness of the firing, the "P-1" plotting board is inconvenient to handle, and the set of stamping devices could not be used by missile units because of the absence of needed code signs; the set of rulers and stencils for entering the radiation situation is cumbersome; it has a large set of rulers which causes inconvenience in the work. Work in this direction must be conducted both in military educational institutions as well as among the troops.

In the missile battalion, control of fire and maneuver must be carried out by the battalion commanding officer from a mobile control point on the chassis of a GAZ-63 truck with a single axle trailer where the battalion staff is located. The battalion's section for preparation of data was located in the trailer. In deploying into combat formation, the trailer was joined to the body of the vehicle by a tarpaulin cover and, with the rear door of the bus open, formed a single unit with it. This ensured personal contact of the battalion commanding officer and chief of staff with the data preparation section.

The equipment inside the control point included a table for working on the fire control map and places for locating the signal-code devices and telephone apparatus. The trailer was equipped with places for the work of the data preparation section.

Of the mechanized means, the battalion used an electronic computing machine (elektronno-vychislitelnaya mashina--EVM) to calculate the fire settings. This machine was located at the battalion control point. The exercise showed that it is more efficient to have the EVM for preparing data in the battalion fire control vehicle. This will make it possible to avoid technical means of communications between the battalion commanding officer and the EVM operator and, consequently, to decrease the time needed for preparing firing data. In addition, the commanding officer and the chief of staff of the battalion will be able, in this instance, to control the work of the EVM operator because they will be able personally to observe the initial data fed into the EVM and the results of the computations which are received.

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The use of an EVM in the battalion to prepare initial data made it possible to decrease the time for passing the command at the battalion or battery level by more than 2.5 times. It must be noted that the EVM assures reliable control over the accuracy of the computations made and releases the battalion commanding officer and the battery commanding officers from this task.

Thus, the use of mechanized means in a missile battalion together with significantly decreasing the time for preparing nuclear/missile strikes makes it possible to increase the reliability of fulfilling missions. It is advisable to have all the technical means for control and communications in the battalion's mobile control point. The battalion's mobile control point must have cross-country ability and ensure fire control under any conditions of a situation and any time of the year or day.

The conditions for conducting modern combat make exceptionally high demands on all missile units, including tactical missile battalions, in regard to speed in the preparation and delivery of nuclear strikes. The most specific problem in the use of tactical missile battalions is, as is well known, the calculation of initial data for firing. According to the experience of a series of exercises, up to 50 to 60 percent of the total time spent in the preparation of a nuclear strike was spent on this.

The use of an electronic computing machine in the tactical missile battalion during the exercise made it possible to decrease the time in determining the fire settings by 15 to 20 times while there was greater accuracy in the calculations themselves. This will make it possible for tactical missile battalions to deliver strikes in the shortest possible time against any objective in enemy territory, depending on the range of fire.

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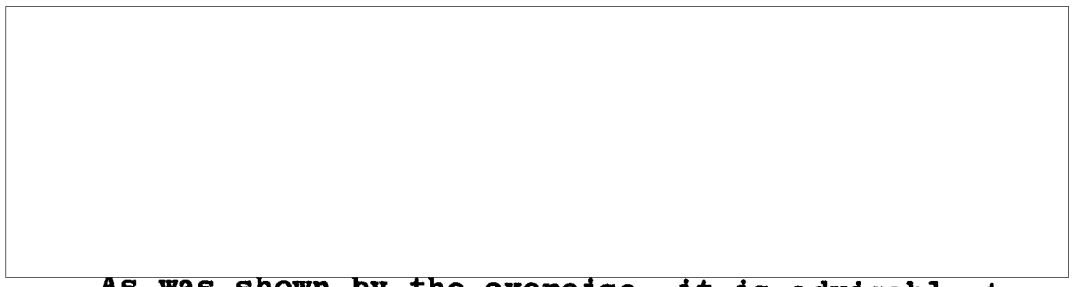

As was shown by the exercise, it is advisable to have an EVM to prepare initial data in the long range tube artillery battalions also, keeping in mind that they can and must be drawn into the combat against enemy nuclear weapons, during the destruction of which time limits and accuracy of fire frequently have a decisive importance.

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