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CENTRAL INTELLIGENCE AGENCY

WASHINGTON, D.C. 20505

16 May 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Reconnaissance Data Requirements in Support of Rocket Troops and Artillery

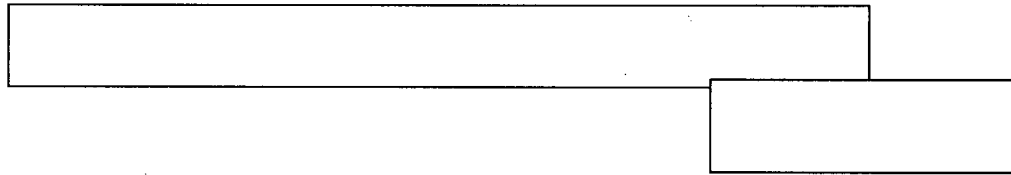
1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article stresses the need for accuracy, completeness, and speed in obtaining and transmitting reconnaissance data on targets to be hit with nuclear warheads. Figures are given on how the first two factors affect the number and size of warheads necessary and the third affects the probability of hitting the target at all. This article appeared in Issue No. 1 (77) for 1966. [redacted]

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 [redacted]

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John N. McMahon

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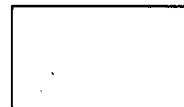
Director, National Security Agency

Deputy Director of Central Intelligence

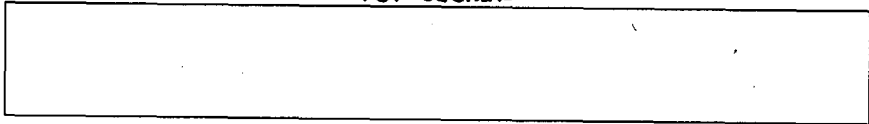
Director of the National Foreign Assessment Center

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Intelligence Information Special Report

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COUNTRY USSR



DATE OF INFO. Early 1966

DATE 16 May 1978

SUBJECT

MILITARY THOUGHT (USSR): Reconnaissance Data Requirements in Support of Rocket Troops and Artillery

SOURCE Documentary

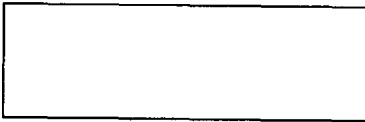
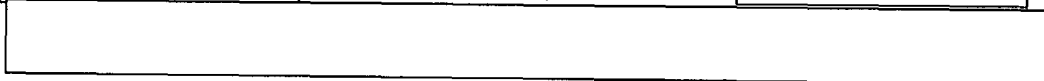
Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 1 (77) for 1966 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal 'Military Thought'. This article, by General-Major of Artillery L. Sapkov and Colonel I. Zakharov, stresses the need for accuracy, completeness, and speed in obtaining and transmitting reconnaissance data on targets to be hit with nuclear warheads. Figures are given on how the first two factors affect the number and size of warheads necessary and the third affects the probability of hitting the target at all.

End of Summary

Comment:

The authors also contributed to "Regarding a Single Geodetic Base for the Combat Use of Rocket Troops and Artillery" in Issue No. 2 (75) for 1965. General Sapkov has also written or contributed to articles on the control of rocket troops in Issue No. 2 (63) for 1962 and Issue No. 2 (90) for 1970.



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Reconnaissance Data Requirements in Support of
Rocket Troops and Artillery

by
General-Major of Artillery L. SAPKOV
Colonel I. ZAKHAROV

As is known, the success of a present-day operation depends directly on the effectiveness with which weapons are used, which in turn can be achieved only when reliable reconnaissance data are available concerning the enemy's key installations. And despite the fact that nuclear weapons incomparably surpass in yield the conventional means of destruction, they must be employed, not against an area, but against specific targets.

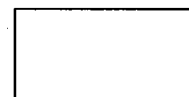
Staffs at all levels must know how to rapidly and precisely determine these targets and know their coordinates. However, in actual operational training as yet these requirements are not always fulfilled. In particular, targets are often evaluated using small-scale maps, without a thorough analysis and detailed study of the terrain and without taking into consideration the characteristics of the target, not to mention the lack of reliable reconnaissance data.

All of this leads to an uneconomical expenditure of nuclear warheads, to an unjustified use of large-yield warheads, and in some cases to the non-fulfilment of the tasks to destroy the targets.

Let us examine how accuracy in determining target coordinates affects the selection of warhead yield and, consequently, the reliability with which the target is destroyed.

In order to make the calculations connected with a determination of the yield of the nuclear warhead needed to achieve an intended level of destruction, one is required to know not only the location and dimensions of the target, but also its characteristics and the extent of the engineer preparation of the terrain in the area where it is located. To determine the aiming points one must have accurate coordinates of the center of the target and -- when the target is large in size -- the coordinates of its component elements.

The chart (Figure 1) shows how the yield of the nuclear warhead depends on the accuracy of determining target coordinates and the magnitude of missile strike errors.



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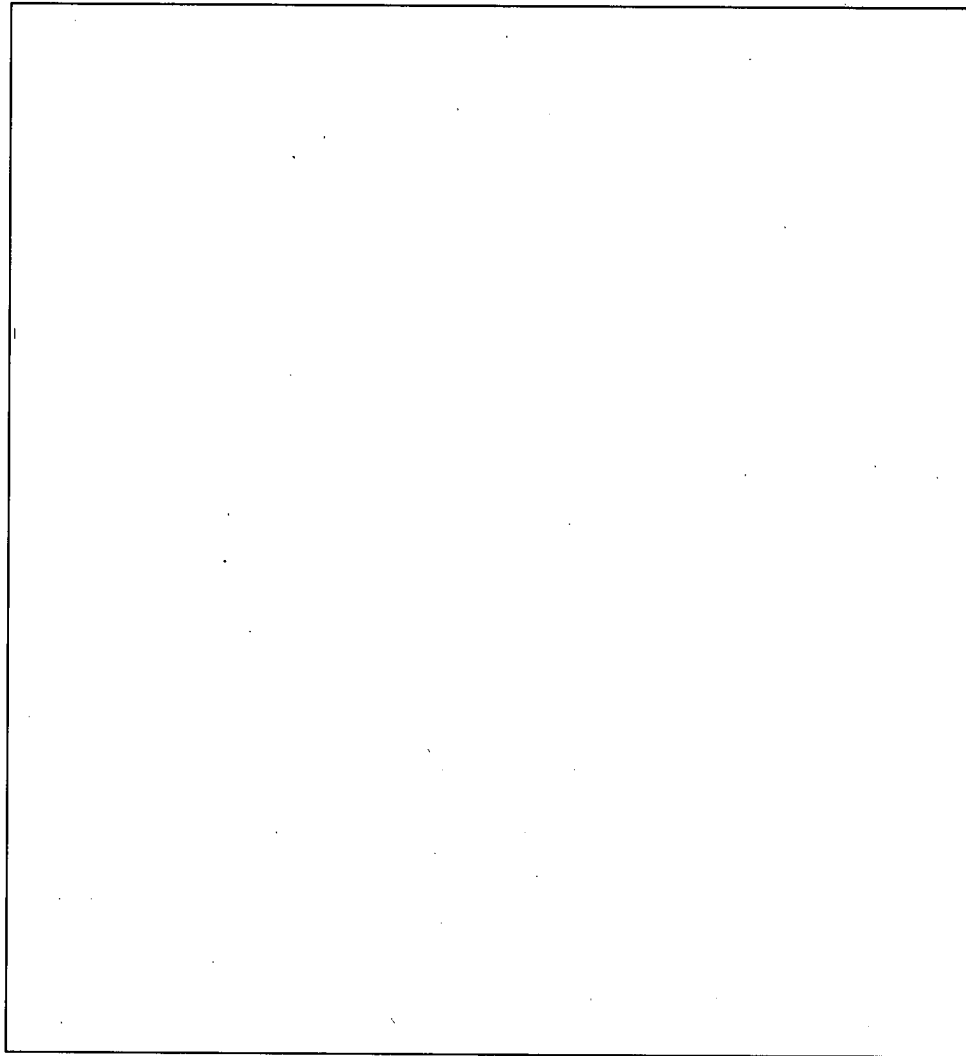
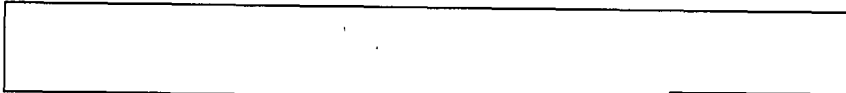


Figure 1. Dependence of the yield of the nuclear warhead on accuracy in determining target coordinates



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From the chart it is evident that the lower the ratio of the error in determining target coordinates to the missile strike error, the lower will be the nuclear warhead yield needed to destroy a small-size target, primarily the enemy's nuclear attack means. Thus, for example, if the target coordinates are determined with an accuracy of 200 meters, and the missile strike error amounts to 600 meters (the missile strike error includes the missile dispersion value and the errors in topogeodetic, meteorological, and technical preparation), then the ratio of these errors will amount to 0.33 ($200 \div 600 = 0.33$). With such a ratio of the error in determining target coordinates to the missile strike error, it will require nuclear warheads of a certain yield, let us say q kilotons, to destroy the targets.

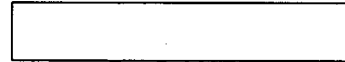
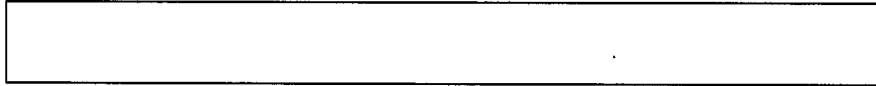
But if the error in determining target coordinates doubles to 400 meters while the missile strike error remains the same as before -- 600 meters -- then the ratio of these errors will be 0.66. With such a ratio of the errors in determining target coordinates to the missile strike error, in order to destroy the same target, the yield of the nuclear warhead will need to be doubled, as can be seen from the chart. Consequently, with decreased accuracy in determining target coordinates, a considerably greater yield of the nuclear warhead is required for the same level of destruction.

This circumstance forces strict demands to be made on accuracy in determining target coordinates. The coordinates of small-size targets (for example, missiles in launching positions) must be determined with errors that are not over a third of the missile strike error. Thus, these errors, as calculations show, must be no more than 175 to 200 meters for operational-tactical missiles, 100 to 150 meters for tactical missiles, or 50 to 75 meters for tube and rocket artillery.

The choice of more yield or an increase of the number of nuclear warheads is also affected by the completeness of reconnaissance data on the component elements of a target. For example, if reconnaissance determines the overall concentration area of a tank brigade without detailing the disposition of its battalions, then it will require a warhead with a yield of around [] or [] nuclear warheads with yields of [] kilotons apiece to achieve the necessary degree of destruction with an [] missile at a launching range of [] kilometers, with the center of this area designated as the aiming point. But if the position of each battalion of the brigade is known, then only [] nuclear warheads will be required (Figure 2).



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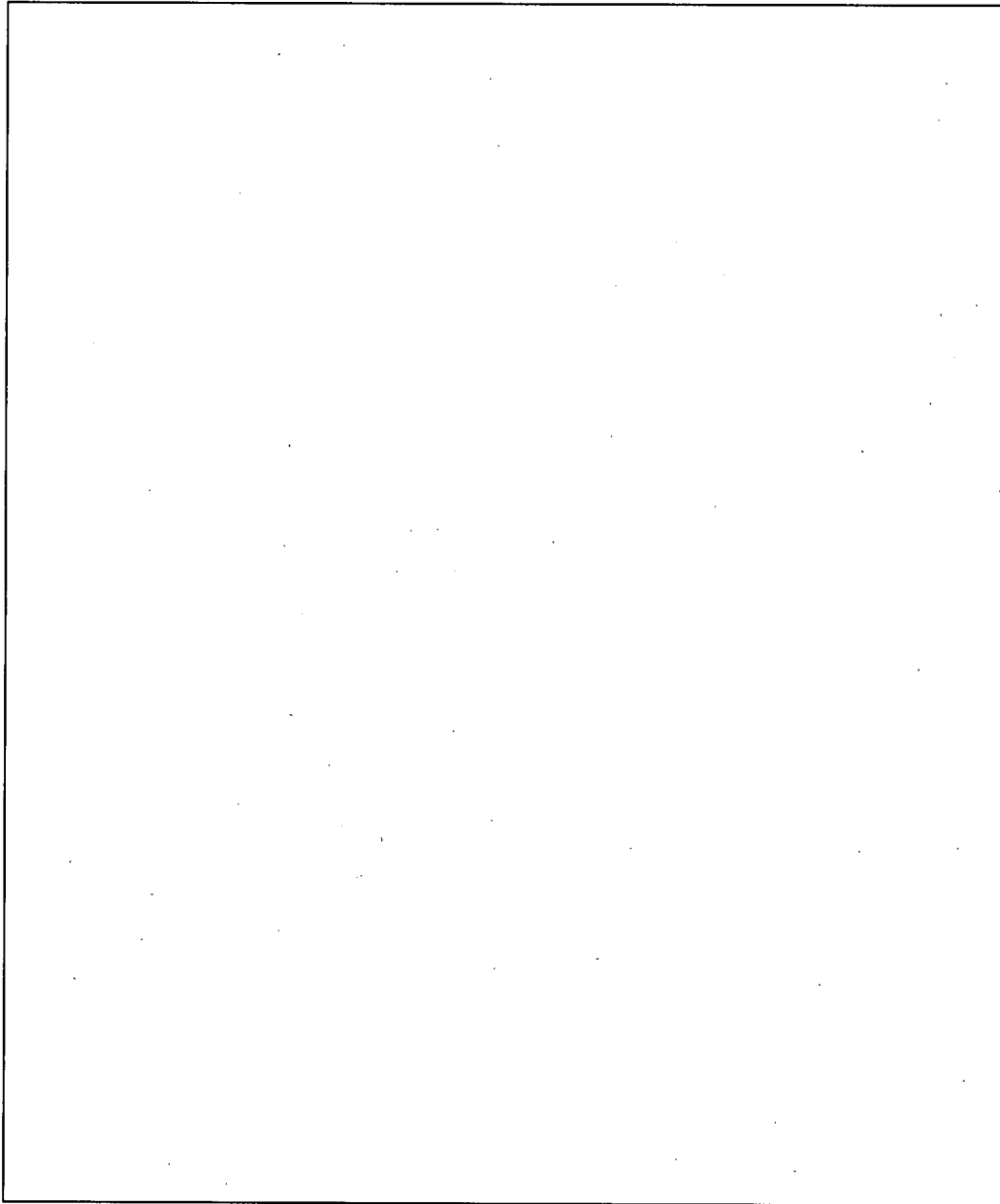
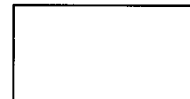
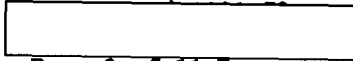
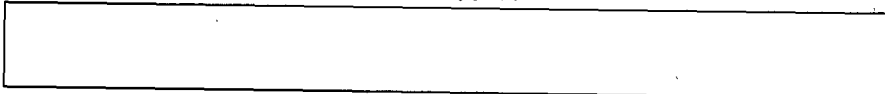


Figure 2. Dependence of the expenditure of nuclear warhead yields on the completeness of reconnaissance data about the enemy. (The target of destruction is a tank brigade in a concentration area.)

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Thus, receipt of reconnaissance data on each battalion of the tank brigade in the concentration area of the brigade affords a greater saving of the overall yield and number of nuclear warheads, which allows the task of destroying the brigade to be accomplished with a smaller number of launchers.

That is the reason why each enemy target must be thoroughly studied on large-scale maps or photographs taking into account (correlating) the battle formation disposition layouts assumed by the enemy, the tactical-technical characteristics of the targets, and so forth. Only a complete analysis of the data from all types of reconnaissance with a meticulous study of the terrain will make it possible to precisely establish the location of the target and, consequently, to most fully and with the least expenditures accomplish the task of destroying it.

It should, of course, be taken into account that the conditions of the situation may require the immediate destruction of a target (installation) and that in this case there will be no opportunity of precisely locating the elements of the target. Obviously, in such cases one must resort to the intentional expenditure of a larger number of nuclear warheads or to the use of a warhead of larger yield.

Under present-day conditions when most enemy targets, especially nuclear attack means, are highly mobile, the receipt, processing, and transmission of reconnaissance data must be carried out in the shortest possible time.

Unfortunately, staffs continue to devote insufficient attention to the problem of the timely transmission of reconnaissance data. After all, the enemy will always strive to keep nuclear attack means in their sites for the shortest time possible. A missile launcher or weapon will, after it has made a launching or fired, immediately relocate to a new area. There is no need to prove that the faster the data on the location of a reconnoitered target are received and the command given to destroy it, the more effective our nuclear strikes against the enemy will be.

From the graph presented in Figure 3 it can be seen that in order to destroy tactical missiles and Pershing guided missiles in their sites with 70 percent reliability, strikes have to be delivered against them within not more than nine minutes (against operational-tactical missiles within 18 minutes) from the moment they are detected. And if we bear in mind that the enemy nuclear attack means must be destroyed with 90 percent reliability, then this time will amount to three minutes for tactical missiles, and nine



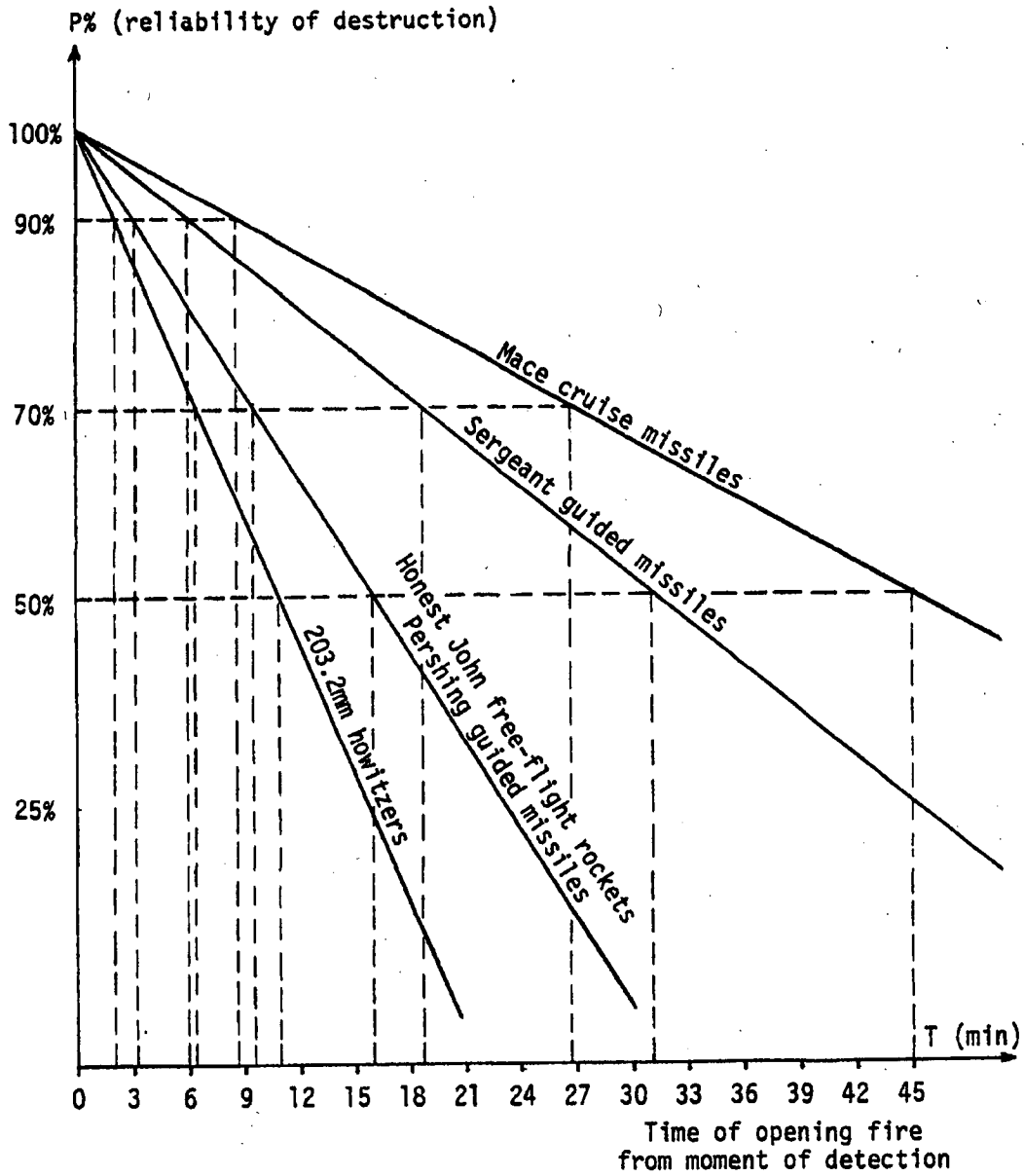
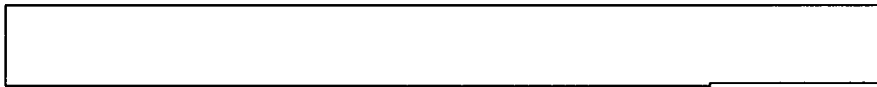
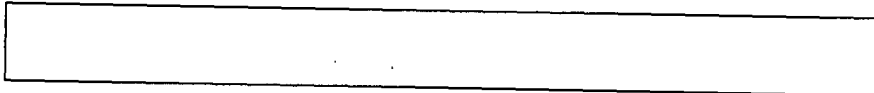


Figure 3. Dependence of reliability of destroying nuclear attack means in launching (firing) positions on the rapidity of opening fire





minutes for operational-tactical missiles.

Each one of the enemy's nuclear attack means is located for a definite time in its launching (firing) position. For example, the Pershing guided missile and the Honest John free-flight rocket may be located in a position (from the moment they occupy it until the launching) approximately 30 minutes. If immediately after detecting such a target we deliver a missile/nuclear strike against it or open artillery fire against it, then there is a 100 percent probability the target will be located at this moment in its position. But if the time between the detection of the target and the missile/nuclear strike exceeds 30 minutes, then the strike will fall on an empty spot, because by this time the enemy launcher will have made the launching and quit the position. With intermediate time values, the probability that the target will be present in its position until the strike will vary from 0 to 100 percent.

The graph (Figure 3) shows how hitting enemy nuclear attack means in their launching (firing) positions depends on speed in preparing the missile/nuclear strike or opening fire with artillery.

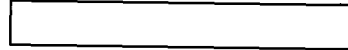
It has already been stated many times in the pages of the Collection that delay in receiving reconnaissance data and in making a decision to deliver nuclear strikes will inevitably bring about a decrease in the reliability of destroying the targets. Let us corroborate this by a specific example. Thus, when there is a delay in receiving reconnaissance data on a Pershing missile (when it is located in its launching position) of 10 minutes from the moment of its detection, the probability of finding the target in the given area decreases to 25 to 30 percent.

That is why we raise the subject of the necessity of having reconnaissance data come in not only to the intelligence directorates (departments) of combined-arms staffs, but also simultaneously to the rocket troops and artillery staffs so that, in order to gain time, the targets are studied in parallel.

For example, the formation commander, having received reconnaissance data, studies the target and on the spot makes the decision to destroy it. The chief of the rocket troops and artillery at the same time, rather than later, must study the same target, determine the aiming points and required yields of the nuclear warheads, and prepare commands. This will permit shortening the time from the moment the target is detected to the moment it is destroyed and, consequently, considerably increase the effectiveness of the nuclear strike.



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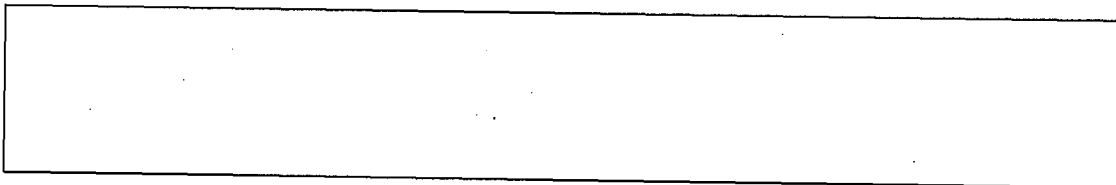
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Thus, the effectiveness with which the rocket troops employ nuclear weapons depends directly on the reliability, completeness, and accuracy of the reconnaissance data and also on the timeliness of their receipt. Reconnaissance must not only find out the intention of the actions of the enemy and his grouping, but also ensure the accurate and rapid detection of each target to be struck with nuclear weapons. In doing so, at the beginning and during the course of front and army operations, enemy targets must be detected to the full launching range of front and army missiles.

And the fact that presently existing reconnaissance forces and means, as exercise experience has shown, do not, in their technical equipping, fully correspond to modern demands and cannot fully satisfy the needs of rocket troops, leads to tardiness in detecting enemy targets, to the impossibility of obtaining precise data, and to delay in transmitting the data.

All of this leads to where it often happens in exercises that nuclear strikes are delivered against areas the enemy is not occupying. Formation commanders and staffs try to find a way out of this situation by using nuclear warheads of larger yield and by increasing the expenditure of nuclear warheads in the operation, which is completely intolerable.

We must carry on the struggle for an efficient and economical utilization of missile/nuclear weapons, not only by way of improving the rocket troops and the methods of employing them in combat, but also by drastically improving the quality of the reconnaissance forces and means, which right now should be in full combat readiness.



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