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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

5 July 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Final Aerial Reconnaissance Against Targets in Support of Rocket Troops

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". In this article the authors expound on the difficulty of conducting final aerial reconnaissance, especially under conditions of poor vertical visibility, and discuss how this was organized during a command-staff exercise and an operational-tactical exercise. To streamline this activity only three signals were used at the operational-tactical exercise. In addition, the authors describe the procedure for determining the coordinates of targets using maps and an overlay. Radiotechnical systems of bombing and aircraft navigation for determining coordinates of targets were also examined, as well as means of quickly transmitting the location of targets to the rocket troops. 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

/s/ John N. McMahon

[redacted]

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DATE

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5 July 1978

SUBJECT

MILITARY THOUGHT (USSR): Final Aerial Reconnaissance Against Targets in Support of Rocket Troops

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". The authors of this article are General-Mayor of Aviation V. Godunov and Colonel I. Astapchik. In this article the authors expound on the difficulty of conducting final aerial reconnaissance, especially under conditions of poor vertical visibility, and discuss how this was organized during a command-staff exercise and an operational-tactical exercise. To streamline this activity only three signals were used at the operational-tactical exercise. In addition, the authors describe the procedure for determining the coordinates of targets using maps and an overlay. Radiotechnical systems of bombing and aircraft navigation for determining coordinates of targets were also examined, as well as means of quickly transmitting the location of targets to the rocket troops.

End of Summary

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Final Aerial Reconnaissance Against Targets in Support of Rocket Troops

by
General-Mayor of Aviation V. GODUNOV
Colonel I. ASTAPCHIK

Of all the questions relating to the conduct of combat operations at the outset of a war, the most important is the employment of nuclear weapons and missiles as one of the basic means of delivering nuclear warheads to target. All measures, therefore, taken among troops in peacetime and during a war, are directed primarily toward creating conditions which guarantee the successful use, especially in an initial strike, of rocket troops and aviation.

It is known that at the outset of a war a front command will not always have at its disposal absolutely accurate information on the enemy. When combat operations begin, its staffs and troops will move out of their permanent locations and into areas designated for them by the operational plan of the war, while aviation will disperse on operational airfields. Nor will there be any accurate data on the location of most of the positions of missile units and subunits. Naturally, to deliver an initial strike against targets on which there are no reliable data, it will be necessary at the outset of a war to carry out in an extremely limited amount of time, sometimes measured in minutes, careful final reconnaissance against these targets. Accomplishing this will be quite difficult. Even under conditions of operational exercises the command of a number of military districts had difficulty when planning its initial strike. To get around this problem, the use of missile/nuclear weapons was quite often planned against stationary targets on which reliable information was available and could be counted upon not to change for a comparatively long time.

At exercises held in the summer, a front command-staff exercise by the Commander-in-Chief of the Ground Forces, Marshal of the Soviet Union, Comrade V.I. CHUYKOV, and an operational-tactical exercise by the Commander of the Transcaucasus Military District for reconnaissance units and

subunits of district subordination, it was confirmed that the most reliable, quick, and sufficiently dependable means of accomplishing tasks of final reconnaissance against targets in support of rocket troops is aerial reconnaissance carried out by extremely well-trained crews of organic units of reconnaissance and spotter reconnaissance aviation. At these exercises it was organized in the following manner.

As the threat of the "enemy's" unleashing of combat operations increased, the commander of the front air army provided for 50 percent of the personnel of reconnaissance air units to be put into the air in holding areas, in order to conduct final reconnaissance against targets subject to destruction by rocket troops, as well as poststrike reconnaissance for the purpose of determining the effectiveness of our strikes.

The holding areas of aircraft in the air were established in such a way that no more than two to three minutes were required to fly from them to the national border. This distance enabled the crews, on receiving the appropriate signal, to quickly cross the national border and begin performing their assigned task in the shortest possible time. For control of reconnaissance units and crews on the ground and in the air, uniform signals were adopted for all, which could then be broadcast widely over wire means and radio means of communication.

At the operational-tactical exercise only three signals were used: the first meant to shift the crews to Readiness No. 1, the second to put aircraft into the air in the holding areas, the third the order to the crews in the areas to begin performing the tasks assigned to them. The presence of these signals simplified control of aviation at the most intense moment in the development of combat operations.

As the operational situation was built up, the commander of the operations group of the air army, in accordance with the decision of the front commander, at a set time brought the reconnaissance crews to Readiness No. 1. Twenty minutes later they were put into the air in the holding areas (for six crews to take off in MIG-15R bis aircraft at night took four minutes from the time the signal was given), and ten minutes after that they were ordered to begin performing final reconnaissance against the targets.

Putting reconnaissance crews into the air in the dark for final reconnaissance did not produce the results that were hoped for. The experience of the flights showed that even at dawn, owing to poor vertical visibility, it was practically impossible to visually spot, identify, and determine the affiliation of a certain target. Out of six well-trained crews that were put into the air, not one was able to detect the assigned reconnaissance targets, although subsequently, during daylight hours, out of the 14 targets to be attacked by missile/nuclear means they were able to detect nine. The same difficulty in spotting targets was also encountered by crews of IL-28 aircraft. They were unable to detect final reconnaissance targets until 14 minutes after sunrise.

As a result we now believe that to conduct final reconnaissance and poststrike reconnaissance at dawn, illumination equipment and night aerial photography must be used. But this will not solve the problem completely. The limited capabilities of aerial reconnaissance in detecting and determining the coordinates of targets at dawn or dusk make it necessary to find still other forms of reconnaissance for final reconnaissance against targets. This concept was confirmed at the operational-tactical exercise of reconnaissance units, where the reconnaissance tasks of providing rocket troops with the necessary data on targets of strikes were performed successfully through the combined efforts of all types of reconnaissance at the disposal of the front.

A major concern of the air army command was that of ensuring the timely transmission of the reconnaissance data obtained to the command levels concerned. Preliminary research into possible methods of transmitting the information has led to the development and practical testing at exercises of the uniform coding of a flight map with a 1:500,000 scale and of a map with a 1:100,000 scale. This made it possible during the flight not only simply to determine the coordinates of targets, but also to quickly convey the data obtained to the staffs directly from on board the aircraft.

Orienting detected targets on the 1:500,000-scale map was accomplished by using a special grid overlay made of cellophane (Figure 1). The coordinates were determined according to their distance in millimeters from the X and Y axes, formed

respectively by the lower and left sides of the squares of the geographic grid of the map. For a clear determination of the positions of targets, the squares on the 1:500,000-scale map were coded beforehand according to the method of progression of the coordinates.

The coordinates of targets are determined using the grid overlay in the following manner. On detecting a target on the ground, the navigator plots its position on the map. Then he lays the grid over the map, fixed at the upper righthand corner (at point 0). After making the X and Y axes parallel to the meridians and parallels, respectively, of the geographic grid of the map, he then measures off on the grid overlay the linear distances in millimeters of the desired point, first to the X axis, and then to the Y axis. In all cases each coordinate is indicated by a two-digit number. The accuracy in determining the position of the target discovered equals one millimeter on the map or 500 meters on the ground.

The location of the detected target will be transmitted by the reconnaissance crew using an eight-digit number group, in which the first four digits represent the code number of the square, the next two the distance in millimeters to the X axis, and the last two the distance to the Y axis. Thus, the location of the target at point 1712 (five kilometers south of Rezaiyeh, Iran) will be transmitted by the group 50523616, where 5052 is the number of the square, 36 -- the distance in millimeters to the X axis, and 16 -- the distance in the same units of measurement to the Y axis.

For single-seater reconnaissance aircraft a different method of reading off the coordinates was employed at the exercises.

Each square on the 1:500,000-scale map is a trapezoid of a sheet of the 1:100,000-scale map. This means that we can assign to each sheet of the 1:100,000-scale map the code number of the corresponding square on the 1:500,000-scale map and prepare it for the determination and transmission of coordinates. And determining and transmitting the coordinates are accomplished in the following sequence.

After detecting the target the pilot plots it on the map, determines the coordinates of the target by eye using the

coordinate grid, and transmits them by radio to the staffs concerned in the form of a twelve-digit group. In this the first four digits represent the code number of a sheet of the 1:100,000-scale map, the next four digits -- the kilometer coordinates of the small square (with sides 2x2 centimeters), within which the detected target is marked (reading off the kilometer coordinates is done first along the vertical frame, then along the horizontal). The last four digits represent the coordinates of the detected target (the distance in millimeters to the X and Y axes of the small square). The value of each coordinate is transmitted by a two-digit number, not exceeding 20 in any specific case (since a side of the small square equals 20 millimeters).

We should note that the mean error in either direction in determining the coordinates of targets detected on terrain with few landmarks in practice amounted to 300 to 1,000 meters and sometimes more; when the targets were located near typical points of reference the errors ran from 20 to 100 meters. The experience of an individual tactical reconnaissance air squadron indicates that a trained pilot, when determining on a map the distance from the X and Y axes of a detected target, will be off by no more than one millimeter, i.e., he is able to determine the coordinates with an accuracy down to 100 meters.

In addition to this method of determining the coordinates of a target, it appears possible to use a radiotechnical bombing and aircraft navigation system for this purpose. Certain military districts have already had some experience in the practical mastery of this method. But positive results from a radiotechnical solution to the problem of establishing the exact coordinates of ground targets do not rule out the ways of calculating coordinates examined above. The method of reading coordinates by means of a grid overlay or by eye may be considered as being supplementary to the radiotechnical method, and in a number of cases it may prove to be the principal one (for example, when the bombing and aircraft navigation system fails to operate, or when conducting reconnaissance outside the zone covered by the system, etc.).

Along with seeking methods of increasing accuracy in determining the coordinates of "enemy" means of nuclear attack that have been discovered, considerable attention was devoted at

the exercises to finding the most advantageous organization of radio nets in which the transmission of reconnaissance data on the enemy was carried out. Having analyzed the possible methods of organizing radio communications and tested one of them at an exercise, we may make the following generalization.

To transmit information to a staff of the rocket troops and artillery in one radio net designed for control of aviation is impossible. Besides considerably complicating the command of reconnaissance crews in the air and of units on the ground, the receiving of reconnaissance data transmitted from on board an aircraft has turned out to be nearly impossible. As a result it has now become extremely urgent to install multichannel radio sets on reconnaissance aircraft, with special channels and crystals allocated for operational and tactical aerial reconnaissance, while in the staffs of combined-arms operational formations and large units we must have additional radio receivers to receive reconnaissance data from crews of operational reconnaissance, with extensive use of sound recording equipment.

For speed in transmission of reconnaissance data from airfields where reconnaissance units are based (after oral debriefing of the crews and photographic transmission of the results of the interpreting of wet aerial negatives), the command post of an air army should have a specially established radio link, serving the level command post of the air army -- command post of the reconnaissance unit (or separate subunit). Only by organizing autonomous radio nets and radio links using modern communications means which ensure security, reliability, and speed of operation, can we be sure of transmitting in the shortest possible time information obtained on enemy means of nuclear attack to the command levels concerned, especially to the staffs of rocket troops.

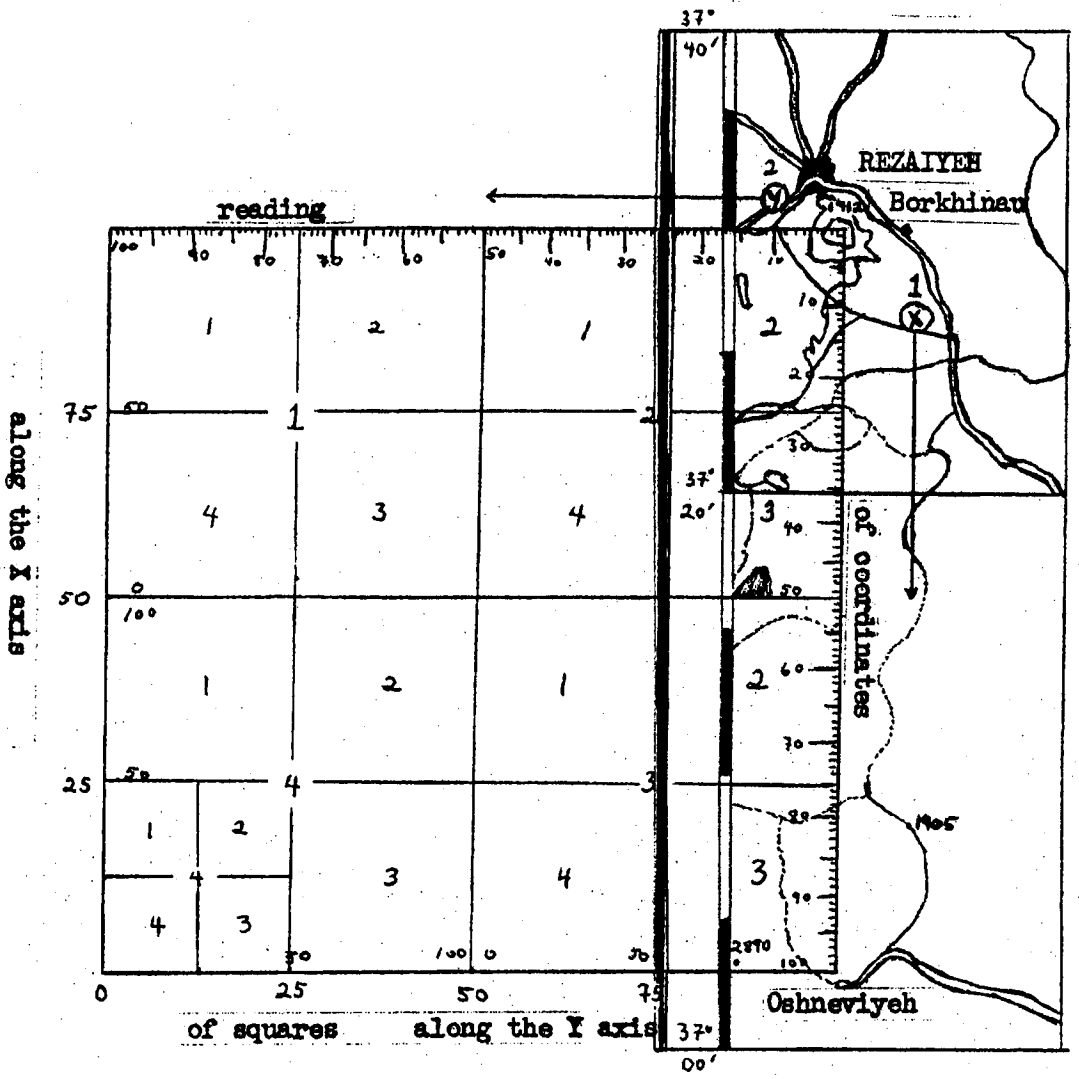
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Figure 1