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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

30 August 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John H. Stein
Acting Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Hydrometeorological Support of 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". The authors comment on an article on the subject of hydrometeorological support for a front offensive operation and on an article written in response to it in which the special characteristics of hydrometeorological support of troops in the military districts are explored. They share the points of view of these two regarding the need to establish a unified hydrometeorological service on the scale of a military district, front, and armed forces as a whole, and offer suggestions for improving hydrometeorological support. This article appeared in Issue No. 1 (77) for 1966.

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 H. Stein

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SUBJECT

MILITARY THOUGHT (USSR): Hydrometeorological Support of Troops

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". The authors of this article are Engineer Lieutenant Colonel V. Shmakov (first part), Engineer Colonel M. Katkhanov, Colonel G. Korolev, and Engineer Major I. Kozlov. They comment on an article on the subject of hydrometeorological support for a front offensive operation and on an article written in response to it by Engineer Colonel G. Yanyushkin in which the latter looks into the special characteristics of hydrometeorological support of troops in the military districts. They share the points of view of these two regarding the need to establish a unified hydrometeorological service on the scale of a military district, front, and armed forces as a whole, and offer suggestions for improving hydrometeorological support.

End of Summary

[redacted] Comment:

The SECRET version of Military Thought was published three times annually and was distributed down to the level of division commander. It reportedly ceased publication at the end of 1970.

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Hydrometeorological Support of Troops

by

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An article by Engineer Colonel L. ULANOV* examines the problems of hydrometeorological support for a front offensive operation, and, in response to this article, Engineer Colonel G. YANYUSHKIN** looks into the special characteristics of hydrometeorological support of military district troops. We share the points of view of the authors regarding the need to establish a unified hydrometeorological service on the scale of a military district, front, and armed forces as a whole.

The absence of a unified hydrometeorological service in the armed forces has a negative effect on the solving of theoretical, organizational, scientific research, and other problems. In attempting to solve these problems, the hydrometeorological services of the various branches of the armed forces proceed, to a considerable degree, solely on the basis of their own interests. Thus, duplication is often observed in their work (for example, at one airfield we can encounter two meteorological organs, and at large garrisons several such organs, performing the same task) at a time when other problems are not being solved, or are being solved slowly or not completely.

Cooperation of the military hydrometeorological organs with the organs of the USSR Hydrometeorological Service and with scientific, design, and other organizations is most frequently implemented on behalf of only one branch of the armed forces. At times, technical supply problems are looked at in a superficial and subjective manner. All this is not conducive to the standardization of instruments, machinery, and equipment. The training of regular hydrometeorological specialists also has a number of shortcomings. In the training programs for officers in

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* Collection of Articles of the Journal "Military Thought", No. 3 (73), 1964.
** Collection of Articles of the Journal "Military Thought", No. 2 (75), 1965.

the higher military educational institutions, the problems of hydrometeorological support of troops are scarcely touched upon.

In our opinion, the first step should be to organize in peacetime at the USSR Central Forecasting and Information Center a special military information group that would satisfy the requirements of the General Staff, main staffs, central directorates, and formations of the branches of the armed forces.

Remaining unresolved in the article and in the response are the problems of providing hydrometeorological support to military units and formations arriving in a theater of military operations at the start of military actions. As is known, the most variable element of the hydrometeorological situation is the weather. Special weather maps are the basis for information about weather conditions, forecasting the weather, and warning of its dangerous phenomena. At present, the technology involved in preparing weather maps has been modified somewhat in order to shorten their preparation time. The data from hydrometeorological observations obtained from a network of stations are collected and processed in an information center. There weather maps based on these data are prepared and sent by radio ready for use in the form of a photo-image (facsimile transmissions). Under these conditions, counting from the moment of observation it takes four to four and a half hours to obtain large-scale weather maps, which are prepared every six hours, and three to three and a half hours to obtain small-area weather maps, which are prepared every three hours. However, even these times are still quite long.

In the chain of operations involving the preparation of weather maps, forecasts, warnings of dangerous weather phenomena, and other information, the most important and, at the same time, the weakest link is the obtaining of initial data from the radio information centers of the USSR Hydrometeorological Service. In the years of the Great Patriotic War these data were transmitted by radio in Morse code. At the end of the fifties, radio Morse code gave way to teletype, which is gradually being supplanted by facsimile transmissions. Radio Morse code, despite the slow speed of transmission, was stable and enabled staffs and troops to receive hydrometeorological data while on the move. Teletype equipment transmits meteorological data almost three times faster than does radio Morse code, but is complex and requires some time for adjustment after being moved. Facsimile transmission

equipment is even more complicated and will operate in a stable manner only under stationary conditions.

Because of the strict time limit on the operation of the information centers of the USSR Hydrometeorological Service and the impossibility of receiving data while on the move, there is the danger of delays and interruptions in obtaining these data. The question arises regarding reliable methods by which the centers of the USSR Hydrometeorological Service can pass on hydrometeorological data to the hydrometeorological organs of the formations and units entering a frontline zone or a zone forward of the front line.

In our opinion, such support must be provided by two methods: first, the hydrometeorological organs of the large units and formations obtain initial data from the information centers of the USSR Hydrometeorological Service, process the data, and send the processed data to the troops; secondly, the same organs request an entire array of hydrometeorological data from a central military hydrometeorological center, without time limitation, using all types of military communications, which are more stable and more reliable. Also justifying hydrometeorological support by the use of the two methods is the fact that the civilian information centers, by handling information according to a generally accepted program, cannot satisfy the special requirements of the large units and formations of the branches of the armed forces distributed over an immense territory.

It must be remembered that with the start of a war, information received in accordance with international agreements will cease, and the USSR civilian hydrometeorological network in the frontline zone will be disrupted. Thus, in order to receive the maximum amount of data, it is best to organize in the frontline zone a special mobile network of hydrometeorological stations and posts by drawing on the meteorological stations of air forces air units, the meteorological subunits in missile units, the non-organic meteorological posts in the chemical subunits of the divisions, and, in coastal regions, the navy meteorological stations. For this purpose, the above-listed organs must be manned by specialists able to conduct hydrometeorological observations and measurements, encode the data correctly, and send them to the information center. The

subunits, on the other hand, must be provided with the necessary hydrometeorological instruments and equipment. Organizing a hydrometeorological network in a frontline zone is a very complex matter. It requires the working out of a series of instructions, work regulations, codes, as well as the recruitment and training of personnel.

In conclusion, let us note briefly that in operational training, taking into account the actual hydrometeorological conditions will undoubtedly be of benefit during all war games on maps, all command-staff exercises, and exercises with troops. This gives the generals and officers practical experience, enabling them to grasp the basics of hydrometeorological support and to apply them satisfactorily in support of the troops.

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Extremely urgent, in our opinion, is the matter of increasing the effectiveness of hydrometeorological support of troops, particularly of rocket troops, which was raised in articles by Engineer Colonel DANILIN and Engineer Colonel L. ULANOV* The improvement of the means and methods of hydrometeorological support has a considerable potential for increasing the effectiveness of the actions carried out by rocket troops in modern operations.

In our opinion, the tasks of providing meteorological support for the combat actions of missile units and subunits should be divided into two main groups: the first group -- the providing of the hydrometeorological data required for planning, organizing, and controlling the combat actions of rocket troops, as well as the warning of dangerous weather phenomena; the second -- the meteorological preparation of missile launchings.

The tasks of the first group can be entrusted to a centralized system of hydrometeorological support, the establishment of which was suggested by V. DANILIN and L. ULANOV. However, the performance of the tasks in the second group is conditioned by the fact that the accuracy of the meteorological data depends on the radius of the actions and the time, security, and reliability of the transmission. This results in the logical need for an autonomous meteorological preparation of missile

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* Collection of Articles of the Journal "Military Thought", No. 1 (56), 1961 and No. 3 (73), 1964.

launchings as well as a hydrometeorological support service at the front level.

As is known, this preparation includes meteorological measurements at the surface of the earth and at various altitudes, the processing of the results obtained and the calculation of the data required for launchings, the preparation of meteorological bulletins based on the data and their timely transmission to the sections that prepare the data in the missile battalions and launch batteries. As a rule, this preparation is presently carried out in a missile brigade siting area by the forces and means of an organic meteorology battery consisting of three meteorological stations. However, when a missile brigade is moved, the deployment of the meteorology battery in the new area takes a great deal of time, with two and a half to three hours passing before it can issue data. We note that a missile battalion takes 60 to 70 minutes to prepare for a launch, and a battery, 40 to 50 minutes when deployment is carried out from the march in an unprepared area.

The movement forward of meteorological stations to a new area as part of a reconnaissance group is greatly limited due to the slow average rate of travel of the motor vehicles, and is made difficult by the situational and movement conditions, particularly on rugged and mountainous terrain. As a result, the capabilities for providing meteorological support to the battalion during movement are greatly impaired. Meteorological data compiled prior to a march become obsolete and thus cannot be used effectively; moreover, the range covered by the meteorological bulletins is considerably shorter than the battalion's possible range of movement.

Meteorological support becomes even more difficult when two battalions, or even an entire brigade, are deployed from the march in an unprepared siting area. The experience of exercises shows that this type of deployment of missile brigades (or battalions) is most typical. The desire to use the meteorological bulletins issued by the army and front meteorological stations is connected with the necessity of having over the entire area of actions of the operational-tactical missile brigades a large amount of meteorological support means and reliable transmission of data by communications means under conditions of enemy jamming.

We should also emphasize that a delay in obtaining meteorological data has a direct influence on the timeliness of a missile/nuclear strike delivered against targets that are in one place for only a short time. Calculations reveal that from the moment they are detected not more than six minutes must be spent to prepare a strike against guided missiles of the Sergeant and Pershing types at their launch sites. Under these conditions, the probability of the timely delivery of a strike will be 90 percent.

However, an attempt not to give strict consideration to meteorological factors in order to save time will lead to an increase of the circular error by, for example, as much as 19 to 37 percent for the R-300 missile and 80 to 90 percent for the R-170 missile. Consequently, the nuclear warhead yields of these missiles must be increased by factors of two to three and six to eight, respectively, in order to guarantee the prescribed target destruction effectiveness. It follows from this that, in practice, the preparation time for a launch, including the time involved in meteorological support, must be reduced to the minimum.

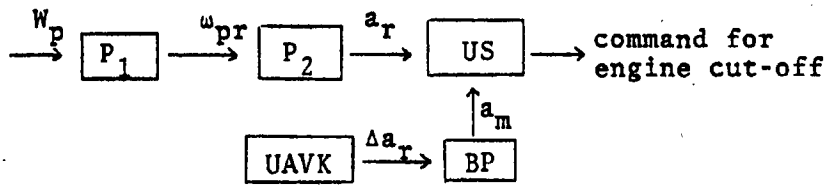
Consequently, shortcomings in meteorological support constitute one of the factors limiting the readiness of missile means and the timeliness and accuracy of the delivery of missile/nuclear strikes. We may conclude from what has been said above that the meteorological support of operational-tactical missile launches does not meet the requirements involved in preparing missile units and subunits to deliver precise strikes within short periods of time.

In our opinion, the measures taken to solve this problem may be divided into organizational and technical measures, depending on the meteorological support problems. The organizational measures should include the establishment of a unified, centralized system of meteorological support for all the branch arms and branches of the armed forces. This system, as already mentioned, can guarantee a relatively reliable solution to only the first group of tasks.

The technical measures involve improving the methods of meteorologically preparing missile launchings so as to ensure the carrying out of the second group of tasks. One of the promising

technical measures for obtaining a basic solution to the problem of meteorological support for the launching of operational-tactical missiles will be, in our view, the method of automatically introducing corrections of meteorological data directly into the guidance system of missiles prior to their launching and while they are in flight.

A structural diagram of a range guidance system with a mechanism for the automatic input of corrections might be represented in the following form (see sketch).



P - device for converting the pseudoacceleration W_p into the angular gyro precession rate ω_{pr};
P - device for converting the angular gyro precession rate into the rotation angle a_r of the adjusting gear of the longitudinal acceleration integrator;
US - comparator, for comparing the rotation angle a_r, which corresponds to the actual value of pseudovelocity of the the missile, with the value of the rotation angle a_m which corresponds to the rated value of the missile pseudovelocity;
BP - memory unit for rated value of rotation angle;
UAVK - device for computation and automatic input of correction for change in meteorological conditions.

The action of the range guidance system results in the conversion of the pseudoacceleration into the rotation angle a_r by means of device P_1 and P_2 when the missile is in flight. If meteorological conditions change, the device for automatically introducing corrections changes the rated value of the rotation angle to a value proportionate to the variation of the meteorological factors. When rotation angle a_r reaches the value of rotation angle a_m, the comparator delivers the command for engine cut-off. This happens the moment the missile attains the velocity corresponding to the assigned range.

Instrumentation used to allow for changes in meteorological factors must include information sensors and a correction comparator, both of which continuously feed data into the automatic correction device.

In this case, the proposed apparatus will automatically allow for any changes of meteorological conditions on the flight path of the missile, and also automatically introduce the appropriate corrections into the guidance system while the missile is in flight. Guaranteed UAVK operation requires, prior to the launching, the setting of correction coefficients in the correction computer corresponding to the geodetic range and launching direction. While the missile is in flight, the initial information on any changes of meteorological conditions is supplied from sensors on board the missile to the correction computer, which computes the correction that is fed automatically into the guidance system.

The diagram examined here does not reflect all of the operations involved in computing a correction and is presented only as an illustration of a technical solution. It affords a comprehensive solution to the problems of reducing the missile launch preparation time and increases the accuracy of missile strikes.

The automatic calculation of the meteorological factors and the introduction of corrections for their deviation from the rated values assist in increasing the reliability of meteorological support of operational-tactical missile launches, since it does away with high-altitude sounding and operation of weather radars. In the future, when the technical solution to the problem of devising equipment for automatically allowing for

weather conditions has been solved completely, it will be possible to abolish the meteorological stations in the brigade, which will increase the mobility of the brigade and reduce the number of required personnel.

Autonomous meteorological support actions by launch batteries and battalions will considerably increase their effective combat use in the preparation and delivery of nuclear and chemical strikes.

The automatic allowance for meteorological factors can be used effectively in the launching of missiles from submarines and surface ships.

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