3615

CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

22 February 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Regarding a Single Geodetic Base for the Combat Use 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 sets forth all the disadvantages that would be involved if the rocket troops and artillery were to change from the use of a rectangular coordinate system to a geodetic coordinate system, as had been proposed in an earlier article. The authors maintain that the complexity of the new system, the impossibility of using the new maps for other purposes, and the cost of the changeover far outweigh any advantages and that therefore the geodetic coordinate system should not be adopted. This article appeared in Issue No. 2 (75) for 1965.

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]

Distribution:

The Director of Central Intelligence

The Director of Intelligence and Research
Department of State

The Joint Chiefs of Staff

The Director, Defense Intelligence Agency

The Assistant to the Chief of Staff for Intelligence
Department of the Army

The Assistant Chief of Staff, Intelligence
U. S. Air Force

Director, National Security Agency

Deputy Director of Central Intelligence

Director of the National Foreign Assessment Center

Director of Strategic Research

[redacted]

[redacted]

Intelligence Information Special Report

COUNTRY USSR

[redacted]

DATE OF INFO. Mid-1965

DATE 22 February 1978

SUBJECT

MILITARY THOUGHT (USSR): Regarding a Single Geodetic Base for the Combat Use of Rocket Troops and Artillery

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 2 (75) for 1965 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 Artillery L. Sapkov, Colonel I. Zakharov and Colonel I. Dolgov. It sets forth all of the disadvantages that would be involved if the rocket troops and artillery were to change from the use of a rectangular coordinate system to a geodetic coordinate system, as had been proposed in an earlier article. The authors maintain that the complexity of the new system, the impossibility of using the new maps for other purposes, and the cost of the changeover far outweigh any advantages and that therefore the geodetic coordinate system should not be adopted.

End of Summary

[redacted] Comment:

General Sapkov and Colonel Zakharov also wrote "Reconnaissance Data Requirements in Support of Rocket Troops and Artillery" in Issue No. 1 (77) for 1966 [redacted]; General Sapkov has also written or contributed to articles on the control of rocket troops in Issue No. 2 (63) for 1962 [redacted] and Issue No. 2 (90) for 1970 [redacted]. 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. [redacted]

[redacted] The article to which it refers is not available.

[redacted]

[redacted]

Regarding a Single Geodetic Base for the Combat Use of Rocket Troops and Artillery

by

General-Mayor of Artillery L. SAPKOV
Colonel I. ZAKHAROV
Colonel I. DOLGOV

The article by Colonel LUKASHENKO* presents, in our opinion, an insufficiently founded proposal for a change from the presently used system of rectangular coordinates to a new system of geodetic coordinates. This measure will inevitably involve not only a change of all presently formed views and established traditions and methods of working with a map, but will also require considerable material expenditure connected with a complete re-issuing of the topographical maps and the rebuilding of the equipment and instruments used in topogeodetic work.

What result would be obtained if this proposal were accepted, and would it be worth the expense?

Let us attempt to answer these questions on the basis of the specific tasks to be accomplished by the rocket troops and artillery with the use of one system of coordinates or the other.

It is known that the purpose of a geodetic base is primarily to provide the missile and artillery units and subunits with initial data for a rapid and accurate topogeodetic preparation for a launch or a firing. This preparation amounts to determining the coordinates of positions and the aiming point bearings from where the guidance equipment is, computing the geodetic range and bearing for a launch or firing, and correcting the rectangular coordinates from one zone to another.

---

* Collection of Articles of the Journal "Military Thought", No. 2 (72), 1964.

In the missile and artillery units the positional coordinates (x, y, h) are, as a rule, determined automatically, with the aid of topographical tie-in equipment, relative to points of the skeleton geodetic network or spot heights of a map; and the bearings to the aiming point are determined with the aid of artillery gyrocompasses or by astronomical observation.

At present, when the system of rectangular coordinates is used, the topogeodetic tie-in of a position is accomplished by trained crews within 20 minutes. In the future, as combat training experience shows, this time may be shortened.

Going over from the use of rectangular coordinates to geodetic coordinates will provide no advantages at all, because it will not speed up the topogeodetic preparation for launching or firing nor make it more accurate; indeed, the methods of the topogeodetic operations remain basically unchanged.

Moreover, in practice, the use of geodetic coordinates is more complicated than the use of rectangular coordinates, and with the geodetic coordinates the procedure for the topogeodetic preparation for launching or firing, as the experience of the missile and artillery units has shown, is difficult for the personnel to master.

In the author's opinion, with geodetic coordinates, problems can be solved by a manual method in four to five minutes. But such a method is still not worked out, and the existing methods require not less than 12 to 15 minutes, as it says in the article (page 83). With rectangular coordinates this problem is already solved in three to four minutes.

It is well known that in a calculation of the required data for a launch or firing to ranges of over 20 to 25 kilometers, a reduction of range and bearing must be taken into account.

However, methods of accounting for the reduction with geodetic coordinates are not determined, though it is quite possible to assume that the formulas and graphics required for this purpose will be quite complicated. Regarding the possibility of using special computers for operational-tactical missile units as recommended by the author of the article (page 86), such talk is premature, since the matter is problematic and requires detailed research.

As far as the problem of correcting the coordinates in going from one zone to another is concerned, the necessity of solving it when working with rectangular coordinates arises in connection with a peculiarity of this system, namely its spread only within the limits of a six-degree zone. However, the correction is done only during a firing at long range, i.e., in practice by the missile units; and not always at that, but only in those cases where the target and the launch position are in different coordinate zones.

Going over to a geodetic system of coordinates will eliminate this problem from the total complex of operations of the topogeodetic subunits of the rocket troops and artillery. However, in practice, this is still no advantage. The point is that the correction of the coordinates when going from one zone to another, or even across a zone, takes only three to four minutes by the manual methods. This much time is needed additionally for the preparation of the missiles for launching and artillery for firing whenever the missile and artillery subunits are deployed from the march and take positions for launching or firing that have not been previously prepared. The correction of the coordinates, as a rule, is done in the process of topogeodetic tying-in, i.e., beforehand, often even before the fire tasks are received by those who must execute them. For this reason, such corrections generally do not require additional time and have no influence on the readiness of the launchers to launch their missiles or of the artillery batteries to open fire. All of this is confirmed by practical combat training of rocket troops and artillery.

We should also remember that the main means to perform computational operations in the missile troops are special electronic computers, in which case, the proposal of the author of the article loses its meaning. This is explained by the fact that all computations connected with the support of the topogeodetic preparation of the rocket troops and artillery are carried out by machine within several seconds, no matter which system of coordinates is used -- rectangular or geodetic.

We should also like to draw attention to the fact that the change to a system of geodetic coordinates involves great difficulties.

First of all, as previously mentioned, it will require enormous material expenditures to devise a new projection to replace the rectangular projection and to re-issue all the topographical maps. Moreover, such a projection of the earth's surface in microzones has not been studied in sufficient detail and in many respects is not yet clear.

Secondly, the topographical maps of the territory of foreign countries, just as the maps of our own country, are based on a rectangular projection. For this reason to re-issue only our maps on the basis of the new system of coordinates will cause greater complications if the maps of the bordering countries have to be used together with ours.

Thirdly, a topographical map based on the new system of coordinates loses its graphic qualities and becomes very difficult to use for the purposes of measurement. It is known, for example, that a coordinate map grid with notation in kilometers, in addition to its primary function of determining the coordinates of points and plotting them correctly on a map, is also used widely for assessment of the terrain and the situation, and particularly for a rough determination of distances, dimensions of areas of various localities, relative positions of various targets, and the tie-in of aerial photographs to the map, etc. If grids of only geodetic coordinates are on the maps, as the author proposes, the accomplishment of these tasks will become essentially impossible. In particular, distances will be able to be measured on the map only in angular values and will have to be converted into meters, which is very inconvenient in practice. The usefulness of the map for measurement will also be reduced because the grid will be made up of triangles rather than squares. Accordingly, to determine the coordinates of points and plot them on a map, one will have to employ the methods used in working with unrectified aerial photographs. But these methods, as we know, are not advantageous nor have they won recognition among the troops, and the assertion of the author that the determination of coordinates is simplified if the map has a rectangular grid is not contested.

Finally, the computing systems of topogeodetic tie-in equipment and electronic computers would have to be rebuilt if the change were made to the new system of coordinates.

Thus, the proposal regarding the advisability of going over from rectangular coordinates to geodetic coordinates will not be effective and there is no sense in breaking with ages of tradition and changing the computing methods, all the more since the author has completely disregarded the interests of the various branch arms. For example, the missile (tactical) and artillery units experience no inconvenience in using the rectangular system of coordinates. In these units the maximum range is comparatively short, and they do not have to be concerned at once with two zones nor, that means, to correct coordinates. The motorized rifle and tank troops are not involved at all in making various corrections. Consequently, for all of these units the transition to geodetic coordinates

will only make their work more complicated.

As far as the long-range (over 100 kilometers) operational-tactical missiles are concerned, for them the correction of coordinates when going from one zone to another can be done successfully in a short time with the present maps. In this case, it is no longer a complicated matter to take geodetic coordinates from a map by generally known methods.

It should also be taken into consideration that computing corrections is only a small part of all the tasks accomplished by rocket troops and artillery with the aid of topographical maps. And to raise the question of radical changes in the entire system of coordinates is, to say the least, incorrect.