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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

22 September 1978

MEMORANDUM FOR: The Director of Central Intelligence
FROM : John N. McMahon
Deputy Director for Operations
SUBJECT : MILITARY THOUGHT (USSR): Topogeodetic
Support of Troop Combat Actions

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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 describes the functioning and tasks of the topogeodetic service and topographic units in supporting the accuracy of strategic, operational, tactical, and surface-to-air missiles by means of geodetic surveys; in providing accurate and timely information by means of topographic and special maps on the results of nuclear strikes and on other intelligence data obtained by air reconnaissance and aerial photography; and in supplying troops with maps and photomaps. The organization, numbers, and map scales involved in map supply are discussed. This article appeared in Issue No. 3 (79) for 1966.

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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

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John N. McMahon

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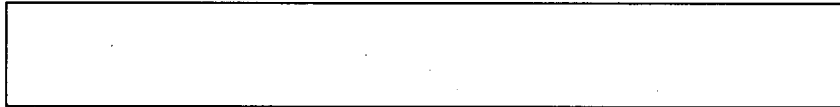
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Intelligence Information Special Report

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COUNTRYUSSR

DATE OF INFO. Late 1966

DATE 22 September 1978

SUBJECT

MILITARY THOUGHT (USSR): Topogeodetic Support of Troop Combat Actions

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 3 (79) for 1966 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The authors of this article are General-Leytenant of Technical Troops M. Kudryavtsev and General-Major of Technical Troops A. Nikolayev. This article describes the functioning and tasks of the topogeodetic service and topographic units in supporting the accuracy of strategic, operational, tactical, and surface-to-air missiles by means of geodetic surveys; in providing accurate and timely information by means of topographic and special maps on the results of nuclear strikes and on other intelligence data obtained by air reconnaissance and aerial photography; and in supplying troops with maps and photomaps. The organization, numbers, and map scales involved in map supply are discussed. End of Summary

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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Topogeodetic Support of Troop Combat Actions

by

General-Leytenant of Technical Troops M. KUDRYAVTSEV

General-Major of Technical Troops A. NIKOLAYEV

With the change in the nature of armed combat, there has been a substantial change in the content and tasks of topogeodetic support, in the forms and methods of work of topogeodetic units, and in their cooperation with the topogeodetic services of the branches of the armed forces and the branch arms.

For example, the topogeodetic service has been faced with such fundamentally new tasks as producing a more precise definition of the parameters of the Earth's ellipticity and gravitational field in order to increase the accuracy of strategic missile strikes; and providing an initial topogeodetic base for strategic and operational-tactical missiles, missile systems of the Air Defense Forces of the Country, artillery, and for radiotechnical control and target-designation means to ensure the reliable destruction of the different targets, particularly small targets located under shelter. An inaccurate determination of target coordinates and launching sites, as calculations show, will require that the number of missiles or the yield of the nuclear charge be increased several-fold in order to achieve an identical level of destruction.

Once again the question has arisen of transmitting to staffs and troops information on terrain changes which may occur as a result of the extensive use of nuclear weapons by the belligerents. Thus, as a result of the destruction of hydrotechnical installations or retaining dams, extensive zones of flooding may be formed; as a result of nuclear strikes, many population centers, towns, bridges, and other road installations will be demolished and forests destroyed over large areas; etc. The front topographic service is also called upon, together with the front reconnaissance organs and front reconnaissance aviation, to prepare such information, the more so since it is impossible to show the destruction over such an enormous territory by any means other than on topographic maps.

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Other means are required also for resolving such key questions as providing troops with topographic maps, operational graphics, and an initial geodetic base for the launching of missiles.

The basic and main task of topogeodetic support during an operation becomes the timely, complete, and uninterrupted supplying of the troops with topographic and special maps. Of particularly great importance are large-scale topographic maps for operational-tactical and tactical missiles, artillery, and tanks; maps which during the operation will be the basis for determining the initial geodetic data for missile launchings and artillery fire when combating enemy nuclear means. The method of preparing initial geodetic data for missile launchings from large-scale topographic maps should be recognized as the most efficient method and the only one possible at present.

This task can be carried out successfully only if in peacetime there are set up and efficiently distributed the necessary reserves of topographic and special maps at the center, in the main staffs of the branches of the armed forces, in the staffs of the military districts (groups of forces), and also in the troops, and if the organs supplying the troops with topographic maps are kept in constant readiness.

Reserves of topographic maps, in our opinion, must be set up based on the estimates of the maps needed to supply all of the command levels, beginning with the platoon (crew) commander and going up to the front commander.

Troops of the first operational echelon usually need to have reserves of topographic maps with a scale of 1:50,000 and less for the entire zone of the front operation, with an overlap of the zone's flanks on three to four sheets in the front, two to three sheets in the army, and one to two sheets for the maps of each scale in the division; the tank army and the air army are provided with reserves of maps for the entire zone of the front operation.

For combined-arms and tank armies located in the second echelon of the front, reserves of maps must be set up also for the entire zone of the front operation (for the territory up to their line of commitment to battle -- at a level up to 50 percent

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of the established norm, and from that line forward -- to the full norm).

The total reserve of topographic maps to support the troops in a front offensive operation, as applied to the European Theater of Military Operations, is about 18,000,000 copies of the maps of all scales. The essential portion of these reserves must be directly in the hands of the units and large units in peacetime.

Interior military districts must have reserves of topographic maps for the regrouping areas and for the operational dispersal areas of these troops based on estimates of providing the troops with maps of 1:200,000 scale and less in amounts that are 30 percent of the front norm. Reserves of maps for strategic rocket forces and Air Defense Forces of the Country must be set up based on estimates of satisfying their full requirements.

A matter of great complexity is the supplying of topographic maps to formations and large units moving up from the interior of the country, since their tasks and zones of action will obviously be known only approximately and the axis and line of their commitment to battle may be different from what was initially anticipated. In our opinion, the troops moving up from the interior of the country must have previously established reserves of maps for the regrouping areas and the areas of anticipated combat actions in amounts that are 50 percent of the front norm and which they must take with them when they move up to the area of combat actions. This comes to about 8,000,000 or 9,000,000 copies of maps, whose transport requires about 50 motor vehicles.

For complete supplying of topographic maps to troops moving up from the interior of the country, part of the map reserves should, in our view, be brought up near the anticipated troop deployment areas in advance so as not to be delivering maps from deep within the rear areas under conditions of beginning war and disrupted transportation lines. For this purpose it seems advisable to establish, on each strategic axis of the European Theater of Military Operations, special depots with the necessary reserves of topographic maps to support the troops moving up from the interior of the country.

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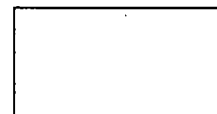
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In order to provide topographic maps to staffs and troops on a timely basis, there must be an efficiently worked out system of supplying troops with maps as well as mobile, constantly ready supply organs in the form of front and army depots and of special depots for special-purpose maps.

We consider it advisable to supply troops with topographic maps during an offensive operation according to the following schematic diagram (page 8).

As is evident from the diagram, large units and units in their departure position are supplied in full norm with topographic maps having scales of 1:50,000 and 1:100,000 to the depth of the initial army task and with topographic maps having a scale of 1:200,000 to the depth of the initial front task.

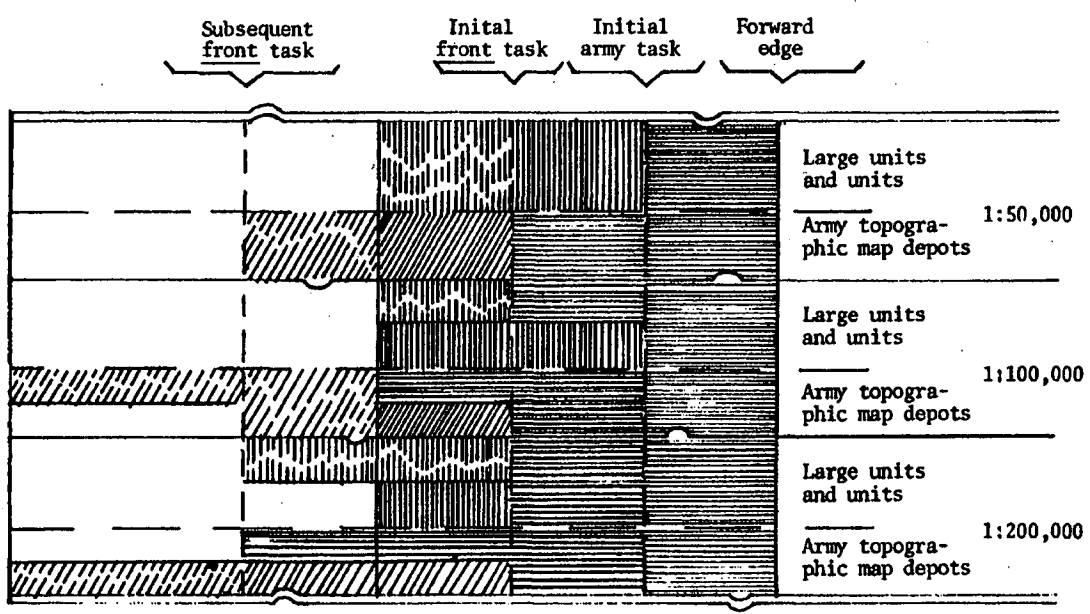
Army topographic map depots at the departure position must have: to the depth of the initial front task -- topographic maps with scales of 1:50,000 to 1:200,000 in full norm; to the depth of the subsequent front task -- maps with scales of 1:100,000 and 1:200,000, to 50 percent of the norm; and maps on a scale of 1:500,000 and less, to the full depth of the front operation.



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LEGEND

Supplying completed during the operation

100%
50% Supplied at initial position (% of norm)

Army topographic map depots At line of initial army task

Front Topographic map depots At line of initial front task and of subsequent tasks depending on the situation

Schematic diagram of supplying troops with topographic maps during a front offensive operation

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During the course of the operation, reserves of topographic maps in units and large units are replenished from the army topographic map depots at the lines of the initial army task and initial front task and at following intermediate lines depending on the situation. Front topographic map depots replenish the map supplies of the army topographic map depots at the lines of the initial and subsequent front tasks. This is, of course, only a schematic diagram of topographic map support; it may be changed during an operation depending on the specific situation.

From the experience of command-staff exercises the conclusion may be drawn that 48 to 72 hours are required for the delivery of topographic maps by motor transport means from a front depot to units according to the arrangement: front depot -- army depot -- division depot. This is under favorable conditions: the absence of enemy action. Naturally, this condition cannot be called normal, the more so since topographic maps must be replaced constantly as our troops advance.

All of this requires a clear-cut delimitation of responsibility for supplying troops with topographic maps. It will clearly be correct to consider that the chief of the military topographic service must be responsible for establishing the necessary reserves of topographic maps and for replenishing the front depots with them, while the district (front) chiefs of staffs must be responsible for the condition and preparation of the organs which supply troops with maps and for the timely providing of staffs and troops with maps during an operation.

A second key matter of topogeodetic support for troops in a modern front offensive operation is to provide the troops, primarily operational-tactical and tactical missile units (large units), with an initial geodetic base which must above all make it possible to determine target coordinates with the greatest accuracy and to carry out a precise geodetic survey for launching.

According to calculations by specialists, for reliable destruction of targets the errors in the determination of their coordinates must not exceed: 175 to 200 meters for operational-tactical missiles, 150 meters for tactical missiles, and 50 to 70 meters for tube and rocket artillery.

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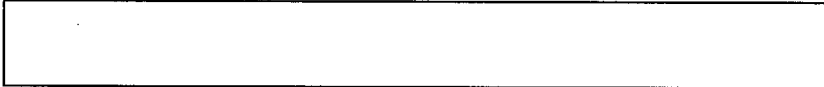
Reconnaissance aviation, using maps with a scale of 1:200,000 and even 1:50,000, is not in a position to provide the necessary accuracy in coordinate determination, which involves difficulties in recognizing or locating these targets on the terrain and plotting them on maps. It is clear that until more exact technical reconnaissance means are procured, reconnaissance crews must be trained to reach target areas using small-scale maps but to determine target coordinates using maps of larger scale.

To determine target coordinates with the necessary accuracy for launching, topographic maps on a scale of 1:50,000 and 1:100,000 are drawn up with a common system of coordinates. It goes without saying that such precision on topographic maps can be obtained only from intelligence personnel who are well trained in topography and who bear full responsibility for the accurate determination of target coordinates.

In determining the accuracy of a geodetic survey for launching, we must proceed from the error of a missile strike and from the relative proportion of geodetic data in this error. If we assume the error in a missile strike by modern operational-tactical missiles as equal to [500? meters?], and the relative proportion of this error due to geodetic data as averaging 20 percent, we obtain the result that the geodetic survey for launching must be done with an accuracy on the order of 100 meters, which is also provided by topographic maps with scales of 1:50,000 and 1:100,000. However, as missiles improve, the error in a nuclear strike will decrease, which in fact leads to the necessity of increasing the accuracy of the geodetic survey for launchings. This in turn requires increasing the accuracy of large-scale topographic maps or printing on them the coordinates of reference points or of contour points that will remain quite intact on the terrain and can be used by rocket troops as a reliable initial geodetic base.

The comprehensive and thorough topogeodetic preparation of an initial nuclear strike has taken on particular importance for topogeodetic support. For the reliable destruction of the given targets, this preparation must be carried out on a full geodetic base, with the development in the areas of the launching sites of geodetic control networks whose accuracy must be two to three

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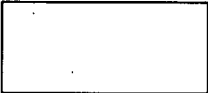


times greater than the accuracy of the geodetic survey for the launchings themselves. For this reason, it is obviously necessary, during peacetime or in the period of threat (if there is one), for topographic units, following the plans of the district (front) staffs, to prepare in the geodetic aspect the main and alternate siting areas for each battalion of operational-tactical and tactical missiles, and also for the regiments of cruise missiles. In conformity with the requirements of regulations, in the main and alternate siting areas they must develop geodetic control networks or special-purpose reference networks so that there is not less than one point per 20 square kilometers.

During an operation, when there will be very limited time for preparing to launch missiles to destroy enemy nuclear means after these have been detected, it will hardly be possible to succeed in developing geodetic control networks for these purposes in the new siting areas. If there is enough time, such networks may be developed in order to support the destruction of more or less stationary targets: enemy defensive structures, airfields, arsenals, crossings, and other installations. In all other instances, the most expedient course of action will be to determine, in the area of each new launching site for operational-tactical and tactical missiles, two to three precise reference axes and a baseline for the adjustment of gyrocompasses and for the topographic survey personnel.

If we consider the possible number of missile battalions included in a front and the possible schedule of their relocation (operational-tactical missiles once in 48 hours, tactical missiles at least twice in 24 hours, cruise missiles three or four times during an operation), then for an entire front operation it will be necessary to prepare in the geodetic aspect up to 300 main and alternate operational-tactical missile sites and as many as 600 tactical missile launching sites, not counting artillery. This is an enormous volume of work for front topographic units; its fulfilment is now somewhat easier as a result of their adoption into service of highly accurate, autonomous orienting devices.

In connection with this, we must recognize as erroneous the practice whereby in some military districts subunits of topographic units, at training exercises, engage in the direct



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topographic tie-in of the battle formations of missile units and thereby take the place of the topogeodetic subunits of these units.

During an operation, topographic units will not be in a position to carry out such work and it would be fundamentally wrong to make them responsible for these duties except in special instances. As is well known, the tasks of the topogeodetic tie-in of launching sites are carried out by the topogeodetic subunits of the rocket troops and artillery, and the responsibility for this is fully borne by the chiefs of the rocket troops and artillery of the fronts. The topographic units, however, in addition to carrying out their own main functions, may be called upon, in conformity with the plan of the front staff, to monitor the accuracy of the topogeodetic tie-in of the battle formations.

The topogeodetic support of the Air Defense Forces of the Country and air forces participating in a front operation consists in providing them with topographic and special maps and with catalogues of the coordinates of geodetic points and of providing them with an initial geodetic base for the siting areas of surface-to-air missile troops and for the positions of radiotechnical troops and cruise missiles. This support is handled by the topogeodetic services of these branches of the armed forces.

An important task of topogeodetic support is the preparation of operational graphic and measurement documents for staffs and troops, which falls within the responsibility of front topographic units. During an operation, staffs and troops will need, in addition to topographic maps, supplementary documents with information on the enemy and the terrain as well as a number of operational-graphic documents, special maps, and photographic documents for measuring. Of great value, in particular, will be information on terrain changes brought about as a result of nuclear strikes. The main method of obtaining such data is aerial photography, which is carried out by front reconnaissance aviation according to the plan of the intelligence directorate. Air reconnaissance data, it seems to us, can be processed at a special front photogrammetric center made up of representatives from front reconnaissance, the aerial photography service, and the military topographic service. This center can be made

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responsible for preparing and producing photo reports with data on the enemy and terrain changes, to be supplied to the troops of the first operational echelon on the basis of getting them delivered down to regimental commanders.

This task can also be carried out in other ways, for example: by setting up a high-capacity front aerial photography service capable of simultaneously and fully processing the results of aerial photography for the purposes of obtaining reconnaissance data on the enemy and on terrain changes in the front zone of actions.

It is difficult at present to answer the question of which organization can better provide for fulfilment of the assigned task. This question is in a stage of study and experimentation. One thing is clear: such an organization is extremely necessary as a component of a front and must be prepared in advance, while we are still at peace. In this case, the subunits of topographic units could provide substantial assistance in the interpretation of military installations, in the determination of target coordinates, and in the preparation and issuing of photo mosaics and photo maps.

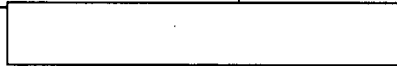
In order to support troops of the front's second echelon, the military-topographic service must overprint detected terrain changes on topographic maps with a scale of 1:200,000, and for the main axis of attack, on maps with a scale of 1:100,000, based on estimates of getting these maps delivered down to battalion commanders.

Since information on terrain changes will be required immediately following nuclear strikes, all commanders and staffs, when they have received data on nuclear bursts, must plot the assumed results on their own working maps without waiting until photo reports or corrected maps are received from the front staff.

During the conduct of operations, troops will as a rule receive information on the enemy by technical means. However, this does not eliminate the need to have reconnaissance maps. Such maps, with scales of 1:500,000 and 1:200,000, may be produced in certain cases (if there is time), for example, when preparing an operation and also during an operation; for certain

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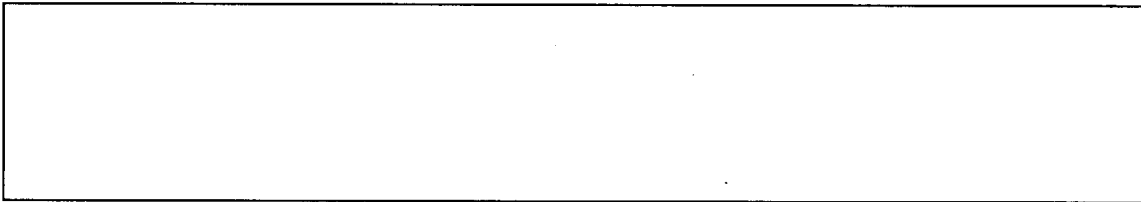
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fortified points or areas or when destroying isolated enemy groupings. However, in all instances the issuing of reconnaissance maps will be occasional in nature.

Staffs and troops will experience a great need for special maps, for example maps describing water obstacles and the suitable spots for their assault crossing, photo maps, photo mosaics of landing areas for operational and tactical landing forces, maps of cities, large population centers, and railroad centers, general maps, relief maps, outline maps, coded maps, maps showing hidden areas to ensure the effective operation of radioelectronic means, and other graphic documents. The front (army) military topographic service must be prepared to produce such maps and documents from the aerial photography produced by the reconnaissance aviation of the fronts and from the materials of the other types of reconnaissance.

The timely delivery of these documents to the troops must be included in the responsibility of the respective staffs (directorates) on whose behalf the reports are prepared.

All of this indicates the growing role of topogeodetic support in modern operations. From this arises the urgent need to strengthen by all possible means the military topographic service and the topogeodetic services of the branches of the armed forces while we are still at peace, to increase the combat readiness of topographic units, and to improve the topographic training of troops.



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