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CENTRAL INTELLIGENCE AGENCY

WASHINGTON, D.C. 20505

5 October 1978

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John H. Stein  
Acting Deputy Director for Operations

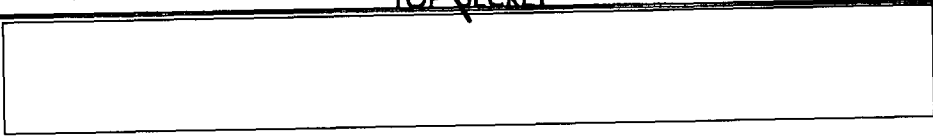
SUBJECT : MILITARY THOUGHT (USSR): Methods of  
Scientific Research in Military Affairs

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 discusses the need for programs of study in operations research theory and mathematical methods in military educational institutions, especially for training command personnel, and indicates how these courses should be organized in the various academies and schools. Also, a general outline of the application of operations research theory in the US Army is given. This article appeared in Issue No. 2 (72) for 1964.

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 the CONFIDENTIAL Codeword OSSIAN.

John H. Stein

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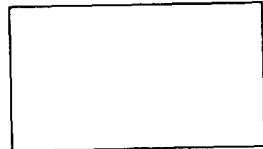
The Assistant Chief of Staff, Intelligence  
U. S. Air Force

Director, National Security Agency

Deputy Director of Central Intelligence

Director of the National Foreign Assessment Center

Director of Strategic Research





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# Intelligence Information Special Report

Page 3 of 10 Pages

COUNTRY USSR

[Redacted]

DATE OF INFO. Mid-1964

DATE 5 October 1978

SUBJECT

MILITARY THOUGHT (USSR): Methods of Scientific Research in Military Affairs

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 2 (72) for 1964 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The author of this article is General-Leytenant of Communications Troops P. Kurochkin. This article discusses the need for programs of study in operations research theory and mathematical methods in military educational institutions, especially for training command personnel, and indicates how these courses should be organized in the various academies and schools. Also, a general outline of the application of operations research theory in the US Army is given.

End of Summary

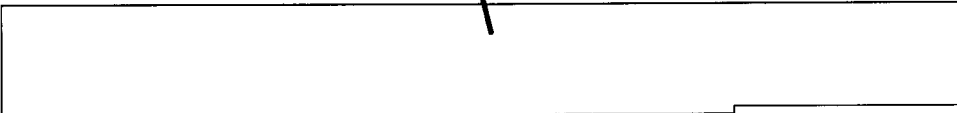
[Redacted]

Comment:

The author also wrote "Problems of Modern Defense" in Issue No. 2 (78) for 1966 [Redacted] and "Control Posts and Communications of a Combined-Arms Army During Advances Over Great Distances in the Initial Period of a War" in Issue No. 5 (66) for 1962 [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]

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Methods of Scientific Research in Military Affairs

by

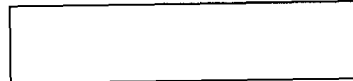
General-Leytenant of Communications Troops P. KUROCHKIN

The revolution in military affairs is unquestionably also affecting methods of scientific research. At the present time research on military questions is making more and more use of mathematical methods or, more precisely, of operations research theory, which has as its basis primarily mathematical methods. This theory is being applied in various scientific research institutions engaged in developing diverse types of combat and special military equipment, and in research on the effectiveness of means of combat.

Now, however, a serious need has arisen for the use of new methods of research in other fields of military affairs: in research on the organization of troops, i.e., determining the qualitative and quantitative correlation between men and equipment organizationally joined in a system of armed forces; the planning and organization of combat operations, i.e., determining the probability of effectiveness, using a projected plan of an operation (battle), of nuclear strikes, troop groupings, air defense, engineer, materiel, and technical support, a communications system, combat against enemy radioelectronic means, and reconnaissance; as well as in military-historical research aimed at discovering any natural laws in combat actions.

The use of mathematical methods in military affairs also stems from the fact that the armed forces have now begun to make extensive use of automated means of controlling troops and combat means. These means, as we know, are in use in the air defense troops, the air forces, rocket troops, and the navy, while similar systems of control are being set up in certain military districts as well. We may assume that in the near future combined-arms large units and formations will also have field automated systems of control. All this attests to the fact that electronic computers, as the chief means of all automated systems of control, are making deep inroads into the field of the complex creative processes of troop control which go into the making of decisions. An ever-greater need is arising for a quantitative reckoning of various interconnected factors,





for determining operational, military-technical, and military-economic criteria, finding optimum decisions, formalizing processes, and processing the large volume of various types of information. This work must be brought up to a definite level of accuracy and put in mathematical form. It is quite obvious that this may be accomplished successfully only by specially trained personnel.

From the above facts it becomes clear that to successfully use new methods of research in military affairs, trained people are needed not only for work in the military-technical field, but also in such fields as operational art, tactics, and the organization and mobilization of troops. Meanwhile we should point out that the system for training military cadres so as to be proficient in operations research theory and in mathematical methods needs to be improved.

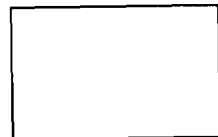
The situation is relatively satisfactory when it comes to training military-technical workers. In institutions of higher learning they receive, as a rule, solid mathematical training, and study operations research theory and successfully apply it in practice.

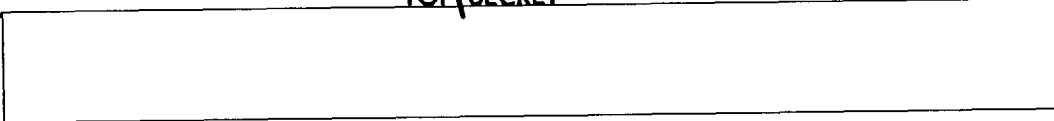
A completely different picture prevails in the training of command personnel. In higher combined-arms military schools a 300-hour course in higher mathematics is taught, but it does not include questions of the use of mathematical methods for research in military affairs. The higher mathematics course is taught as a compulsory subject for receiving a state diploma.

In the M. V. Frunze Military Academy a short familiarization course of 28 hours is given on the use of operations research theory, but the fundamentals of higher mathematics, on which operations research theory is based, are not taught. Naturally, without a knowledge of the fundamentals of higher mathematics, one can hardly expect to gain a deep knowledge of operations research theory.

Approximately the same picture prevails at the Military Academy of the General Staff, where a short familiarization course is given entitled "Mathematical Methods Used in Planning Operations." But the fundamentals of higher mathematics are not taught.

In certain academies, in particular the command faculty of the Military Academy of Armored Troops and the Military Political Academy, a short course in higher mathematics is planned but operations research theory is not taught.





The faculty for operational-tactical subjects does not, as a rule, have adequate training in mathematics, nor theoretical knowledge or practical skills in the field of operations research.

The examples cited make it clear that in the training of command personnel in the mastery of new research methods in military affairs, there is no fixed system or sense of direction. In one instance higher mathematics is taught, but with no practical application to research of military affairs questions; in another, students are made familiar with operations research theory and the use of mathematical methods in military research, but are not taught higher mathematics.

In the capitalist countries operations research theory has found broad application, partly because it was developed there earlier. In the US, for example, operations research theory began to be studied in 1943.

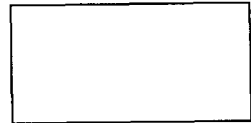
In the US Army all work on the application of operations research theory is coordinated by the "Weapons Systems Assessment Group" attached to the Joint Chiefs of Staff. It decides overall problems involving all branches of the armed forces and directs the work of operations research agencies of the air force, navy, and ground forces.

In addition, in 1958 a special institute was founded which uses operations research methods to assess various strategic concepts.

Data exist showing that recently specialists in operations research studied a number of major problems, including that of predicting the nature of a future war, laying out of a system of defense, determining the most promising branches of the armed forces for the future, determining the reserves of strategic forces, calling up the reserve, allocating defense expenditures for the current year and for the future, and a number of others.

Detailed information on this research is not available to us, but there are reports to the effect that as a result of recommendations worked out on the basis of operations research theory the US postponed putting into serial production the Nike-Zeus antimissile missile, the RS-70 bomber, the Minuteman missile on a railroad platform, and nuclear-powered aircraft, while the production of Minuteman missiles in deep silos was stepped up.

According to available data, at the Aberdeen Proving Grounds, on the basis of operations research theory, models of combat actions of ground forces are being studied, and tactical and operational decisions and the





effectiveness and methods of using combat weapons are being tested.

In 1958 a special combat research center was established at Fort Ord, where recommendations developed with the help of mathematical methods of research undergo practical testing in exercises and war games conducted with the participation of specialists in operations research.

In addition to the military specialists, about 350 civilian firms work on contract, conducting research on questions of military affairs.

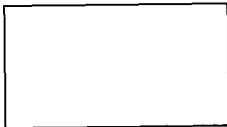
In military educational institutions (schools, military colleges, and special courses) students acquire a good knowledge of operations research theory. At the same time there are many officers in the US Army who have graduated from civilian institutions of higher learning in which operations research theory is rather widely taught.

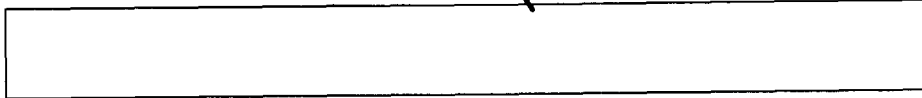
In the combined NATO and SEATO forces, at the initiative of the US and Great Britain, an extensive network of organizations for operations research was established. At a conference held in April 1957 in Paris, devoted to the practice of work in the field of operations research, all the NATO countries were represented.

Thus, in the armed forces of the most important capitalist countries operations research theory has rather broad application in solving many problems of military affairs.

In order to expand the range of practical application of operations research theory -- particularly in the field of research on operational-tactical, organizational, mobilization, and military-historical questions of military affairs -- it is necessary, in our view, to take a number of measures.

First of all, we should determine and develop the optimum amount of knowledge of operations research theory needed by command-operations specialists. It should presumably be a data base including general information on the goals, tasks, and methods of military research, the basic elements of higher mathematics used in operations research theory, the theoretical and mathematical fundamentals of operations research, general methods of operations research theory, individual methods of research on various classes of problems, practice in describing problems in mathematical terms, as well as the solutions of basic types of problems on electronic computers.





As a first step we must train command cadres in the central directorates and in the staffs of military districts, as well as the teaching staffs of higher military educational institutions.

This training should be carried out using the method of short training courses, similar to the way in which specialists in missile weaponry were trained in the beginning. The courses should be organized at those higher military educational institutions where operations research theory is widely taught and the appropriate teaching staff exists. Even if courses were to be organized at only two or three military academies, within a year as many as 1,000 specialists could be trained in the application of operations research theory.

In command academies we recommend introducing a course in operations research theory consisting of about 300 to 350 hours of class time. Now is probably the time for military academies to include a course in operations research theory in the post-graduate training curriculum and in the candidate's minimum curriculum for people preparing to defend their dissertations outside the post-graduate program.

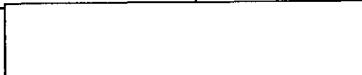
These measures can be carried out painlessly by revising the existing curricula and reducing the time spent studying subjects already mastered by post-graduate students while receiving their higher military education, such as tactics, operational art, and the history of military art.

In higher combined-arms military schools a thorough study of operations research theory is clearly impossible. But we should revise their curriculum in higher mathematics and broaden the study of those branches of it on which operations research theory is based. In addition, the higher mathematics curriculum should include the study of the use of mathematical methods to solve problems of a military nature.

For the study and practical application of operations research theory it is advisable to have special departments in all academies. We should note that as yet there is not full agreement on this point. For example, in the Military Academy of the General Staff the mathematical methods used in planning an operation are taught by the department of automation of troop control, in the M. V. Frunze Academy familiarization with operations research theory is performed by personnel from military science groups, while in the Military Communications Academy this task is the responsibility of the department of military cybernetics. In addition to the special departments, all operational-tactical departments should deal with the practical application of operations research when studying







questions of the planning and conduct of combat actions, and also when performing scientific research work.

In central directorates and staffs of military districts, directorates (departments) directing military science work must, in our view, become the main centers for ensuring broad application of operations research theory in the practical solution of scientific problems. Setting up special departments or groups for the application of operations research theory is inadvisable, because it would lead to an increase in the table of organization and to a gap between military science work and the methods used in carrying it out. We probably need to reexamine only the composition of these directorates and their complement of specialists.

In the light of the question being discussed, the appropriate measures are about to be taken in the field of scientific work. It seems to us that in general they must be carried out in two directions.

In the first place, in the direction of the broad use of operations research theory when performing scientific work, research command-staff and troop exercises, and range and field tests.

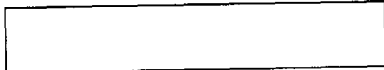
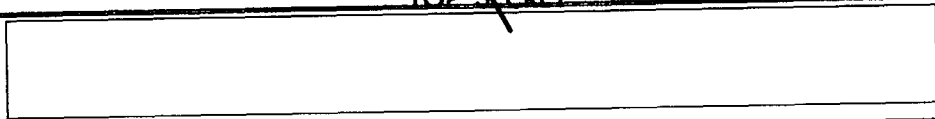
In the second place, in the direction of developing operations research theory itself, i.e., expanding its bases and methods, and developing individual methods for solving various types of problems encountered in the practice of military science work.

Considerable scientific work will also be required to develop textbooks and study aids on individual branches of operations research theory and its practical application.

The present state of problems of military affairs, we have become convinced, has become so complex that new scientific methods will inevitably be required to solve them. Operations research theory is one of these methods.

Operations research theory is a science which makes it possible to study complex phenomena in all fields of human practice. It is recognized the world over and therefore either changing its name or narrowing its scope is not justified. There is a tendency, because of the various meanings of the word "operation," to give it other names. It seems to us that this reason is purely formal.





A great deal of forces and means are being expended to equip our armed forces with modern combat and special equipment. In order for them to be used more effectively and economically, it is essential to put on a scientific basis both the development of means of armament and the methods of using them in armed combat. Operations research theory can be of inestimable help and the time has come to take a number of organizational measures to improve work in this field.

