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CENTRAL INTELLIGENCE AGENCY

WASHINGTON, D.C. 20505

4889

26 November 1973

MEMORANDUM FOR: The Director of Central Intelligence

SUBJECT : MILITARY THOUGHT (USSR): The Role of Communications In Automated Troop Control

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 deals primarily with the principles of communications support to automated troop control systems. The major concern of the authors is that communications and computer equipment be subordinated to the same authority for operation and maintenance. This article appeared in Issue No. 1 (89) for 1970.

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.

William E. Nelson  
Deputy Director for Operations

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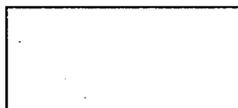
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Intelligence Information Special Report

COUNTRY USSR

[Redacted]

DATE OF INFO. Early 1970

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SUBJECT

**MILITARY THOUGHT (USSR):** New Tasks for Communications in Automated Troop Control Systems

SOURCE Documentary  
Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 1 (89) for 1970 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The authors of this article are Colonel General of Signal Troops A. Frolov, Professor, and Colonel V. Davydenko, Candidate of Military Sciences. This article deals primarily with the principles of communications support to automated troop control systems. The major concern of the authors is that communications and computer equipment be subordinated to the same authority for operation and maintenance. No specific equipment is identified or described.

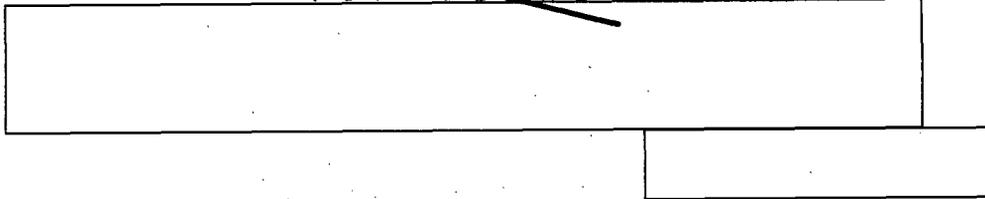
End of Summary

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Comment:

Col. V. Davydenko has authored several articles on radio communications, Vestnik PVQ, No. 9, 1963, and Tekhnika i Vooruzheniye, No. 4, 1964, and also "US Air Strikes in North Vietnam", Red Star, 11 February 1965. Col.-Gen. A. Frolov became commandant of the Military Signals Academy in 1963. He has written various related articles: Voyenny Vestnik, No. 5, 1967; Soviet Military Review, 11 November 1965; and Red Star, 16 November 1971. Military Thought has been published by the USSR Ministry of Defense in three versions in the past -- TOP SECRET, SECRET, and RESTRICTED. There is no information as to whether or not the TOP SECRET version continues to be published. The SECRET version is published three times annually and is distributed down to the level of division commander.

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New Tasks for Communications  
In Automated Troop Control Systems

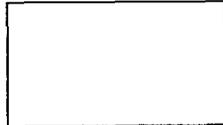
by

Colonel General of Signal Troops A. Frolov, Professor,  
and Colonel V. Davydenko, Candidate of Military Sciences

The primary purpose of a communications system, as an element of a control system, is to provide for the exchange of information between controlling organs and the controlled entities. The specific tasks levied on a communications system are determined by the structure of the control system being served and the patterns established for the exchange of information.

In non-automated troop control systems, information is transmitted via communications channels in the form of telegraph (facsimile telegraph) and telephone messages. The texts of the telegraph and facsimile telegraph messages to be transmitted are prepared by the responsible officers effecting the exchange of information. The mission of communications is to transmit these messages in a timely manner with the requisite reliability and security. Control organs manually process the information collected to support the formulation of plans. Consequently, communications here fulfil functionally isolated technical tasks and, therefore, constitute that independent element in a control system which incorporates the technical means for the transmission of telephone and telegraph (facsimile telegraph) messages.

In automated troop control systems developed for the purpose of raising the efficiency of control, the first thing envisaged is the automation of the information collecting and processing procedures. To accomplish this, electronic computers, automatic data transmitters, high-speed printers, and special display devices are employed.





By using data transmitters and electronic computers, many messages are automatically made up and transmitted via communications channels in the form of code messages. From communications channels the code messages are again fed into the electronic computer where they are sorted, stored, and processed.

The information output from the equipment may be accomplished automatically and on request either in the form of a text, which is convenient when preparing data for the formulation of a plan, or in the form of a graphic display (using conventional symbols) of the situation on the special display devices.

Along with the automation of the collecting and processing of information, the automated troop control systems are also expected to make use of electronic computers to automate the completion of various types of operational-tactical calculations related to the quantitative assessment of the capabilities of friendly and enemy forces and means by forecasting the results of alternative troop operations and by choosing the optimum plan.

Thus, the array of technical means for automated troop control systems designed to automate the solution of information and calculation problems, includes not only communications means, but also electronic computers with automatic data transmitters and data input and output devices. Naturally, all of these means which provide automation of data processes should be combined into a single technical system. In this context, the following question arises: what is meant by a communications system in automated control systems of ground forces operational formations and what tasks should be levied upon it?

Unfortunately, a unanimous opinion has not yet been formed regarding this question. There is a point of view which holds that even in automated control systems the communications system should provide only for the transmission of messages with the appropriate reliability and security and, therefore, it should only include communications lines, channel-forming means, equipment which increases reliability, security equipment, and automatic data transmitters. Electronic computers, which carry out the collection, storage, processing, and output of data, are



considered to be separate, independent elements of a control system.

It seems to us that there are a number of substantial deficiencies in such a division of a technical system which constitutes a single process into elements according to the types of means employed.

In the first place, the organizational and technical dissociation of communications means from electronic computers, which provide automated data processing, will lead to considerable difficulties in the technical mating and operating maintenance of both. This deficiency begins to manifest itself in the developmental phase of automated control systems, when electronic computers and data transmission systems are designed separately without the necessary technical coordination, and then later various mating devices are produced. In addition, under these conditions some automated data processing functions are not always allocated efficiently between data transmission systems and electronic computers. In particular, it is more practical in a number of cases to have such functions as automatic enciphering and improving the reliability of telecode data performed by electronic computers rather than to develop special equipment for these purposes.

Some experience with the operating maintenance of existing automated systems has convincingly attested to the fact that the subordination of signal subunits and electronic computer servicing subunits to different services reflects most adversely as a whole on the cohesiveness and coordination in the performance of the entire system. Signal troops had a similar experience in the postwar years: when they were assimilating alphabetic printing radio communications, the reliability and efficiency of these communications were raised markedly only after radio subunits and telephone-telegraph communications subunits were combined organizationally into joint, centralized subunits.

Secondly, if the principle of switching messages (instead of switching communications channels) is introduced when automated troop control systems of operational formations are furnished with telecode communications, and if communications means and computers are organizationally and technically dissociated, it will be necessary to provide

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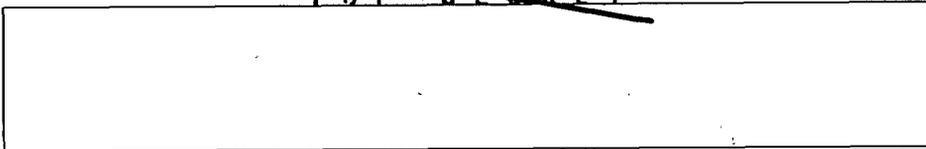
separate communications computers. At the same time, this task may be successfully accomplished by electronic computers which are linked to communications channels and which carry out the collection, storage, and processing of messages, thereby excluding partial duplication of the same operation by two computers.

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Thirdly, isolating electronic computers as an independent element of a control system means that, in order for them to be used fully, they will have to be given the tasks of solving both information and calculation problems in support of all staff directorates (departments), including also those in the principal control posts of operational formations. It is understood, of course, that such multi-purpose electronic computers are very bulky, and they clearly will not be able to provide high reliability and efficiency for automated troop control during the more complex periods of an operation.

In our opinion, when breaking up complex technical systems, the more proper principle is to allocate to separate subsystems (elements) those technical means which accomplish a functionally separate technical process in direct coordination. The collection, storage, processing, and output of data are one information process whose automation can be implemented apart and independently of the automation of other processes which take place in control systems. Since the information process may be thought of as human communications effected through the exchange of telecode messages, the totality of technical means accomplishing it is, in essence, a subsystem of automated telecode communications.

Consequently, the automated telecode communications subsystem should combine, organizationally and technically, not only communications means and data transmitters, but also an electronic computer designated for the collection, storage, and processing of messages. This same computer may be used for message switching, for collecting and processing statistical data concerning message routing, and for the technical monitoring of the status of the communications channels in the system and the axial redistribution of these channels. Specialized electronic data-logic machines may be used for these purposes at the principal control posts of operational formations. The information collected and processed from data-logic machines is issued either

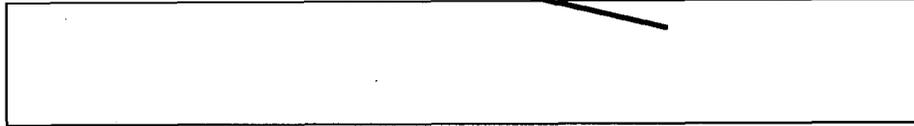


automatically or on request to the directorates (departments) located at a given control post and also by prior designation to higher, coordinating, and subordinate echelons. In view of the above-mentioned principles it is not advisable to have these machines solve computation tasks for directorates (departments) of principal control posts of operational formations. Special data-calculating machines should be used for this purpose, and installed with data-logic machines in the principal directorates (departments). These machines receive information addressed to the appropriate directorate, carry out additional processing if it is necessary, and pass the information on in the required form on high-speed printers or on display devices. When fulfilling these functions, these machines become subscriber devices of automated telecode communications subsystems. In addition, the information they receive from the data-logic machines can serve as input data in making operational calculations for the directorates (departments) they service.



The creation of such specialized machines will permit them to be the best equipped for solving specific types of problems at the operational level of control (with considerably smaller size in comparison with multi-purpose machines). To increase the reliability and viability of service for automated control systems, we must provide for the output and terminal equipment of data-calculator machines of directorates (departments) on communications channels through the main distribution frames of signal centers, in addition to data-logic machines. In this manner we will have favorable conditions for the use of telegraph and photo-telegraph communications means in an automated telecode communications subsystem.

Together with telecode information, ordinary speech information transmitted by communications channels in the form of telephone messages (conversations) will also be circulated in automated control systems. This type of communications is carried out with an automated search for subscribers regardless of their location. The technical means which provide telephone communications constitute an automated telephone communications subsystem. When using pulse-code modulation, the communications channels for this subsystem can be in common with the automated telecode communications subsystem.

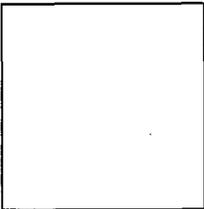


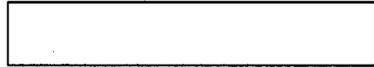
Thus, a communications system in automated control systems is made up of two subsystems: automated telecode communications and automated telephone communications. The tasks of communications in automated control systems are expanding substantially. In this instance, communications are not only a means of transmitting messages, but also a means of human communications which provides the process with the necessary and feasible level of automation to increase the efficiency of troop control.

Besides transmitting messages with the required reliability and requisite security, communications should provide for automatic formulation of messages, the input of data into electronic computers, sorting, storing, switching, and processing information, and for the output of information automatically or on request in a form convenient to control organs for their work.

Of course, the communications system cannot be given the functions of automating the process of preparing and implementing troop control plans. These functions are carried out by control organs and by a special service for automating control, which apparently is to be further developed and will be involved in selecting those information and calculation problems to be solved by electronic computers, and in developing their operational-tactical characterization, algorithms, and programs. However, signal troop subunits (units) should also perform the operating maintenance of the technical means used for these purposes. This is necessitated by the fact that directorate (department) data-calculating machines are intended not only for the accomplishment of operational calculations but also for the exchange, processing, and output of data in support of the directorates (departments) being serviced, i.e., these machines, as mentioned above, are also at the same time subscriber devices with respect to the automated telecode communications subsystem.

From this point of view it seems advisable now to charge chiefs of signal troops of military districts with the task of providing military district computer centers with operating maintenance, thereby expediting the development of automated data-calculating systems based on existing electronic computers and communications channels.





The availability of such data-calculating systems will permit, along with the automation of daily labor-consuming work performed by directorates and departments of military district headquarters, the conduct of further experimental research into problems associated with the introduction of automated troop control means into practice. In addition, by providing the technical and operating maintenance of existing models of automated control equipment, signal troops will be able to accumulate experience and then use it to service future automated control systems.

In conclusion, we would like to express confidence that the development of a unanimous opinion concerning the questions discussed in this article will contribute to the successful development of new and more sophisticated automated troop control systems and to improvement in the training of specialists in the combat use and operating maintenance of these systems.

