1985

Report of a Representative of the USSR Chief of Armed Forces Communications, Developing Modern Communication Systems

Citation:

"Report of a Representative of the USSR Chief of Armed Forces Communications, Developing Modern Communication Systems", 1985, Wilson Center Digital Archive, Institute of National Remembrance (IPN-BU). Translated for CWIHP by Gary Goldberg. https://wilson-center-digital-archive.dvincitest.com/document/114555

Summary:

This report summarizes findings and recommendations by the leadership of the Combined Armed Forces of the Warsaw Pact on the issue of improving allied communications systems and equipment. The writer warns that the alliance's communications technology has not kept up with the demands of modern military command and control systems, emphasizing the importance of rapid combat readiness and survivability; the complexity of modern technical systems and equipment; the imperative of maintaining secrecy; and the significance of efficient transmission of information. By integrating advanced technologies within the existing military infrastructure, it is argued, the Warsaw Pact forces will be better equipped to meet these challenges. Suggestions include standardizing equipment across the military, adopting digital formats of information, automating communications, developing technologies immune to the environmental consequences of nuclear explosions, and more.

Credits:

This document was made possible with support from Leon Levy Foundation

Original Language:

Russian

Contents:

[Polish declassification stamps; no original Russian classification level indicated]

REPORT OF A REPRESENTATIVE OF THE USSR CHIEF OF ARMED FORCES COMMUNICATIONS "THE PRIMARY WAYS TO BUILD AND DEVELOP MODERN COMMUNICATIONS SYSTEMS AND EQUIPMENT. THE NEED TO JOIN EFFORTS TO CREATE AN AUTOMATED FIELD COMMUNICATIONS AND DATA TRANSMISSION [SYSTEM]"

Dear comrade generals and officers!

In the very acute struggle to anticipate the enemy in operations the role of communications as a decisive factor in providing command and control of troops and weapons and to gain time has grown substantially in the current conditions of waging combat operations.

Now, as never before, the degree of realization of the operational capabilities of the Armed Forces depends on the quality of communications, especially the capabilities of their nuclear missile weaponry and, of course, the effectiveness of the command and control of troops and weapons.

In consideration of this, the leadership of the Combined Armed Forces of the Warsaw Pact devotes constant attention to the study of trends in the development of communications systems and equipment, considering them an important stage in the improvement of military communications.

At a meeting in Varna in 1976 army specialists of the Warsaw Pact countries took note of the main trends in the further development of field communications systems and the communications equipment in the armed forces of allied countries. Much has done since then to realize them.

[I] would like to examine the issue somewhat more broadly at this conference.

Some proposals about the directions of further improvements in communications systems and equipment will be described in the report based on an analysis of the most important requirements and factors which have resulted from the need for robust command and control of the armed forces.

THE MOST IMPORTANT FACTORS DETERMINING THE DEVELOPMENT OF COMMUNICATIONS SYSTEMS AND EQUIPMENT

A scientific and technical revolution and the revolution in military affairs which continue at the present time have exerted and is right now continuing to exert a decisive influence on all aspects of military policy and combat applications in the armed forces.

The radical changes in the forms and methods of command and control, the wide-scale introduction of the latest triumphs in science and technology, and the comprehensive automation of the command and control of troops and weapons are characteristic features of its present stage.

Naturally, the development of command and control systems present new and high demands on the communications systems which are its technical basis. A communications system should keep pace in its development with the growing requirements imposed by a command and control system.

If in the recent past we could have resigned ourselves to the apparently natural process of the development of a communications system with "concessions" to the command and control system, now in an era of scientific and technical revolution when the combat capabilities of troops and weapons are developing at a rapid pace the demands on command and control are growing quickly and sharply. Such a development path for communications systems is already unacceptable since it might lead to a critical lag in the capabilities of communications systems behind the command and control requirements.

Accordingly, in order not to lag behind in the development of communications systems it is necessary to foresee command and control requirements on the basis of a scientific analysis, and provide the development of a communications system not with "concessions" but in parallel with the development of requirements for command and control and at times anticipate them.

Therefore, when determining the primary ways to construct and develop modern systems, arrays, and communications equipment for the armed forces, we first of all proceed from an analysis of the trends in the development of command and control systems and the requirements for communications in order to properly develop and improve a communications system and equipment while anticipating their development.

So, what are the main factors that need to be taken into account?

1. The combat readiness of a command, control, and communications system

If previously the main criterion determining the level of combat readiness of a command and control system was troop readiness now the readiness of a weapon for combat use has become such a criterion.

The readiness of a command and control system ought to be higher or, in any event, commensurate with the readiness of the weapon. But now this is minutes and even seconds.

Accordingly, in order to fulfill the requirements of command and control, the combat readiness of a communications system also ought to be higher or commensurate with the combat readiness of the weapon.

2. The scope of a command, control, and communications system

One of the most important areas in the development of a command and control system is the increase of the level of its centralization, including the provision of direct centralized command and control of nuclear weapons platforms.

This presents a communications system with a number of very serious organizational and technical problems.

The highest reliability and confidence of information exchange and the assurance that unauthorized operations are precluded should be provided. It is necessary when doing this to take into consideration that a substantial growth in the number of command and control facilities is being observed and accordingly a growth in the scope of command, control, and communications systems and a growth in their saturation with complex interconnected modern technical systems and equipment.

The requirements to ensure the secrecy and security of communications are also

taking on a qualitatively new overtone. A completely new problem is appearing, particularly the protection of information in an automated control system.

In a series of measures concerning communications security increasing importance ought to be given to countering foreign technical reconnaissance and preventing of the possibility of identifying the structure of the command and control system, the force grouping, and the order of battle through the communications system.

3. The robustness and survivability of a command, control, and communications system

In modern war with the use of weapons of mass destruction the requirement to ensure the robustness of command and control ought to be especially taken into consideration.

A command and control system should survive and provide reliable command and control in the most critical situations created by enemy use of nuclear missiles.

This imposes high requirements on a communications system regarding survivability. The creation of well-hardened control posts with communications centers remains a necessary condition.

But this is already insufficient. An entire set of other measures is needed.

The creation of a far-flung support network which would ensure the reliable exchange of information even when an entire series of its elements is out of commission is needed.

An optimal combination and the comprehensive, efficient use of various types of communications equipment should also be provided, including equipment [based] on new principles and physical phenomena not previously used for communications purposes.

For example, the widespread use of repeaters on various air-transportable equipment might be employed for redundancy of ground nodes in a communications system.

Finally, the creation and employment of new equipment, [radio] stations, and communications centers ensuring comprehensive protection against the various damaging factors of nuclear explosions is necessary.

The requirements to ensure resistance to jamming are also of no little importance in the list of measures to ensure the stability of communications.

4. The traffic capacity and mobility of communications equipment

A communications systems should support the exchange of all types of information with the required quality and time response to satisfy the requirements of command and control.

The growth of the volume of information in a command and control system and the introduction of automated command and control systems is creating a need for a sharp increase in communication systems' traffic capacity.

When doing this it is necessary to resolve the conflict between the ever-growing volume of information and the need to reduce the time to deliver it to command and

control facilities.

The fulfillment of this requirement by only the simple mechanical growth of the amount of equipment would for many reasons be physically and economically unjustified.

The most advisable way to solve the problem is to increase the efficiency of the use of communications channels and equipment.

The employment of an efficient means of organizing communications which allow the same channels to be used to transmit various types of information is needed. The simplest method of achieving this is the transmission of information in digital form.

The switch to digital methods of sending all types of information will moreover permit the automation of the process of switching and managing the distribution and redistribution of channels on a network by the best method, that is, the management of the structure of a network, which is especially important in providing the necessary flexibility and survivability of a communications system.

Characteristic of modern operations are rapid changes in a situation and critical situations to which a command and control system must react immediately.

This means that a communications system also should ensure a rapid reaction to a change in the overall situation and the communications situation. In such conditions the automation of information exchange processes alone will turn out to be insufficient. An active, real-time effect on the communications system is necessary, permitting it to quickly redirect its capabilities.

The creation of a rapid, automated command and control system of the communications system itself a necessary condition to fulfill these requirements.

5. The reliability of data exchange

The amount of information sent in discrete form may sharply increase when introducing automated command and control systems of troops and weapons.

A data exchange system intended to exchange information (standardized and unstandardized messages) between elements of automated command and control systems with the automation of the processes of its construction, and an increase in reliability, encryption, input, distribution, and switching emerges as its most important component of a communications system.

Computer complexes and automated workplaces of officials at the control posts in command-staff, staff, and special vehicles are users and information sources in a data exchange system.

Information exchange needs to be provided in real time for the transmission of data about the air situation (radar information) along with an exchange of tactical information conducted in a message switching mode. This imposes a number of specific requirements on the construction of radar information exchange networks and the communications systems and equipment used in them, including the data transmission device.

The information being transmitted between computer complexes and other automatic processing equipment in automated systems of the command and control and troops

and weapons, do not as a rule have conceptual (semantic) redundancy and cannot be corrected by operators.

The required reliability of data exchange can only be ensured by the use of devices to automatically detect errors (which arise in the process of transmission through a communications channel) and correct them.

Depending on the nature of the information being transmitted, its importance, and the processing method, the requirements for the correctness of transmission are 10-5/10-6 (and higher) per device [blok].

The data transmission centers of communications centers, the data transmission equipment systems at command and control facilities, and also the communications channels connecting them to one another should comprise the technical basis of a data exchange system.

The introduction of automated command and control systems will require a refinement of the structure of the individual elements of a communications system, including the communications centers of command and control posts and command-staff vehicles.

Along with channelization centers, encryption of telephone and telegraph communications, and radio centers, data transmission centers and stations appear at communications centers which are designed to carry information, encrypt it, increase reliability, distribute and redistribute information, and link the automation equipment of command and control points with communications channels.

The appearance of a new type of communications, data transmission, will lead to a corresponding redistribution of the volume of the main kind of information (telephone, telegraph, etc.) in a communications system.

The equipment of command-staff vehicles will also undergo changes with the introduction of automation equipment.

Along with HF- and UHF-band radio equipment, switching equipment, remote control equipment, and telephone encryption equipment, data transmission equipment and the automated workstations of operations officers equipped with corresponding automated terminal devices and communications should be installed in them.

Changes in the equipment of command-staff vehicles impose new requirements on the integration of components.

It is first of all necessary to support the operation of communications equipment both for data transmission as well as for conducting secure telephone conversations, and the interfacing of data transmission equipment and automation devices and channeling equipment. Additional difficulties arise in ensuring electromagnetic compatibility of the system's automation and communications components.

6. The electromagnetic compatibility of radio equipment

The conditions for ensuring the electromagnetic compatibility of electronic equipment in mobile facilities and at command and control posts on the whole are becoming increasingly more difficult.

The most difficult conditions for ensuring the electromagnetic compatibility of field

electronic equipment should be expected in command-staff vehicles in which automation equipment is to be installed together with communications equipment.

In existing command-staff vehicles the control of the operation of radio's transmission is exercised directly by the commander. Therefore, as a rule, only one radio transmits, which does not exert a negative influence on the range of communications of other radio channels.

Where there is automation equipment, the powering on of transmitting equipment is done both by the commander and the automation equipment independently of him. This creates situations in which two or more radios can be operating at the same time, which can lead to a reduction of the range of radio communications.

The problem of ensuring the electromagnetic compatibility of electronic equipment at control posts when introducing automation equipment is quite urgent and the efficiency of the functioning of the command and control system depends to a large degree on its solution.

Consequently, as is evident from a brief analysis of some requirements and factors produced by new requirements for the command and control of troops and weapons, a prospective communications system should:

1. satisfy the general requirements for the management of combat training, survivability, security, speed, resistance to jamming, and efficiency; support the centralized command and control of troops.

2. functionally support the exchange of all kinds of information, including data transmission of automated systems for the command and control of troops and weapons with the necessary reliability.

3. be automated; support the automated command and control both of the communications systems itself as a whole as well as its individual elements.

Hence the requirements for technical systems and communications equipment.

II. THE PRIMARY WAYS TO DEVELOP COMMUNICATIONS HARDWARE

Communications hardware is the material basis of a communications system. Its capabilities, quality, and the degree of adoption of the latest achievements of science and technology determine the possibilities and quality of the operation of the communications system as a whole. That is why we devote constant attention to the improvement and development of communications equipment.

Further improvement and development of communications hardware should be done in the direction of supporting:

an increase in the range of operation, traffic capacity, resistance to jamming, and mobility;

an increase in survivability and reliability and a reduction in weight and size;

an improvement in the electromagnetic compatibility of electronic equipment;

simplification of operation and a reduction in the number of maintenance personnel;

a reduction in the time to bring equipment into full combat readiness;

standardization at both the level of subassemblies and units as well as at the types of equipment as a whole.

The implementation of the above requirements when developing new and the improvement of existing communications equipment can only be achieved in an integrated fashion.

For example, to improve the survivability of communications equipment steps should be taken to ensure it is earthquake-proof and is protected against neutron radiation, electromagnetic impulses, and the other damaging factors of nuclear explosions.

The reliability of communications equipment can be increased by the use of highly-reliable basic components, the optimization of circuitry solutions, a modular design principle, automatic redundancy of the main assemblies of the equipment, built-in monitoring, etc.

A reduction in weight and size can be mainly achieved by the broad use of new basic components, including a high level of integration (microcomputers, microprocessors, and large integrated circuits), and also by switching to digital methods of formatting and exchanging information.

A simplification of operation and a reduction of personnel can be ensured by introducing automated channel switching processes, a reduction of manual tuning devices, the broad introduction of devices to remotely control equipment, an improvement in monitoring and measuring operations, and the simplification of routine maintenance and repair work.

New frequency bands (including optical), the strict observation of standards for the out-of-band and spurious radiation of radio transmitters, an improvement in antenna patterns, etc. need to be mastered to ensure the EhMS [electromagnetic compatibility] of communications equipment.

It is obvious that the further improvement of the current and the development of new communications equipment should be done making sure to take their use in an automated communications system into consideration.

Some specific areas for the development of communications equipment:

Satellite communications equipment

The introduction of satellite communications is being proposed at the operational level, including down to the control posts of large formations.

The creation of small highly-mobile radios operating in a prospective frequency band is an important direction in the development of satellite communications equipment as is also the solution of the problem of protecting relay devices on satellites from electronic warfare equipment.

Satellite communications channels should be digital, which provides large traffic capacity, high resistance to jamming, and the possibility of connecting to digital terminal equipment.

The policy adopted of rapid development and the creation and adoption of military satellite communications should be expanded.

Radio equipment

Troops will be supplied with radios equipped with adapters and radio communications automation equipment. A further simplification of tuning processes, maintenance, and the monitoring of their working order will be provided in the projected equipment.

The proposed equipment will provide an opportunity for modular construction of radio centers on the principles of group use of radio receiving and transmitting equipment.

A feature in the development of radio equipment at the operational and strategic levels will be a reduction in their variety [tipazh], which is achieved by creating HF-UHF band radios as common standardized systems. For example, it is planned to use third generation radio equipment from the Poisk array - Polyus-15, Polyus-5, and Ehkvator - in the near future in the echelons in the High Command at the Theater of Military Operations-front-army level.

The introduction of third generation radios of the R-156, R-134, R-143, R-159, R-158, R-173, and R-157 types, which differ from existing [radios] by higher reliability and a higher level of the automation of tuning processes and a change to other frequencies, is expected at the tactical level.

In the future when developing tactical radio equipment it seems advisable to lean toward an expansion of the frequency band, an increase in transmitter power, and an improvement in antennas and EhMS parameters. It seems promising to look for ways to create a single system of tactical radio equipment which operates on the principle of the collective use of a group of frequencies and adapts itself to the frequency situation.

Equipment to remotely control transmitters needs to be developed on principles common to all command echelons. When doing this it is proposed to use radiorelay stations of the Azid-1 type as remote control line channeling devices. In the future fiber optic communications lines will find use instead of remote controlled cable lines.

Radio relay and tropospheric communications equipment

A switch to digital methods of transmitting information should be considered a promising direction for the development of radio relay and tropospheric communications.

The replacement of existing radio relay and tropospheric stations with more modern ones should be expected in the near future. Radio relay stations of the R-416 type are recommended for the inventory of the armies of the Warsaw Pact countries at the strategic level, R-414 (Almaz-A) at the operational level, and Azid-1 and Azid-2 at the tactical level.

At the present time the R-410 tropospheric station, which allows a 12-channel line to be built to a length of 1500 km with intervals up to 150 km, is widely used at the operational-strategic level.

The R-412 tropospheric station, which provides three to six telephone channels up to a range of 500 km and intervals of up to 150 km, is used to organize direct

tropospheric communications between control posts at the operational and operational-strategic levels of command.

These radios have high performance specifications and can transmit both analog and digital information, which is especially important when switching to digital methods of transmitting information.

When improving and developing tropospheric communications equipment serious attention should be paid to increasing the energy potential of the radios and increasing the resistance to fading. It is proposed to create adaptive phased antenna arrays and use the effect of long-range troposcatter communications, which permits the quality of communications and the length of the intervals to be increased.

Landline communications systems

Development of [the following] needs to be done for prospective landline communications networks:

landline communications equipment and lines with the capability of transmitting digital information;

hardware and cables for secure and fiber optic communications networks;

a set of equipment for the mechanization of cable laying.

Joint efforts by allied countries are being undertaken at the present time to develop an array of pulse multiplexing equipment for radio relay, tropospheric, and cable communications lines.

In the near future the introduction of a system of channeling equipment with the Azur frequency multiplexer is envisioned.

The introduction of the Azur array will ensure:

a reduction in the number of equipment rooms at communications centers (by reducing the size and weight of the equipment by half to two-thirds);

a substantial reduction in the time to tune circuits;

a three- to fivefold increase in the reliability of the apparatus compared to current equipment and an increase in the number of patches of the TCh [audio] channel to 8-12 with higher quality component channels;

a halving of the number of cables and a two-thirds reduction in personnel when building a 60-channel line.

The further use of P-296 field cables, intranodal cables of the PTRK (PRK) type, and light field cables of the P-274M and P-268 type is foreseen in the period until 1985. The introduction is proposed of the Stroka (Kabel'-2) single intranodal cable created jointly with Bulgaria, which exceeds cable of the PTRK type in a number of operating characteristics.

A further improvement of cables should occur in the direction of reducing the size and weight and improving the technical performance through the use of new materials.

The trend to use fiber optic communications lines in military communications is very promising. Joint research in this field has been planned through the Warsaw Pact Technical Committee.

Encipherment equipment

Secure communications networks at all command echelons are supposed to be improved in the period before 1985 with the use of encipherment equipment of the T-206 type and its modifications, and T-266, T-217, and T-219 by integrating this equipment in special equipment rooms and expanding subscriber networks.

A further improvement in encipherment equipment will be made in the directions of ensuring the necessary cryptographic security while expanding the size of subscriber networks; reducing weight and size; and accelerating the processes of tuning and establishing communications.

It seems to us that a feature in the creation of some proposed encipherment equipment will be support for bulk encipherment and the combination of secure communications equipment and digital channelization equipment. In the more remote future is the use of programmed means of implementation based on computer equipment. In the process the realization and means of bulk encipherment might be comparatively easy to find.

In the future another important feature associated with the switch to digital means of transmission is the increase in cryptographic security of the information being transmitted at all command levels to the guaranteed level.

The considerably increased demands on the degree of information security, especially of telephone conversations, predetermines the need to create a standardized set of encipherment equipment in the near future with guaranteed security capable of securing all types of information transmitted both through audio channels and through the digital channels of the proposed communications equipment.

Switching and data transmission equipment

In the period until 1985 manual telephone cord switchboards of the P-193M, P-194M, and P198M1 type and crossbar ATS [automatic telephone exchanges] in internal communications ATS equipment rooms of front and army control posts will still be mainly used in communications systems.

The improvement of manually operated switchboards is leading in the direction of creating cordless switchboards and in ATS of internal and long-distance communications in the direction of the use of quasi-electronic and the development of electronic ATS.

We expect that in the period before 1985 a new kind of communications will be introduced, data transmission. When this is done the distribution of information to addressees will be performed in a data transmission network through message switching.

The creation of a data transmission network at all command levels of a PASUV [field automated troop control system] is envisioned on the basis of the use of the Bazal't-M

equipment.

In the next few years, based on the results of its use in the tactical-level PASUV automation systems, it will be advisable to pursue work to improve this standardized data transmission equipment on the basis of the use of new basic components.

The realization of some of the trends under consideration in the development of technical systems and communications equipment is one of the most important ways to support a further increase of the quality of the functioning of a communications system and a corresponding increase in the combat readiness, stability, and effectiveness of the command and control of troops, forces, and combat equipment.

However, this does not exhaust the problems of further improving and developing communications systems.

THE PRIMARY WAYS TO IMPROVE AND DEVELOP COMMUNICATIONS SYSTEMS

As already noted, the primary ways to build and develop the field communications systems of the armies of the Warsaw Pact member countries should be decided on the basis of the results of an analysis of the trends in the development of command and control systems and the demands they place on the system, the complexes, and the communications equipment.

If we view the existing field communications systems of allied armies from the perspective of the results of this analysis then we can see that, while providing command and control as they were designed to do, they still do not fully satisfy the growing demands of command and control and do not fully match the combat capabilities of the troops and weapons.

It is important to stress the fact that for a long time the existing communications systems of fraternal armies have traditionally developed autonomously. This in turn has led to:

- additional difficulties being created in ensuring coordination between the command, control, and communications systems when joint combat operations are being waged by several national armies:

- the hampering of the purposeful use of the capabilities of all or several of the national communications systems in accordance with a single plan and concept in the interest of the command and control of a grouping of troops which is performing the most important missions at the moment;

- the mutual redundancy of equipment and channels with the goal of increasing the survivability of the communications systems and stability of command and control has been hampered.

Analysis shows that only automated communications systems constructed on common organizational principles and using standardized hardware can be free from these shortcomings.

Therefore, in our opinion the general policy for the development of field communications systems of the armies of the GUVD [Main Command of the Warsaw Pact] should be the creation of automated field communications systems (PASS) of operational large formations constructed on common principles with strict coordination of all organizational and technical decisions.

All the main processes of transmitting and processing all type of information should be automated in the PASS as well as the processes of controlling the elements of communications centers, the assemblies, the networks, and the system as a whole.

Special attention should be devoted to improving and automating the management of communications.

With today's reach of a communications system, the great saturation of its complexes and communications equipment, and the rapid and sharp changes in a situation it is impossible to ensure the efficient functioning of a communications systems and its accomplishment of the tasks of command and control of troops if there is no orderly, clear, organized management of the communications system itself.

This is a very complex task. For a comprehensive solution
it is necessary not just to create purely technical command and control equipment but to also automate the communications equipment itself. We do not have such communications equipment right now; it is just being developed.

But it is impossible not [SIC] to solve the urgent problems of the management of communications at a given stage. They need to be solve successively, in stages, in parts.

The most serious attention should be paid to increasing protection against enemy technical reconnaissance equipment and the protection of communications system against enemy electronic countermeasures equipment. Along with organizational measures a number of technical measures should be envisioned which are implemented right in the communications equipment.

When improving and developing field communications systems it is necessary to ensure a further increase in their survivability and mobility.

This problem will be solved by improving field communications centers, command-staff vehicles, and control posts and using communications equipment on air-transportable means.

It is obvious that when embarking on the creation of the proposed field communications systems it is first of all necessary to clearly define the concept of such systems and formulate the basic principles of their construction and functioning.

Allow [us] to describe some preliminary ideas about these principles as they appear to us today.

1. The principle of unity - one of the basic principles of the development and creation of automated field communications systems of operational large GUVD formations

An automated field communications system of an operational large formation (front) should be created standardized [yedinyy] for the purpose of providing the command and control of the large formations, formations, and units of the branches of the Armed Forces, troop arms and special troops, and the rear formations, units, and institutions operating therein. In our opinion, the principle of the unity of a communications system should be preserved with a coalition of troops of an operational large formation. This situation brings to the forefront the problems of ensuring the information technology compatibility of the systems and communications equipment of the large formations, formations, and units of the allied armies.

The independent development of the communications systems of the Combined Armed Forces of the Warsaw Pact member countries creates difficulties both in the preparation of theaters of military operations with respect to communications and reduces the effectiveness of the command and control of troops when the OVS [Combined Armed Forces] conduct joint operations.

The creation of operational- and tactical-level PASS for the command and control of allied armies will require the coordination of a number of doctrines concerning:

the development and coordination of the concept of the OVS PASS;
the development and coordination of the overall operational and technical demands on the system;
the elaboration of the problems of managing a system and its elements and the problems of operational maintenance;
the solution of economic issues, issues of implementation, etc.

The principle of the unity of operational- and tactical-level PASS for command and control should be ensured by its construction and development in accordance with to a common plan, by the enhancement of the degree of centralization of command of the system and signal troops, by the use of common principles of channelization, switching, and securing of communications channels, by cross-utilization of receiving and transmitting radio centers, and also by the centralized use of channels of state communications networks operating in the band of the operational large formation.

Not only the organizational, but also the technical unity of a PASS takes on great importance in the creation of a PASS. It consists of the standardization of the equipment and the communications systems being used and also in the use of common systems for addressing information, the standardization of codes and message formats, the means of increasing reliability, and the principles of construction and algorithms for the functioning of primary and secondary PASS networks, the use of typical circuits of the organizational and technical construction of communications centers [, and] the standard versions of connecting the communications centers of control posts with the OUS [support amplifier station] of communications grids.

The information technological and algorithmic compatibility of the field communications systems of the armies of the Warsaw Pact member countries should be the result of realizing these conditions.

Thus, the principle of unity should be the basic principle when creating an operational- and tactical-level PASS for command and control.

2. The principle of the conformity of a PASS with the requirements and structure of a PASUV

A PASS should satisfy the basic requirements of a PASUV and conform to the structure and scope of the PASUV in its own structure and scope. It should provide reliable secure communications at the operational and tactical levels both in automated and non-automated modes of the command and control of troops when they are conducting combat operations at a high tempo, when there are sharp changes in the situation, frequent changes of control posts, under conditions of the impact of nuclear missiles, other means of destruction, and active enemy electronic countermeasures.

The scope and structure of a PASS at each level of command should allow communications to be supported with the control posts of the higher headquarters,

subordinate and supporting troops, and also across one or two command levels in accordance with the structure of the PASUV.

3. The principle of the comprehensive use and optimal relationship between troops arms and types of communications

A PASS should be constructed using a point-to-point network between the communications centers of control and controls posts via a field communications grid with the comprehensive use and an optimal relationship between the various branches and types of communications.

An automated field communications grid of a front (army) should be created using the multichannel equipment of radio relay, tropospheric, and landline communications. It should include communications arteries, lateral lines of communications, and communications grids.

The direct communications lines between the communications centers of control posts should be based on satellite communications equipment, radio equipment, low-channel tropospheric and radiorelay stations, and also on communications using relay stations on air-transportable means.

Automated secondary networks of telephone, telegraph, and data transmission communications are created from the channels of the primary PASS network, of which the channels of the field communications grid, the direct communications line, and the switching and terminal devices comprise the basis.

The comprehensive use and optimal relationship of the various branches and types of communications in a PASS should ensure an increase in the efficiency of field communications systems to the level of contemporary requirements.

4. The principles of manageability, centralization, and autonomy

A PASS should have a unified automated system for managing communications. An automated communications management system should support the automated collection of information about the status of the system and the development and delivery of decisions to the users [ispolniteli] with the object of bringing the status of the system and its elements into conformity with the requirements of stable command and control of troops.

Organizationally, a communications management system should consist of communications control posts for command levels and control posts of PASS elements (zones, centers, and communications lines).

The centralization of the management of a system and signals troops should not exclude, rather on the contrary it should clearly determine, the possibility of the autonomous deployment of a communications system by command levels. In addition, a PASS should strictly consider the specifics of the support of communications in the subsystems of the management of troop arms, special troops, and the rear and not exclude but rather reinforce the responsibility of the corresponding chiefs of troop arms and their staffs for the organization and supply of communications for the command and control of their troops and men.

In the period up to 1985 and subsequent years it seems advisable to pursue the automation of the following main processes of organizing and managing communications:

the management of a communications system as a whole and its elements;

the cross switching of channels and groups of channels of the primary PASS network in supporting communications centers and the communications centers of control posts;

the switching of standardized digital channels at communications centers;

the search for and the priority service for telephone communications subscribers;

message (data) switching at communications centers.

For a comprehensive solution to the problem of automation it is necessary to create not just the hardware for automated management and automated channel and message switching but to also automate the communications equipment itself and the processes of its tuning, retuning, monitoring, etc.

5. The principle of the evolutionary nature and mutual agreement of the development and continuity programs

The creation of a PASS should be done starting with a gradual switch from the existing communications system to the proposed one. The only realistic way to create one is to develop a system of coordinated programs to develop the main parts and communications systems and the step-by-step realization of these programs.

In so doing it is necessary to support the comprehensive use and mutual saturation of the existing equipment, the equipment under development and the communications systems in the PASS. When necessary, correction of previously taken directions in the development of communications equipment and systems can be advisable, taking their use in the PASS into consideration.

In the process it is especially important for the field communications systems of GUVD armies to be developed through joint efforts by the systematic and purposeful augmentation of their capabilities with a gradual transition to new quality (as new communications systems and equipment are developed and introduced).

IV. THE NEED TO COMBINE EFFORTS IN THE CREATION OF AN AUTOMATED FIELD COMMUNICATIONS SYSTEM

The preliminary ideas reported above about the main principles for the creation of the proposed automated field communications systems of the operational large formations of GUVD armies clearly stress the complex nature and difficulty and the problem.

It is completely natural that it is only possible to solve the problem of building a standardized PASS with the active participation of communications specialists from all the GUVD armies. To create a PASS it is first of all necessary to prepare and develop a number of coordinated rules which determine: the overall common design specifications; the composition and structure of the communication system; issues of managing the system and its elements; operational maintenance; the implementation procedure; economic issues; the testing procedure; and many others.

The joint efforts of all member countries of the Warsaw Pact will be required to conduct much scientific research and experimental development work in a timely and high-quality manner on behalf of a PASS, to search for the optimal structure to build

it, to develop elements of the system, etc. It will also be necessary to solve the problems of the mass production and outfitting of the signal troops of the GUVD armies with communications systems and hardware in order to use the scientific and technical potential of the industry of the allied countries efficiently.

This is a complex matter but we have accumulated a certain experience in preparing and implementing coordinated decisions.

The many years of practice of the joint work on the ETTT [Common Design Specifications] for basic communications equipment and of joint work to create standardized technical communications equipment on the basis of such common requirements has paid off well.

A good example of the joint efforts is the creation of the system of fixed tropospheric communications stations of the OVS (codenamed Bars). The deployment of the Bars system substantially increases the support network of the allied countries armed forces' communications systems and provides more reliable management of the OVS GUVD. Per an agreement about this, it is proposed to pursue work in 1981-1985 to design and construct tropospheric communications centers and also the corresponding control posts of the lines, zones, and the Bars system as a whole.

At the end of this October a conference of specialists from the armies of the Warsaw Pact countries examined and approved the general part of the technical design of the system made by Soviet Army specialists and recommended specific technical designs and blueprints for the construction of the tropospheric communications stations to be pursued by the personnel of the national armies.

This experience allows us to say with confidence that with the joint efforts of our armies it is possible in the next few years to develop the basic documents to create a PASS, make the necessary joint decisions to fashion, and implement a practical program to create it.

It seems to us that as a first step in this direction it is advisable to pursue joint research of the main principles (concept) of constructing automated field communications systems of the large formations of the allied armies in 1982-1983.

In our opinion, such research could be pursued within the framework of the already planned international scientific research work [called] Monolit, "the elaboration of the technical operational and military technical issues of the construction and functioning of an automated field troop command and control system of the Warsaw Pact member countries".

The study of communications issues on behalf of a PASUV has already been envisaged in the assignment for this scientific research work.

If the allied armies agree with this proposal Soviet Army specialists could develop and send the allied armies proposals through the established procedure no later than the 2nd quarter of 1982 to specify the technical assignment for the Monolit scientific research work with respect to the volume and time frames of the technical system issues of constructing the automated field communications systems of GUVD armies which are subject to scientific study.

In submitting such a proposal we proceed from the assumption that the study of the principal issues of the construction and functioning of a PASS should be done in close connection with the solution of the technical military issues of creating a PASUV, for the proposed field communications systems should fully satisfy the needs of

automated command and control systems.

It is quite obvious that a PASUV will be able to function effectively on condition that there is a reliable highly mobile automated communications system. Only in close organizational and technical coordination between a PASUV and a PASS can the maximum benefit be obtained in increasing the operational efficiency of the command and control of troops and weapons and bringing it up to the required level. This is confirmed by the experience we have of developing and creating a tactical-level PASUV. Therefore we again stress that the basic principle which ought to be followed when developing and creating a PASUV and PASS is support for a precisely coordinated and interconnected program of work, beginning with the stage of conducting scientific research. This is why we are deeply convinced that the proposal we have submitted about expanding the framework of the Monolit scientific research work with regard to researching the entirety of the main issues of building a single standardized automated field communications system of the large formations of the allied armies is justified and relevant.

Based on the results of this research it will be necessary to develop and approve an ETTT for a PASS and determine the joint practical steps to implement a comprehensive coordinated program to develop and create it.

It needs to be expected that this will also require corresponding new organizational forms in our cooperation. Possibly, as was done with respect to a PASUV, at the stage of realizing the program to create a PASS the need will appear (by analogy with InterASU) to establish a special international coordinating body.

One would think that this could improve the coordination of our efforts in the development of communications systems and equipment, in implementing a common systemic and technical policy, and in standardizing technical communications equipment.

The solution of the problem of joining efforts in the creation of a PASS is dictated by practice and, in our opinion, the time has already come to take appropriate preparatory steps in this direction.

It is evident that everything needs to be carefully weighed, the possible contribution of each national army to the common cause of creating a PASS specifically evaluated, and suitable proposals prepared.

In our view, it would be advisable to ask the Directorate of Communications and Automation of the OVS Staff to organize the preparation of proposals from allied armies about the procedure to conduct joint work to create a PASS in order to examine them at the end of 1982 at a special meeting of GUVD army specialists. Based on the results of such a meeting it might be possible to plan and submit specific preparatory measures in the established procedure for the approval of the Combined Command to create a PASS.

We express the hope of support for the substance of our proposals from the leadership of the signal troops of fraternal armies.

Thank you for your attention.