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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

(FOUO 1/82)

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USSR

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PROGRESS IN ELECTRICAL COMMUNICATIONS THROUGHOUT UKRAINIAN SSR

Moscow ELEKTROSVYAZ' in Russian No 8,Aug 81 pp 1-5

[Article by G.Z. Sinchenko, Ukrainian SSR Minister of Communications: "Creative Contribution of Ukrainian Communicators"]

In his Report to the 26th CPSU Congress, CC CPSU Secretary General and President of tne Presidium of the Supreme Soviet of the USSR Comrade L.I. Brezhnev summarized the development of our economy and the increase in workers' welfare for the 10th Five-Year Plan and the past 10 years. It was noted that the economy of the USSR developed as a unified national economic complex in which the economic potential of each republic increased significantly.

Thanks to intensive creative labor, the communicators of the Soviet Union, including those in the Ukraine, also contributed to achieving overall high national economic results. Let us look at some typical numbers and examples which illustrates the results of the labor of communicators in the Ukraine during the 1970s.

Communications managment in the Republic was raised to a new level over the past 10 years. For example, the volume of production increased by a factor of 1.9, tariff revenues by more than a factor of 2, profit by more than a factor of 1.6 and available capital by a factor of over 2.3. Labor productivity increased by a factor of 1.6. Over one billion rubles have been invested in the development of the branch for the Republic budget alone.

Long distance telephone and telegraph communications developed most rapidly. During the past 10 years, the length of long-distance cable lines increased by a factor of 2.8. This made it possible to provide long distance communications via cable, and via radio relay on a number of links, for all rayon centers and cities of oblast subordination in the Republic.

The branching network of cable and radio relay links which has been created in the oblasts of the Ukraine has made it possible to increase the length of long distance telephone channels by a factor of 2.76 and to create large groups of channels between Kiev, the capital of the Republic, and the oblast centers, between oblast centers and rayon centers, and to begin widespread introduction of automated long distance connections.

While automatic long distance telephone exchanges were in operation in only four oblast centers in the Ukraine by the early 1970s, and these were low-capacity installations; during the intervening period, high-capacity type AMTS-1M, AMTS-3 and ARM-20 automatic long distance telephone exchanges have been constructed and put into operation in 21 oblast centers, as well as the cities of Yalta, Krivoy Rog and Sevastopol'. Small AVTS automatic exchanges are now used widely for intra-oblast long distance telephone communications. These have been installed in nearly all rayon centers (500 of them) and cities of oblast subordination.

The increase in long distance telephone capacity has combined harmoniously with the development of creative activity of engineers and technicians in this subbranch, which has made it possible to accelerate the development of automated long distance connections, to make a number of improvements and to expand the limits of automation which ordinary AMTS-1M and AVTS exchanges do not have.

One valuable rationalizer's suggestion is the "tariff zone finder" developed by Zhitomir and Rovenskiye [possibly Rovno -- Tr.] engineer-rationalizers: this device makes it possible to organize fully automatic telephone communications within a zone (oblast) (figure 1), and is used extensively in the oblasts of the Republic. These tariff computers are in use at AVTS exchanges in more than 400 rayon centers and cities of oblast subordination. Subscribers in these rayon centers and cities which are connected to the AVTS within their own oblast can call one another automatically without operator intervention at either end of the channel. Figure 2 shows a schematic diagram of the organization of intra-zone automatic long distance telephone communications.

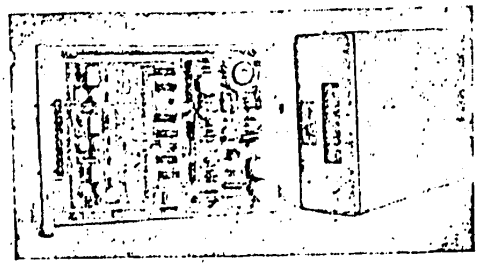

Figure 1

Communicators at Ivano-Frankovsk and Zaporozh'ye made a valuable rationalizers' suggestion. Its introduction allows a group of supervisors of oblast party, council and management organs at oblast centers with AMTS-1M or AMTS-3 stations with no AON [expansion unknown] equipment at the city telephone exchange to call subscribers at rayon centers and cities connected to these exchanges without dialing their own number (so-called "simplified dialing"). Figure 3 shows a schematic diagram of the organization of simplified dialing of rayon center subscribers from an oblast center.

Besides introducing technical innovations to the existing connection automation technology, each city and rayon communications center publishes advertisements indicating the city codes and explaining how to make calls using automatic long

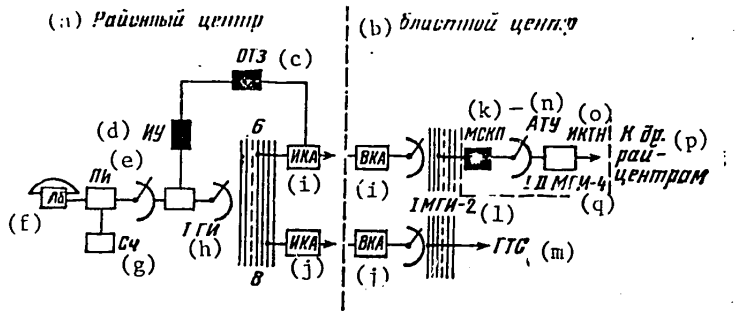

Figure 2

Additional devices to the standard circuits in figures 2 and 3 are shown by the dark boxes.

Key:

(a) Rayon center	(g) counter	(l) IMGI-2 [expansion unknown]
(b) Oblast center	(h) GI [expansion unknown] I	(m) city telephone exchange
(c) tariff zone finder	(i) IKA [expansion unknown]	(n) ATU [expansion unknown]
(d) pulser	(j) VKA [expansion unknown]	(o) IKTN [expansion unknown]
(e) PI [expansion unknown]	(k) semiautomatic trunk matching system	(p) to other rayon centers
(f) subscriber		(q) IIIMGI-4 [expansion unknown]

distance calling. These advertisements are colorful, and are distributed free to subscribers. Oblast, city and rayon newspapers regularly contain advertising-type announcements two or three times each year concerning changes at long distance telephone exchanges or the appearance of new capabilities for utilizing automatic long distance communications.

Of course, the question arises of what has resulted from all of these efforts aimed at accelerating long distance exchange automation, expanding the zone of long distance communications automation and simplifying its operation. Let us look at some specific numbers.

In 1980, 3.7 times as many long distance telephone conversations were ordered than in 1970. Of the total outgoing paid traffic input to long distance exchanges in the Ukraine during 1980, 69% of the conversations were held over automated channels, while the nationwide average index is 40-42%. If this entire increase in the number of conversations were to be processed manually at exchanges in the Republic, it would be necessary to increase the telephone operator staff by at least 7000.

The network of long distance coin-operated telephones has developed extensively within the Republic. This has been accompanied by continuing improvement in coin-operated telephone circuits and their connection to the long distance telephone network, which is described in detail in "Elektrosvyaz'", No. 10, 1979, as well as an improvement in the technology of servicing and monitoring the technical

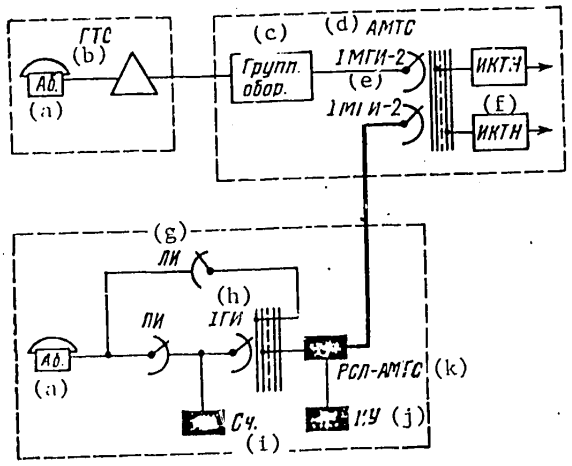

Figure 3

Key:

(a) subscriber
(b) city telephone exchange
(c) group equipment
(d) automatic long distance exchange
(e) IMGI-2 [expansion unknown]
(f) IKTN [expansion unknown]
(g) LI [expansion unknown]
(h) GI [expansion unknown]
(i) counter
(j) IU [expansion unknown]
(k) automatic long distance telephone exchange RSL [expansion unknown, possibly connecting lines relay --Tr.]

condition of coin-operated telephones. Their operating reliability has been improved, their accessibility to the long distance telephone network is high, and the efficiency of utilization of long distance telephone channels has been increased accordingly.

The coin-operated telephone network is highly popular in the Republic, especially in resort areas. For example, in the Yalta area conversations from long distance coin-operated telephones made up 71% of the total outgoing long distance traffic. To use the order system of handling this number of calls, the Yalta long distance telephone exchange would have to more than double the number of long distance telephone channels and add at least 100 operators.

In the future, until the communications network of the Republic has enough standard automatic long distance telephone exchanges with zone organization of long distance communications, the creative initiative of engineers and operating technicians will be aimed at improving the automation of long distance connections.

Further developed within the Republic was telegraph communications, which during the 1970s, especially during the 10th Five-Year Plan, was completely restructured

for the main purpose of creating a Republic high-speed data transmission network as a component branch of the nationwide data transmission network. This problem was solved using AT-PS-PD, PTSK and ATA-MK crossbar telegraph exchanges, mostly domestic but partially imported, and by the extensive introduction of type TT-48 channel formation equipment for long distance communications and TVU-12 and DATA-6 for city networks.

The capacity of the channel switching exchanges within the nationwide data transmission network of the Republic comprises tens of thousands of numbers. Common-user data transmission locations have been created in each oblast center, and TAP-2 telegraph equipment has been installed at organizations and enterprises within cities which allow data to be transmitted over the data transmission network at 200 baud. The nationwide data transmission network is growing rapidly.

The network of channels and stations for photofacsimile reception of central newspaper columns from Moscow has been further developed within the Republic. Work is underway to prepare production areas and communications channels to organize points in Kiev for transmitting and receiving Republic newspaper columns to and from oblast centers in the Ukraine.

Many valuable rationalizers' suggestions were made by city and rural telephone communications specialists which made it possible to overfulfill the annual assignments for city telephone and urban telephone exchange development with the 10th Five Year Plan extremely limited funds for automatic telephone exchange equipment and cable production.

Because of insufficient city automatic telephone exchange equipment, it was necessary to use ATSK-100/2000 exchanges in many large rayon centers and oblast-subordinate cities with population between 30 and 60 thousand. In order to increase the number capacity of these exchanges to 4000, it is necessary to pair two ATSK-100/2000 exchanges, even though this increases the consumption of TSV [expansion unknown] cable. However, there is now no other way, and we must accept this solution.

A capacity of 4000 numbers is not enough for cities with populations between 40 and 60 thousand, and there are quite a few such cities, some of which are rayon centers, in the Ukraine. What can we do when not enough city-type ATSK eqipment can be obtained? A partial solution to this problem was found by rationalizer specialists in the Zaporozhskaya Oblast, who adapted SUS-54 equipment for installation at ATSK-100/2000 exchanges, expanding their capacity to 5000 numbers. Specialists at the Yalta city telephone exchange developed a scheme of interfacing three ATSK-100/2000 stations, increasing the capacity of one automatic exchange using this equipment to 6000 numbers.

Specialists at city telephone network laboratories are now working on the problem of utilizing AON [expansion unknown] at paired ATSK-100/2000 exchanges, using SUS-54 equipment simultaneously in order for these automatic exchanges to respond fully to the requirements of the Unified Automatic Communications System.

The creative initiative of rationalizers in the Kievskaya, Zaporozhskaya, Chernovitskaya, Chernigovskaya, Khmel'nitskaya and other oblasts in developing diode

separators instead of blockers for pairing rural subscriber telephones. The advantage of the development is that diode separators are installed in the line plug of the telephone set, while blockers are installed on poles and operate unstably when the weather changes.

The Laboratory of the Kiev city telephone exchange, with the participations of specialists from city telephone exchanges in the Kiev, Vinnitskaya and Chernigovskaya oblasts, has developed a device which makes it possible to increase the capacity of a 50-number block in the rural ASTK-50/200 by 20 numbers, simultaneously doubling the number of paired rural subscriber telephone sets. A model of this device is being tested at a rural telephone exchange in the Kiev oblast. The results are satisfactory, but it is still a rather complicated matter to use this version. Specialists are now working to simplify the proposed circuit.

City and rural telephone exchange rationalizers are faced with the task of reworking the circuit of the DAVU-10 device, which makes it possible to connect 10 subscribers using two pairs without degrading communications quality in order to utilize the devices on rural exchange subscriber lines. When this is done, all of the subscribers retain the quality of having a private line. Economic efficiency will be increased sharply when this device is introduced, and the rates of development of the rural telephone subscriber network will increase.

A great deal of work was done during the 10th Five-Year Plan to further develop the material-technical base for radio broadcast and television. The five-year assignment of these subbranches was overfulfilled, thanks to a great extent to the creative scientific-technical initiative of specialists at RURT /Regional Radio-Television Administration/ enterprises in the Ukraine.

Here are some examples: there are more than 130 type TRSA-100, TRSA-12/12 and TRSA-56 television relays in operation within the Ukraine which were developed to transmit only black and white television. Replacement of the pool of existing TV relays with more modern equipment will require major material expenditures. Therefore, modernizing them in order to allow them to be used in the future to transmit color television programs is an extremely urgent task.

Specialists of the RURT of the Ukrainian SSR Ministry of Communications have created a modulation color transistorized device (MCTD) installed in a removable chassis which is part of the TRSA equipment. When these relays operate using the MCTD, a color image can be transmitted with quality indicators corresponding to the standard for color television.

RPTDA decimeter-band TV relays have recently gone into production in the Soviet Union. There are already significant numbers of these transmitters in the Ukraine. However, these can only operate by receiving programs directly from the air, and are usually installed at intermediate or junction stations of existing radio relay links. In order for these relays to receive a program from radio relay link equipment, RURT rationalizer-engineers have developed a scheme for modulating the radio signal instead of using an intermediate-frequency relay. This development has been introduced at 18 relays, and produced very good results. It is

continuing to be put into operation.

In addition, during 1976-1980, RURT laboratories invested a great deal of effort in modernizing obsolescent television transmitters. An example is the changeover of type "Yakor'" transmitters to a grounded-grid circuit at 10 television relay stations. "Len" and "Uragan" transmitters have been modified in like fashion at eight large Republic television relay stations.

RURT specialists have created a transistorized video-correction device for obsolescent "Igla" and Yakor'" TV transmitters. It has made it possible to obtain quality indicators corresponding to current technical specifications. The device not only has provided reliable and stable operation of obsolescent transmitters, but has made them suitable for transmitting color programs. These video-correction devices have been installed on 12 TV transmitters in the Republic.

A substantial amount of work has been done during the 10th five-year plan at the Republic radio-television transmission center. Video-correction devices have been created and fabricated for trunk lines up to 8 km in length: their introduction has resulted in the elimination of two equipment rooms, an unattended repeater point, and ASL [expansion unknown] equipment with a total cost of 200,000 rubles. A device has been developed and fabricated with local efforts which allows the duty shift chief to control (and monitor) four TV transmitters and three ultrashort wave FM transmitters simultaneously from the same KUK [expansion unknown] room.

In order to improve the transmission quality of stereophonic broadcast programs, the ARS-3 rack has been introduced: this device has a wideband exciter and was created and fabricated by specialists of the RURT laboratory.

As a result of the equipment modernization which has been done, four TV programs and three FM broadcast programs can be controlled at the Republic television relay station by the duty officer of a shift comprised of a total of seven people.

The Ukraine RURT, in cooperation with the Scientific Research Institute of Radio, created a system of equipment during 1979-1980 for a new Republic long distance television equipment room which is of extreme significance in the widely branching Republic long-distance television network, which consists of several thousand kilometers of radio-relay links which transmit center, republic and local TV programs to 47 high-power and 230 low-power TV stations.

One of the projects of the Republic RURT television laboratory which was completed in 1980 makes it possible to solve the problem of complete automation of control and monitoring of type TRSA relays. An experimental model of this device is based on automatic logic circuits implemented on a modern component base without the use of electromechanical relays, etc. One such relay is already in operation in L'vovskaya Oblast, and experience in operating it is producing positive results. This development, when introduced widely throuout the network of low-power relays, will make it possible to reduce sharply the number of technical personnel servicing the network.

During the 10th Five-Year Plan, installation of wired radio units at all populated points was nearly completed in the Ukraine. A great deal of attention was devoted to the current development of the network of radio points and the introduction of three-program broadcast. There are now more than 35 wired-radio outlets per 100 residents, including 24 three-program outlets.

The main efforts of radio relay network specialists were directed toward improving the profitability of subbranch management and improving the quality of network operation, which mainly is the result of introducing devices for remote automatic control of rural radio junctions from the central rayon center radio junction and from ultrashort wave radio stations. The technology which permits remote control of rural radio junctions from the rayon center is now new, and is produced by the GUPP industry of the USSR Ministry of Communications. However, these funds are limited; if only they were to be used, it would take at least 10 years to complete the automation. Specialist-rationalizers from Republic radio relay networks have also rendered assistance here. The wired-radio installers in the Kiev oblast have developed their own device, organized its fabrication in the oblast communications laboratory and completed automation of controlling rural radio centers in all 26 rayons of the oblast by the end of the five-year plan. The experience of the Kiev radio installers is being introduced in all oblasts of the Republic, and in 1981 there will be remote control of radio centers in villages, city-type settlements and cities of rayon subordination in all rayons of the Republic.

The rationalizers of the radio relay networks in the Ukraine have the task of creating a remote control system for all radio centers in the oblast, both rural and rayon, directly from the main radio junction at the oblast center. The purpose of this development is to both activate and shut down radio centers, transmit urgent messages via the oblast radio network at any time of the day from the center, and measure the basic electrical parameters of trunk and distribution feeders.

The Kiev radio installers have made a significant contribution to the development of three-program wire broadcast. Because of available funds for three-program broadcast transmitters, the specialists have used TU-100 amplifiers as the basis for developing and manufacturing transmitters in the oblast laboratory for the second and third broadcast programs. These transmitters have already been installed at 15 rayon centers. As a result, the Kiev oblast has become the first in the Republic to introduce three-program broadcasting at all rayon centers; in 1981 this type of broadcasting should be introduced in the rural radio relay networks of seven rayons in the oblast.

These are examples of the modest contribution made by specialists of Ukrainian communications enterprises to the scientific-technical progress of the branch. The creative initiative of Republic communicators will be aimed at further technical improvement of electrical communications, radio broadcast and television facilities in the Ukraine, and improving the economic efficiency of production and quality of communications services provided for the population and the national economy.

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NOISE IMMUNITY OF RADIO RELAY ANTENNAS AND SOME WAYS OF IMPROVING IT

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 81 (manuscript received 20 May 1980) pp 45-48

[Article by A.A. Timofeyeva and V.G. Yampol'skiy]

[Text] Introduction. As the network of radio relay links develops, the requirements for both the economic indicators and electrical parameters of radio relay link (RRL) antennas increase.

The basic economic indicators are the following: antenna cost, which is determined by their size, weight, required accuracy of fabrication, technology and design complexity; and operating expenses, which are determined by their reliability, simplicity and convenience of operation.

The basic electrical parameters which characterize the performance of line-of-sight RRL antennas are the following: utilization factor of antenna aperture surface (UFA), antenna-feeder matching and noise immunity. The UFA is often not a decisive factor in choosing the antenna type, since the required gain can be obtained by increasing the size of the antenna aperture, which causes an insignificant increase in cost. Matching requirements depend upon specific conditions, and can vary over wide limits. Further, the matching of most antennas used on RRL usually satisfies the requirements imposed (SWR $< 1.04 \div 1.1$).

The noise immunity of antennas not only characterizes the performance of a given link, but also influences the performance of other radio systems; therefore, as the network of radio relay and satellite communications links expands, this parameter takes on increasing importance.

The noise immunity of antennas can be improved in various ways -- either by using some method to eliminate noise signals, or reducing the fringe radiation of the antenna. The first way is useful for improving the noise situation on existing links using existing antennas, while the second, which is more radical and long range, is suitable for newly constructed and rehabilitated radio relay links, and requires the creation of a new generation of antennas having improved noise immunity.

Until recently, increased requirements for limiting the fringe radiation level of RRL antennas referred primarily to the horizontal plane, which was dictated by the rapid expansion of the terrestrial RRL network. However, as the satellite communica-

tions network expands, the requirements for antenna lateral radiation at angles to the horizon of other than zero are increasing.

Estimating noise immunity. One of the methods for estimating noise immunity is to compare the directivity patterns of RRL antennas with the CCIR reference patterns [1]

$$G(\phi) = 52-10 \log \frac{D}{\lambda} -25 \log\phi \text{ dB with } \phi_1 < \phi < \phi_2$$

$$\left.\begin{array}{l} G(\phi) = 0 \text{ - for average quality antennas} \\ G(\phi) = -20 \text{ dB - for high quality antennas} \end{array}\right\} \text{ with } \phi \geq \phi_2$$

where $G(\phi)$ is the antenna gain in an arbitrary direction with respect to an isotropic radiator; D is the antenna aperture diameter; λ - wavelength; ϕ - the angle, in degrees, measured from the main lobe; $\phi_1 = \frac{100}{D/\lambda}$ is the angle corresponding to first side lobe; ϕ_2 is the angle beyond which it can be assumed that $G(\phi)$ = const.

Figure 1 shows the CCIR reference patterns for average (curves 1 and 1a) and high (1 and 1b) quality antennas, and the directivity patterns, referred to the isotropic radiator level, of various types of antennas having approximately equal gain: 2,3,4 - guaranteed directivity patterns of single-reflector axial symmetric antennas with respective gain of 39.2 dB (Comelit Company), 39.5 dB (NEC Company), 38.8 dB (Andrew Company); 5 - guaranteed directivity pattern in horizontal plane of horn parabolic antenna (HPA) with conical horn, gain of 38.7 dB (Comelit Company); 6 - envelope of directivity pattern in horizontal plane with horizontal polarization of domestic RPA-2P-2 antenna with pyramidal horn, gain of 39.5 dB; 7 - approximate envelope of directivity pattern of type ADE axial symmetric two-reflector antenna with displaced vocal axis, with gain of 39 dB.

It follows from comparing the directivity patterns cited in figure 1 as well as the patterns of various types of antennas produced by leading foreign companies that:

1. In the front half-space, the fringe radiation level of most axial symmetric single-reflector antennas (figure 2a) does not correspond completely to the CCIR patterns even for average quality antennas. The only exceptions are the ultrahigh performance antennas produced by the Andrew Company, which use special screens with an absorbing material. The axial symmetric two-reflector antennas with displaced vocal axis used on RRL in this country (figure 2b) have activity patterns which slightly more than satisfy (except for the sector of the first sidelobes) the CCIR pattern requirements for medium-performance antennas, but do not satisfy the CCIR patterns for high performance antennas. Non-axial symmetric antennas - both HPA and antennas with remote radiator (figure 2c, d) - have a fringe radiation level in the horizontal plane which is far below the required CCIR directivity pattern for high performance antennas.

2. In the back half-space, the CCIR directivity patterns for medium performance antennas are satisfied by practically all axial symmetric as well as non-axial

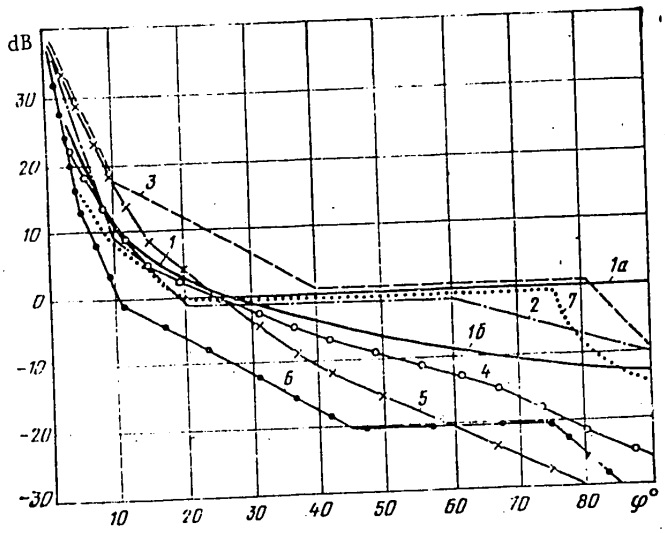

Figure 1

symmetric antennas, with most of these having a fringe radiation level corresponding to the CCIR directivity pattern for high-performance antennas. This is explained by the fact that there have long been increased requirements for the directivity pattern of RRL antennas in the back half-space in connection with the so-called two-frequency plan used on RRL. Therefore, various shields have been developed and are in use (disc-type, shields with dephasing edge, cylindrical shields without absorbing material) [4], which significantly reduce the fringe radiation level in the back half-space.

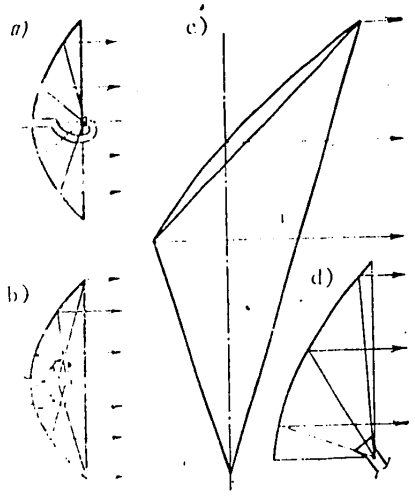

Figure 2

Ways of increasing noise immunity. This comparison shows that axial symmetric antennas are significantly less noise immune in the front half-space than HPA and antennas with remote radiator which, at least in the horizontal plane, have directivity patterns agreeing with or exceeding the CCIR patterns for high performance antennas. The basic shortcomings of practically all non-axial symmetric antennas are their large dimensions, weight and cost. For example, HPA having the same aperture area as axial symmetric antennas have greater depth and significantly larger (by approximately a factor of 2) vertical plane dimensions, and the weight of these antennas ordinarily exceed that of axial symmetric antennas by a factor

of between 2 and 4. Antennas with remote radiator are more compact, but their weight is still greater than that of axial symmetric antennas.

Consequently, it is necessary to develop non-axial symmetric antennas which, with simple construction and size, weight and cost comparable to axial symmetric antennas, would have a fringe radiation level comparable to that of the best non-axial symmetric antennas in both the front and back half-space. Such antennas can be developed using a remote-radiator scheme. This scheme is more flexible than HPA, since the radiator together with the antenna do not represent a unified monolothic construction. It is significantly easier to use a special radiator to create field amplitude distribution in the antenna aperture which is optimal in terms of noise immunity. Because of this, and because of the absence of aperture shadowing, the fringe radiation level in the front half-space is reduced significantly (as compared with axial symmetric antennas).

Research in this direction has shown that when high performance radiators, e.g., those in [5,6], and a protective shield with a particular configuration is used, a single-reflector antenna using a remote radiator which is simple in design can have high noise immunity with size and weight comparable with axial symmetric antennas [7]. The fringe radiation level of such antennas (figure 3,4; solid line indicates directivity patterns in plane of vector E; dotted line in plane of vector H) with gain of about 38 dB in the horizontal plane (figure 3) is below that of the required CCIR directivity patterns for both medium performance antennas (curve 1 and 1a) as well as high performance antennas (curve 1 and 1b).

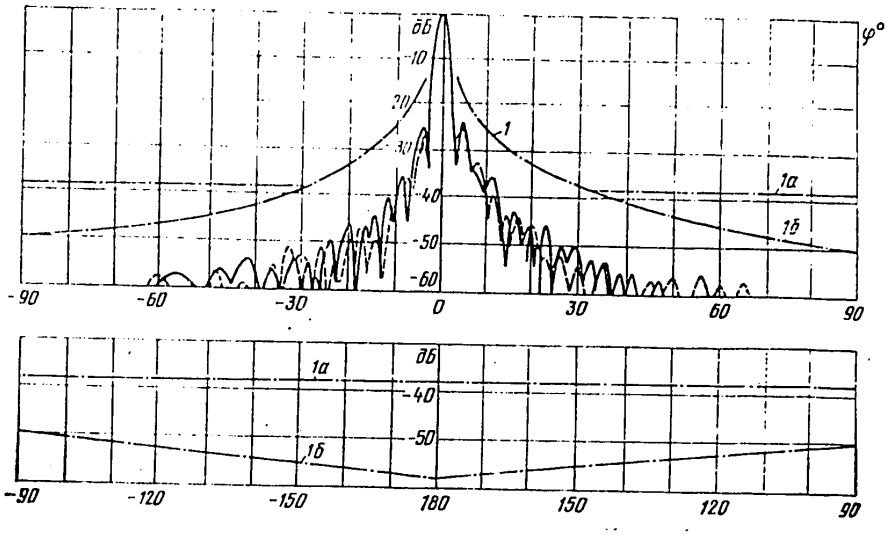

Figure 3

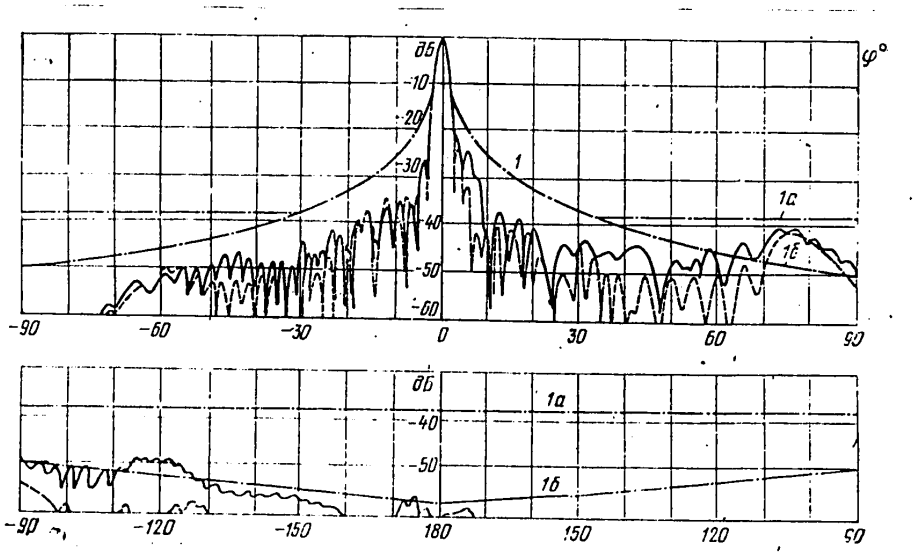

Figure 4

In the vertical plane, the fringe radiation level is below the required CCIR directivity pattern for medium performance antennas and, except for some small sectors, corresponds to the CCIR patterns for high performance antennas (figure 4). In addition, this antenna has a high UFA (≈ 0.7) and good natural matching (SWR < 1.04). One important shortcoming of the antenna is the cross-polarization maximum level, which is higher than that of axial symmetric antennas but comparable with HPA. According to available data in the literature [8,9], this can be reduced significantly by using the special "matched" radiator.

The noise immunity data presented here do not represent the limit. Research has shown that reducing the UFA to 0.5, i.e., to the value of the UFA of most existing antennas, will make it possible to reduce the fringe radiation level by 5-10 dB, while installing absorbing material on the radiator alone will lead to an additional reduction in the side lobe level determined by horn re-radiation. It is also possible to place a coating of absorbent material on the protective shield, which will increase the antenna noise immunity further, especially in the sector of the distant side lobes.

Conclusion. Since the fringe radiation level of most axial symmetric reflector antennas which are most widely used on RRL do not correspond to the CCIR directivity patterns even for medium performance antennas, one promising direction should be considered the creation of a new generation of antennas with improved noise immunity.

The new generation antennas can be implemented in a scheme with a remote radiator, which will make it possible to combine high economic and electrical indicators for various types of antennas.

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OFFICE AUTOMATION EQUIPMENT AT SPECIALIZED 'SISTEMOTEKHNIKA-80' INTERNATIONAL EXPOSITION

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 9, Sep 81 pp 45-46

[Article by Candidate in Philosophical Sciences N.A. Matyukhina and Candidate in Natural Sciences A.L. Raykhtsaum]

[Text] "Sistemotekhnika-80", a specialized international exposition of facilities for mechanizing and automating engineering-technical and management work, was held in Leningrad in late 1980. The exposition was organized by the well-known Dusseldorf Novea Exposition Company (FRG) in conjunction with the All-Union "Ekspotsentr" Association of the USSR Chamber of Commerce and Industry. More than 50 companies specializing in office automation production and support from 13 countries - Austria, Belgium, Great Britain, Denmark, Italy, Liechtenstein, Norway, USA, Finland, France, FRG, Switzerland and Japan - demonstrated their products in the two pavilions of the exposition complex on Vasil'yevskoye Island.

The well-known companies present included Rex-Rotary (Denmark), Rank Xerox (Great Britain), the Nashua Company (USA), Kalle Niederlassung der Hoechst AG and Triumph-Adler (FRG), W. Koreska (Austria) and many others.

Telephone systems and dictaphones, microfilm equipment and systems, accounting machines, archive and computing equipment, etc., - over 500 exhibits - were presented at the exposition.

The present article examines the office automation facilities exhibited in the sections on "Text processing facilities", "dictaphone technology" and "document-retrieval, storage and transportation facilities".

Text documentation and text processing facilities occupied one of the leading places. However, while a wide range of these devices was exhibited by a limited number of companies, there were no exhibits from such companies as Olivetti (Italy), IBM (USA), Vydec (USA), Brother (Japan) and others. In addition, the FRG Olympia and Triumph-Adler companies presented a full set of the latest models of typewriters and word processing systems. The Olympia Company demonstrated the SKM and SG-3 mechanical typewriters, which are already familiar and popular with users. For machines in their class, they have the entire range of functional capabilities needed, aesthetic indicators as well as medium weight (up to 16 kG).

The Olympia models ES-100, ES-101 and ES-105 are members of the new class of electronic typewriters. These three models are modifications of the basic Olympia electronic typewriter. The ES-100 has a 96-character page printer and an 8-character buffer. The features of the ES-100 typewriter include automatic paper feed, error correction and selectable pitch. The ES-101 differs from the basic model in that it has a 32-position decimal tab and enough memory to store the last line typed. The ES-105 has a 1,000-character memory.

The Olympia exhibit also contained familiar basic automatic typewriters which are similar in functional capabilities and appearance to electronic typewriters or typewriters with memory (according to the company's own classification). The model 6010, which opened this series, has a memory which uses a magnetic sleeve with 50 4,000-character tracks. One track provides random-access memory, which permits text editing from a special keyboard. Automatic underline, centering, tabulation, numbering and right-justification are possible.

The memory in the model 6020 uses mini-discs with 70,000-character capacity. The availability of this much memory makes editing possible. The model 6020 has a 20-character line display, and provides the same functions as the basic model.

The 6110 text processing system allows long-term storage of recorded information and provides a large random-access memory (8,000 characters). The model 6110 uses magnetic-card memory.

Triumph-Adler presented a wide range of typewriters. The portable models exhibited included the "Tessy", "Tessy de Luxe", "Contessa de Luxe", "Junior 10/12", and the "Tippa". All of these are mechanical, light in weight (up to 5 kG), and provide the necessary functional keys and a 5- or 6-column tabulator. The "Junior 10/12" model has an additional automatic space bar. The "Matura 300/500" is a mechanical office typewriter with various carriage widths available, and a 9-digit decimal tabulator. The weight with the smallest carriage is 14.8 kilograms.

The "Gabrielle 5000" model is an example of an electromechanical portable typewriter.

The following models of electromechanical office machines were presented: "Electric MX" with half-space key for correcting errors and five functional repeat keys. The "Gabrielle 5000" and "Electric MX" typewriters each weigh 11 kG. The model CE 1000 CD uses a spherical typing head and prints at 20 characters per second. This model has a quick-change ribbon cassette, fast automatic paper feed device and automatic correcting key.

The Triumph-Adler Company demonstrated an electronic typewriter with a daisy wheel. A 132-character memory makes it possible to correct, transpose or move a word or character. The electronics control such functions as line pitch, line spacing, field setting, sub- and superscripting, half-spacing, etc. From among their text processing systems, the Triumph-Adler Company demonstrated two elementary automatic typing systems: the SE 2000 and "TA-20 Compact". Distinctive features of the SE 2000 include visual and audible signaling accompanying the printing and correction processes. The random-access memory capacity is 4000 characters.

Peripheral memory uses mini-discs with capacity of 64,000 characters (approximately 32 pages using A4 format). The typing ball permits printing speeds of up to 20 characters per second. The functional capabilities of the device correspond completely to that class of machine. The "TA-20 Compact" typing machine is recommended for composition purposes. However, the availability of an 8,000-character magnetic sleeve memory and special arithmetic device which can execute four arithmetic operations puts this system in one of the leading positions in its class.

The Juki Company (Japan) exhibited a new electromechanical typewriter - the 3300 - which uses a spherical typing element, two-key rollover protection device, impact adjustment device, and quick-change ribbon cassette. The machine weighs 8 kG.

The Siemens Company (FRG) presented the new "Siemens 580" word processing system which is intended for preparation, processing and output of prepared text as well as computational operations. The availability of remote data transmission devices and the computational device expands the functional capabilities of the system.

Analyzing these exhibits at the exposition, the following basic trends in the development of the market for text composition and processing facilities can be discerned: typewriters are developing in the direction of miniaturization and major utilization of electronic components; the increased numbers of electronic typewriters is erasing the line between traditional office typewriters and elementary word processors; text processing systems are developing in the direction of expanded functional capabilities by equipping processors with auxiliary devices (remote data transmission devices, additional memory modules, displays, high-speed printers, arithmetic devices).

Dictaphone technology was represented by equipment from the Stenocord Electronic GmbH Company (FRG).

The company presented a wide selection of familiar individual and common-user dictaphones (dictation systems). Individual dictaphones include models 78, 79, 91, 178, 179 and others. Their characteristic features include the use of multifunctional switches, automatic record level regulation, end-of-tape indicator, built-in speakers and LED signal.

Some of the technical specifications of this equipment are given below.

Indicator	Model			
	91	178	179	370
Dimensions, mm	143x60x29	65x200x195		300x105x260
Weight, kG	0.315	1.2		2.9
Record speed, cm/sec	4	4		-

The sound recording medium used is either a sleeve (12- or 24- minute capacity, or 5-10 typewritten pages), mini-cassettes (up to 30 minutes capacity, or 12 pages of typewriten text) and compact cassettes [2x30 or 2x60 minutes recording capacity (C-60 or C120 cassettes, respectively)].

The company demonstrated the world's smallest dictaphone, the model 291, which has a microphone and electronic display. A mini-cassette provides one-hour recording, and the nine-volt battery has enough capacity for 25 hours of recording. The dimensions of this machine is 102x52x21 mm, with weight of 190 g.

The "Stenocord 653" system for central dictation was presented: this system has electronic listening interlock, which makes it possible for several talkers, one at a time, to almost fully utilize the recording sleeves. This system is already in use in the Soviet Union.

Document retrieval, storage and transportation facilities were exhibited by Finnish companies.

The desktop card files produced by the Economic Kaluste OY Company are used to store cards with A5 and A6 formats. The card file has longitudinal, transverse and angled dividers, which makes it possible to form files of cards within the boxes in different directions. The boxes has removable walls fastened in special grooves for this purpose. The maximum capacity of these files is up to 1600 A5-format cards.

The same company presented a number of document storage shelves. The MK 1 and MK 2 shelves are designed for storing documents, including those bound in folders. The height, depth and width of MK 1 and MK 2 shelves are 66x45x110 and 115x45x110 cm, respectively, with the shelves spaced 7.2 cm apart.

The tops of the shelves are made of metal or oak. There is an insert for suspended files with removable divisions for blanks which moves on ball bearings.

The model RIKA 2, RIKA 3, and RIKA 4 cabinets are recommended for suspended file storage. Their respective dimensions (height by depth by width) are 76x77x43.3, 104.5x77x43.3 and 133.5x77x43.3 cm; there are two, three or four drawers.

The same company has modular shelves for archive storage. For example, using removable rails the model PKH-5 can be used to obtain seven different arrangements of type LK-4, LK-5 and LK-6 drawers. Each of these drawers can store suspended files, cards, punch cards or separate documents by means of dividers by means of removable internal boxes. The cabinet has an interlock system which prevents opening more than one drawer at once.

Another series of cabinets for archive storage uses the same principles: the PK-2, PK-3, PK-4 and PKH-2. Thanks to modular construction (7.2 cm drawer module), a number of different cabinet versions can be made up. The technical specifications of these models are given below.

Indicator	Model			
	PK-2	PK-3	PK-4	PKH-2
Height, cm	76	104.5	133.5	61.8
Depth, cm		77		49
Width, cm	43.3			
Number of modules	8	12	16	8

The Kago Company (Finland) produces general-purpose office cabinets for storing archive documents, folders (including suspended), cards, technical data media, etc. These cabinets are made of cold-rolled sheet steel, and will preserve materials in the case of fire, destruction of premises, etc. The cabinets can stand free, or can be installed on supports, on top of one another, or lined up, thus forming specialized working areas. Depending upon the size and number of shelves, the weight of these cabinets varies between 120 and 295 kG.

Shelves for document storage were presented by the Finnish Economic Kaluste OY and Electrolux Kahete Companies. The Economic Kaluste OY Company presented stationary metal shelves for storing files, registries, folders, etc. The frame of the shelves is made of aluminum sections, with support battens or panels in the back; bottom cabinets with hinged doors are available. The size of the model MH and MHA shelves (width by height by depth) is, respectively, 84x196(160)x 34; 84.6x160(140)x34.8 cm. The file size is 80x30 cm, with shelf spacing of 7.2 cm.

The Electrolux Kahete Company presented the "Concentra 80" movable shelves with special attachments for storing various types of data (for example, magnetic tapes, punch cards, etc.), rear panels, central interlocking device and lockable doors. These shelves are equipped with both manual and electrical drive. The height of the shelves is 204 cm, with depth of up to 45 cm. The use of such equipment makes it possible to save up to half of the working space set aside for document storage when stationary shelves are used.

The "Telelift" document transportation system was presented by the Translift Gesellschaft F. Hebe-und Foenderanlagen MBH Company (FRG). This system uses several box-transporters to move documents, and has previously been demonstrated in the Soviet Union.

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SUMMARY OF EIGHTH PLENARY SESSION OF CENTRAL BOARD OF THE SCIENTIFIC-TECHNICAL SOCIETY FOR RADIO ENGINEERING AND ELECTRICAL COMMUNICATIONS IMENI A.S. POPOV

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 81 pp 54, 64

/Article by M.Ya. Shebaldina/

[Text] The eighth Plenum Session of the Central Board of the Scientific-Technical Society for Radio Engineering and Electrical Communications imeni A.S. Popov held during April 1981 in Moscow was devoted to strengthening the role of that organization in improving production in light of the resolutions of the 26th CPSU Congress. The main address was delivered by V.I. Siforov, Chairman of the Central Board of the NTORES and corresponding member of the USSR Academy of Sciences. He emphasized that the main task of the NTORES today is to cooperate with enterprises and organizations in the early implementation of the achievements of science and technology within the national economy. One of the forms of this cooperation is the All-Union Public Inspection of the plan for introducing the achievements of science and technology into the national economy which is conducted jointly with the branch ministries and the central committees of the professional unions. The scope and effectiveness of all-union inspections is increasing yearly. In 1980, about 3200 primary organizations participated in the inspection, 23% more than in the previous year. The annual savings expected from implementing the suggestions which were made amount to more than 700 million rubles. V.I. Siforov noted that in the 11th Five-Year Plan, each board must take an active part in the All-Union Inspection.

In order to speed the transmission of economics along the path of intensive development, the development and implementation of integrated programs for scientific-technical progress and goal-directed programs to solve the most urgent scientific-technical problems must be supported. The Presidium of the Central Board made plans to create a coordinating council to render assistance in fulfilling the integrated programs which is to develop a plan for measures to be carried out, i.e., a five-year program for conducting conferences and meetings and organizing inspections and competitions for successful fulfillment of the phases of the program.

In response to the call of the 26th CPSU Congress to increase technical equipping of labor, to take all steps to introduce integrated mechanization and automation of production processes and to continue to reduce the number of workers involved

in manual labor in all branches, a new section has been created within the Central Board on "Automation and Mechanization of Production". In early 1981, the Presidium of the Central Board considered problems of mechanization and automation of loading-unloading and transportation-warehouse operations within the branches. These problems are at the center of attention of most primary organizations and local boards. For example, in 4.5 years of the 10th Five-Year Plan, enterprises in Zaporozhskaya Oblast have put seven integrated mechanized lines into production, and more than 600 pieces of high-output equipment, including both automatic and semiautomatic. Thanks to the participation of the primary organizations of the Scientific-Technical Society, most of the equipment was introduced ahead of schedule. This made it possible to free 848 workers, to mechanize labor of 1757 individuals, and to obtain savings of 1,662,000 rubles.

The public verification of the completion of organizational-technical measures to mechanize difficult and laborious production processes and organizations in Kiev indicated that eight integrated mechanized sectors, 19 mechanized assembly and conveyor lines, 77 pieces of machinery for loading-unloading and transportation-warehousing operations were implemented, and 89 pieces of equipment modernized, at six industrial enterprises alone. As a result, 1068 workers were freed of manual labor. The savings amounted to 3,200,000 rubles.

This work has been especially well-organized in the Tul'sk, Ivano-Frankovsk, Gomel', Sverdlovsk, Kuybyshev and Chelyabinsk oblast boards. Participants of the All-Union Conference on "Developing Means of Mechanization and Automation of Postal Communications" held by the Central Board of the NTORES in October 1980 became acquainted with past experience: this conference was devoted to questions of the participation of the scientific-technical community in implementing the Decrees of the Central Committee of the CPSU and USSR Council of Ministers of 14 July 1978 "On Measures for Further Improvement of Postal Communications in Support of the Population and the National Economy."

For the 1980 All-Union Competition, the Central Board received 120 scientific-technical and planning-development projects for mechanizing and automating labor-intensive processes. The expected savings amount to 194 million rubles.

An important task is to ensure an overall increase in the volume of production through increased labor productivity without increasing the number of workers.

The NTORES Central Board is aiming local boards and primary organizations toward saving metal, power, fuel and metals. This is the first order of attention in organizing competitions of personal and integrated creative plans. Fulfilling creative plans in 1980 saved 7,000 tons of ferrous and 950 tons of nonferrous metals. The implementation of technological processes which are new in principle and new treatments, especially the use of fiber-optic communication links, will make it possible to save tons of valuable copper in the future.

The "Basic Directions for Economic and Social Development of the USSR for 1981-1985 and up to 1990" poses the task of improving the quality of all types of production. Scientists and engineers who are members of the NTORES imeni A.S. Popov continue to develop and improve the integrated communications quality

control system based on developing and implementing automated methods of using them to increase the efficiency and quality of production, as well as widespread introduction of modern microelectronics.

The Central Board has proposed to hold a conference on "Metrological Problems of Microelectronics" in the spring of 1981, with plans to consider problems of the quality of modern microequipment and metrological support for production; there are future plans to hold an all-union conference devoted to questions of the quality of radio equipment which is in production.

In conclusion, V.I. Siforov turned to questions of increasing the qualifications of scientists, engineers and technicians and of disseminating the achievements of science, technology and leading experience. The NTORES Central Board and local boards organize courses, seminars, schools of advanced experience, lectures and reports annually. The Central Board considers the people's universities to be an effective form for increasing qualifications and disseminating knowledge.

In order to disseminate the achievements of science, technology and experience, V.I. Siforov noted that local boards must make wider use of the branch journals RADIOTEKHNIKA, ELEKTROSVYAZ', and VESTNIK SVYAZI, as well as popular newspapers, radio and television.

The eighth Plenum Session of the Central Board of the NTORES imeni A.S. Popov assured the Central Committee of the CPSU the All-Union Central Council of Professional Unions and the All-Union Council of Scientific-Technical Societies that the scientists, engineers and production leaders belonging to the Society of Radio Engineering, Electronics and Communications will lend their efforts, knowledge and experience for the successful fulfillment of the historical resolutions of the 26th CPSU Congress.

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BRIEFS

DATA COMMUNICATIONS CONFERENCE--A meeting was held of the Scientific-Technical Council of the USSR Ministry of Communications in February 1981 where the NIIR /Scientific Research Institute of Radio/ report on "Prospects for development of radio relay systems for transmitting digital information" was discussed. The report examined the singularities of constructing digitial radio relay line circuits, basic digital signal transmission methods, methods for organizing analog radio relay links for transmitting digital signals, methods for organizing radio relay link control systems, problems of the electromagnetic compatibility of digital relay links with themselves and with analog radio relay links. The main directions in the creation of equipment for digital radio relay systems were defined, along with those questions of utilizing various digital radio relay system equipment in networks of the Unified Automated Communications System which need further development. The scientific-technical council adopted the basic points of the report and noted the importance and urgency of creating equipment for digital radio relay systems. An article on the construction principles, singularities and prospects for development of digital radio relay links will be published in an upcoming issue of the journal ELEKTROSVYAZ', which will be devoted to problems of the development of radio relay communications. /Text/ /Moscow ELEKTROSVYAZ' in Russian No 8, Aug 81 p 29/ 6900

POWER SUPPLIES FOR COMMUNICATIONS--Modern communications equipment must provide continuous transmission of widely varying information. Along with other necessary conditions, this is achieved through the availability of a guaranteed failsafe power supply system. The Central Design Bureau of the USSR Ministry of Communications has submitted a report on "New developments of the Central Design Bureau for power supply devices" for consideration by the Scientific-Technical Council (reported by M.V. Brodskiy). The composition and amount of equipment used on new and rehabilitated Ministry of Communications enterprises has changed sharply in recent years. New types of equipment impose new requirements on power supplies. The increased amount of new equipment causes an increase in power consumption, which cannot be satisfied in the near future simply by increasing power. It is, therefore, necessary to implement solutions which are new in principle. The power supply devices which are being developed at the Central Design Bureau can be divided conditionally into two groups: power supply devices intended for use in existing or newly introduced power supply systems and devices which can provide the basis for developing or introducing power supply systems which have not been used at communications enterprises previously. The first group includes thyristor rectifiers, which should replace the widely used VUK /expansion unknown/ rectifiers. Thyristor rectifiers are designed to be used in block-buffer systems as buffer and charge-buffer

rectifiers. A significant amount of the copper and steel used in making windings is saved in manufacturing the new generation of thyristor type rectifiers. This group also includes various AKAB storage battery switching devices, a new modification of the VULS-3, radio relay link equipment power supplies, UKN /expansion unknown/ voltage testing devices and UIT /expansion unknown/ current indicators. The second group of devices includes booster converters, converters for obtaining additional voltage values or voltages with reversed polarity and devices for guaranteed failsafe supply of stabilized AC voltages. The Scientific-Technical Council, discussing the report of the Central Design Bureau, adopted the basic directions of the development of power supply devices and recommended the following: that the Central Scientific-Research Institute of Communications consider the possibility of creating a power supply system using booster converters and voltage converters considering the data available at the Central Design Bureau; that the Central Design Bureau accelerate and finish by 1982 the development of converters and devices for failsafe AC power supply, paying special attention to reducing start-up time and reducing the internal resistance of converters; that the possibility of reducing the internal resistance of thyristor rectifiers be looked into and that requirements be defined for the power of the ADES standby automatic diesel power plant; that suggestions be prepared for the implementation of possible changes and updates in the technical task for thyristor rectifiers; and that the problem of unifying the power supply equipment and systems used in wire and radio communications equipment be worked out. It was recommended that the question of creating a purposeful integrated five-year program for the development and creation of new power supply equipment for communications be examined and, if necessary, that a design board be created for this program. /Text/ /Moscow ELEKTROSVYAZ' in Russian No 8, Aug 81 p 50/ 6900

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