JPRS L/9625

24 March 1981

Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

(FOUO 4/81)

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WORLDWIDE REPORT

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CONTENTS

NIGER

BRIEFS

CONTRACT FOR TELECOMMUNICATIONS NETWORK--Niger has concluded a contract of 276 million [CFA francs] with Thomson-CSF for setting up a far-reaching integrated telecommunications and television by satellite network. This will be the most extensive network in Africa, after that of Zaire. [Text] [Paris VALEURS ACTUELLES in French 2 Mar 81 p 15]

CSO: 5500

NIGERIA

BRIEFS

FRENCH TELECOMMUNICATIONS AGREEMENT--The Signaling Systems Company, an affiliate of CGCT [General Telephone Construction Company] announced in a communique published 26 January 1981, that a 200 million franc contract had been signed with the PTT [Posts, Telephones and Telegraph] administration of Nigeria to study and install three telecommunications cable lines to Ibadan, Ado Ekiti and Akure. The contract covers laying all systems and linking the aboveground and underground cables as well as connecting them with the customers. These lines will become operational in 1982. This contract, obtained because of the support and experience of the ITT group, confirms and strengthens the position of the Signaling Systems Company in the field of telecommunications cable lines in overseas markets, particularly in Nigeria. In 1977, the CGCT affiliate signed a contract with that country to install five similar lines at a cost of more than 120 million francs. The Signaling Systems Company stressed that, with a staff of 1,650, it had a TCC [toutes taxes comprises] turnover of nearly 330 million francs in 1980, of which 35 percent came from exports. [Text] [Paris MARCHES TROPICAUX ET MEDITERRANEENS in French 30 Jun 81 p 254] 9479

CSO: 5500

USSR

UDC 621.396.946

EARTH STATION OF 'INTERSPUTNIK' SYSTEM IN ALGERIA

Moscow ELEKTROSVYAZ' in Russian No 11, 1980 pp 1-5 manuscript received 14 May 80

[Article by S.P. Kurilov, V.A. Borovkov and Yu.F. Konovalov]

[Text] Introduction

At the end of 1979 the earth network of the "Intersputnik" system was enlarged by a new earth station--in the Algerian People's Democratic Republic (APDR). The station was outfitted with Soviet- and Japanese-produced equipment and was put into service by Soviet and Japanese specialists. It was built in the area of the space complex (fig 1) situated in the foothills of the Atlas Mountains near the city of Lakkhdariya approximately 80 km southeast of the capital city of Algiers.

With its construction three satellite communications stations were included in the structure of the space complex. Two of them, equipped with parabolic antennas with a diameter of 32 m and a figure of merit of G/T = 40.7 dB/K (a class A station according to the classification used in the Intelsat system), operate in the Intelsat system, carrying out communications with foreign countries in the regions of the Atlantic and Indian oceans; the third station, with a parabolic antenna 11 m in diameter and a figure of merit of G/T = 31.7 dB/K (a class B station), is the central station of Algeria's national satellite communications network.

A structural diagram of the "Intersputnik" station in Algeria is given in fig 2, where 1 is the antenna-waveguide circuit, 2 is a low-noise amplifier (MShU), 3 is a 1:5 divider, 4 is a frequency converter, 5 is a synthesizer, 6 is a TV demodulator, 7 is a divider, 8 is a processing unit, 9 is a filter, 10 is a sound track unit, 11 is the pilot signal receiver, 12 represents frequency "down" converters, 13 represents "Gradient-N" equipment, 14 is a divider, 15 represents a frequency "up" converter and 16 the transmitter.

The Soviet equipment is represented at the station by the channel-forming equipment, the two-channel sound track equipment (broadcasting rack) [1], and the "Gradient-N" channel-forming equipment [2] included in the individual equipment rack (SIO) and the common-trunk equipment rack (SOO), as well as by the two frequency "down" converters (V-2 racks) [3].

The V-2 racks make possible (for normal operation of the "Gradient-N" equipment) automatic control of the frequency and level of signals received from ISZ's [artificial earth satellites]. These controls are provided directly on the V-2 racks and are accomplished by control signals from the S00 rack.

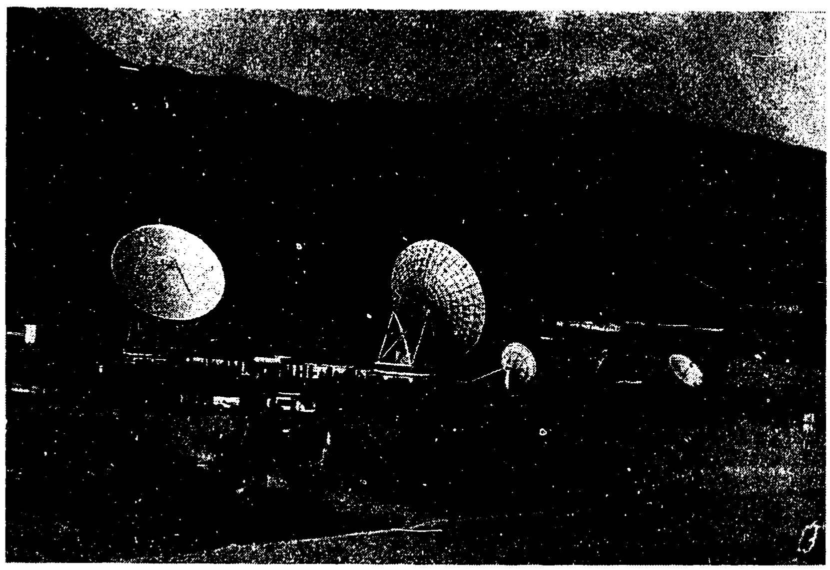


Figure 1.

Almost all the radio engineering equipment of the station (with the exception of the low-noise amplifiers) is located in the equipment room of a single-story building measuring approximately 6 X 12 m.

A diagram of the location of equipment in the equipment room is shown in fig 3, where 1 and 2 are the telephone trunk transmitters (sets A and B), 3 is the receiving and transmitting equipment rack, 4 is a multi-purpose rack, 5 is the intermediate main distribution frame rack, 6 is the sound track rack (RV [radio broadcasting] rack), 7 and 8 are the frequency "down" converter racks (the V-2 racks of sets A and B), 9 and 10 represent the "Gradient-N" channel-forming equipment (the S00-9 and SI0-10 racks) and 11 is the power distribution rack.

On the receiving and transmitting equipment rack, 3 , are located the following: the 1:5 divider, the frequency "up" converters for the telephone trunk, the FM television receiver and the power supplies for this equipment.

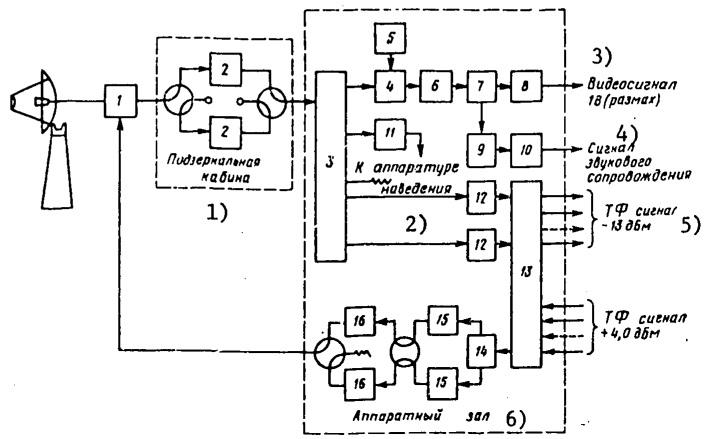


Figure 2.

Key:

1. Cabin under reflector
2. To aiming equipment
3. 1 V (range) video signal
4. Sound track signal
5. -13 dBm TF [telephone] signal
6. Equipment room

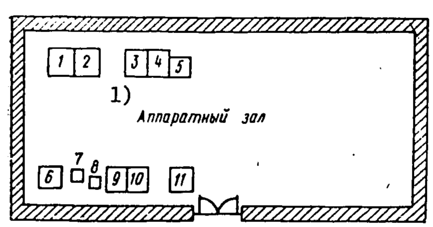


Figure 3.

Key:

1. Equipment room

On multi-purpose rack 4 are located the emergency signalling system, the pilot signal receiver, the equipment for monitoring the position of the antenna, and the equipment for monitoring and switching the low-noise amplifiers and transmitters.

The new station differs substantially from previous stations of the "Intersputnik" system:

1. The station was designed and was implemented for conditions of operation only via geostationary ISZ's. This decision was made on the basis of official information already available at the design stage from the board of the "Intersputnik" Council regarding the changeover of the entire system as of the end of 1979 to operation via geostationary ISZ's.

2. At the station there are only two modes for aiming the antenna at ISZ's--manual and automatic; there is no program mode for aiming the antenna.

Autotracking of the station's antenna is accomplished through a pilot signal of the telephone trunk employing the method of extremum adaptive control; in previous stations of the "Intersputnik" system autotracking of the antenna is accomplished, of course, through signals of the television (or telephone) trunk using the conical scanning method.

3. The station's equipment makes it possible to exchange telephone messages and to receive television signals and, unlike standard stations of the "Intersputnik" system, does not make it possible to transmit television signals. This decision was made by the APDR Communications Administration at the stage of designing the station, but at the experimental operation stage the station was additionally equipped with equipment for transmitting television signals.

4. The station is equipped with an emergency signalling system from all the most important functional units of the receiving and transmitting equipment.

Below is given a brief description of the station's equipment which is non-standard for stations of the "Intersputnik" network.

Antenna System

A general view of the antenna system is shown in fig 4.

Key technical parameters: type of antenna and its dimensions--parabolic reflector 11 m in diameter; the maximum gain in the transmitting and receiving frequency band is indicated in figs 5 and 6, respectively*; the range of variation of the antenna's position in terms of angle of elevation is 0 to 90 degrees and in terms of azimuth (relative to the center position) ± 20 degrees. The antenna can be moved over the range of ± 180 degrees in terms of azimuth under nonoperational conditions.

*The data presented in figs 5 and 6 are guaranteed by the supplier; the actual values have proven to be 1.0 to 1.5 dB higher.

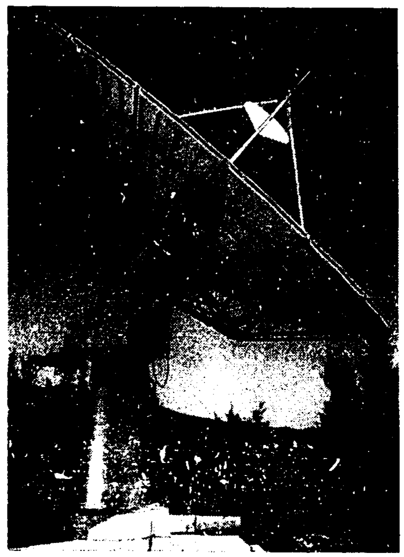
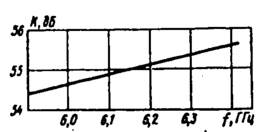


Figure 4.

1)



2)

Figure 5.

Key:

1. K, dB

2. f, GHz

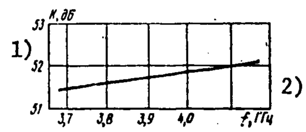


Figure 6.

Key:
1. K, dB   2. f, GHz

Low-Noise Amplifier (MShU)

The low-noise amplifier is designed to reduce the effective noise temperature of the receiver for the purpose of improving its sensitivity. At the station there are two sets of uncooled parametric amplifiers (a main and standby). Each set consists of a single parametric amplifier and field-effect transistor amplifiers following it, which are used to produce the required gain. The parametric amplifier stage is pumped by means of a fundamental oscillator employing a Gunn diode (without using a multiplier). The parametric amplifier and field-effect transistor amplifiers are distinguished by a stabilized temperature, which makes possible a low noise temperature of the equipment and high stability of its gain.

Key Specifications of MShU

Frequency range, GHz	3.7 to 4.2
Noise temperature, K	45
Gain, dB	60
Stability of gain, dB/24 h	± 0.2

The MShU assembly weighs 9 kg and its overall dimensions are 250 X 200 X 125 mm.

A general view of the MShU is shown in fig 7.

Switching from one MShU assembly to another can be accomplished in the process of the station's operation manually and automatically (when a working assembly goes out of order) by means of remote switching equipment located on one of the standard panels (fig 8) of the multi-purpose rack. On the same rack there are two panels (one for each subassembly) with equipment for remote monitoring of the parameters of the MShU (fig 9). The remote monitoring equipment includes a power regulation unit, monitoring equipment and emergency signalling equipment.

FM Television Receiver

The FM television receiver is designed to receive frequency-modulated microwave TV signals with a deviation of ± 15 MHz in the 3700 to 4200 MHz frequency band, to convert FM microwave TV signals into intermediate-frequency (70 MHz) FM TV signals, to demodulate intermediate-frequency FM TV signals and to process them for the purpose of producing the original television image.

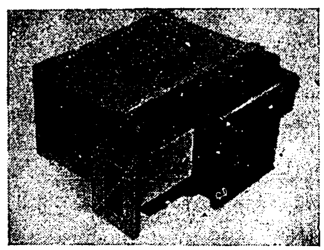


Figure 7.

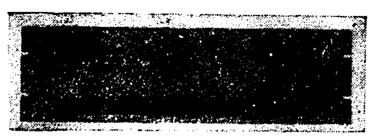


Figure 8.

Figure 9.

It is designed as a separate panel included on the receiving and transmitting equipment rack and includes (fig 10) a frequency "down" converter with a frequency synthesizer, an intermediate-frequency filter, a frequency demodulator, a TV signal processing unit and a power supply. It weighs approximately 25 kg and its overall dimensions are 177 X 483 X 490 mm.

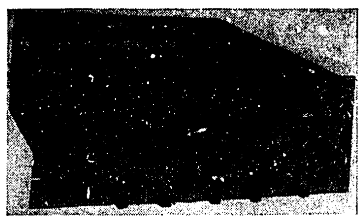


Figure 10.

Let us give its specifications. Input signal level in dBm, from -70 to -37; output signal level in volts, -1 (range); distortion of the "differential gain" type, not greater than ± 2 percent; distortion of the "differential phase" type, not greater than ± 1 degree.

Frequency "Up" Converters

These converters (two units, a main and standby) are designed for converting FM telephone signals from the intermediate frequency to microwave frequencies.

Key Specifications

Center output frequency, MHz	6100
Width of frequency band for -1.0 dB level, not less than, in MHz	36
Stability of output frequency per hour, not worse than	$\pm 2 \times 10^{-7}$
Level of spurious radiation relative to the level of the carrier of a single telephone channel in any band with a width of 4 kHz within the range of the transmission band of converters, in dB, not greater than	-66

Transmitters

The transmitters (two units, a main and standby) are intended to amplify the microwave signals to the necessary level and to transmit them to the antenna. Both transmitter units use a klystron amplifier as the output stage. The transmitters are air-cooled. Each transmitter is placed on a separate rack with overall dimensions of 800 X 720 X 1650 mm.

The transmitters can be tuned to any of five frequency positions with a 100-MHz difference over the frequency range of 5925 to 6425 MHz.

Key Specifications

Width of frequency band for -1.0 dB level, not less than, in MHz	36
Maximum output power, kW	1.5
AM/PM conversion factor, deg/dB	3
Power gain, dB	77
Total level of power of harmonics relative to level of useful signal, dB	-60

Antenna Aiming System

This system provides for two operating modes--manual and automatic employing the extremum adaptive control method. The level of the pilot signal of the telephone trunk serves as the input information for the extremum adaptive control device in the autotracking mode.

Specially developed for this station was a unit for receiving a signal whose center frequency agrees precisely with the nominal frequency of the pilot signal (3774.72 MHz). It consists of a unit for converting the frequency of the received signal to a frequency of 70 MHz and of a tracking pilot signal receiver.

The tracking receiver contains a 70 to 10.7 MHz frequency converter and a pilot signal demodulator. The demodulator is in the form of an automatic phase control (APF) unit with an ARU [automatic level control] circuit, which makes it possible for the receiver to operate with variation of the input level of the pilot signal from -60 to -30 dBm (i.e., in the 30 dB range) and with variation in its frequency by ± 250 kHz relative to the nominal.

The noise band of the APF unit of the receiver is approximately 35 kHz, and the noise band of the ARU 1.0 kHz.

With manual-mode operation the receiver is tuned for reception of the pilot signal (the instrument's pointer is set at "0" on the indicator on the phase panel); with this the band in which tuning of the receiver is carried out is ± 250 kHz.

Switching of the aiming system to the automatic mode should be carried out only after precise tuning of the receiver for reception of the pilot signal in the manual mode. In the automatic mode the input signal can be locked in automatically in the range of ± 20 kHz. After locking in of the pilot signal in the automatic mode, the automatic phase control loop is switched on, which makes it possible to receive and separate the pilot signal precisely in terms of phase.

A control signal proportional to the input level of the pilot signal is supplied from the receiver's output to an actuator (an electric drive) which produces a control effect by means of which the angular position of the antenna is changed.

The antenna can be adjusted in the autotracking mode in time intervals of 7.5, 15 and 30 min and 1 h and 1 h 30 min (according to the desire of the operator and depending on specific conditions).

Emergency Signalling System

This system is included as a separate panel of the multipurpose rack. Shorting to ground of the pilot lead, as the result of which an audio signal is switched on (a low-frequency tone) and an individual lamp is turned on on the face of the signalling system's panel, serves as the warning signal in it.

Key Specifications of Station and Quality Indicators of Signals Received

Figure of merit of station (G/T), not worse than, in dB/K	31.7
Maximum antenna gain, not less than, in dB	
In transmission frequency band	55
In reception frequency band	51.5
Loss of signal power in antenna-feeder circuit, dB	
In transmission	1.5
In reception	0.35
Modes for aiming antenna at ISZ's	Manual and automatic
Maximum angular velocity of antenna's movement, deg/s	
In terms of azimuth	0.01
In terms of angle of elevation	0.01
Maximum error in aiming antenna in autotracking mode, minutes of angle	2.4
Transmission band of transmitting channel for -0.1 dB level, not less than, in MHz	36
24-h instability of frequencies of master oscillators of frequency converters in transmission channels, not greater than	$\pm 5\cdot10^{-7}$
Instability of output power of transmitters, not greater than, in dB	0.8
Transmission band of receiver's MShU with nonuniformity of the frequency characteristic of 1.0 dB, not less than, in MHz	500
Noise temperature of MShU, not greater than, in degrees Kelvin	45
Transmission band of receiving channels within the limits of a single high-frequency trunk with nonuniformity of 1.0 dB, not less than, in MHz	34
Signal-to-noise ratio in receiver's output, not less than, in dB	
In image channel	57
In sound track channels	57
In tone frequency channels	48

The "Intersputnik" station passed tests successfully and its experimental operation began in August 1979.

In the process of implementing the design of the station, Soviet specialists successfully solved problems relating to the following: joining equipment produced domestically and abroad; developing a system for aiming the station's antenna via the pilot signal of a telephone trunk; developing an emergency signalling system for domestic equipment; and leading signal cables and power cables into domestic equipment not from below, as is done in all existing stations of the "Intersputnik" system, but from above.

Conclusions

The "Intersputnik" station in Algeria was put into service in a relatively short time and has been the first station in the system designed for operation only via geostationary ISZ's and outfitted with equipment produced domestically and abroad.

The station meets to the full extent the requirements of the "Intersputnik" international system regulations for the quality characteristics of channels for the transmission and reception of television and telephone signals.

The design employed in this station can be recommended in individual instances for use in designing other stations of the "Intersputnik" system.

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3. Kantor, L.Ya., Polukhin, V.A. and Talyzin, N.V. "New 'Orbita-2' Satellite Communications Stations," ELEKTROSVYAZ', No 5, 1973.

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CSO: 5500

USSR

NEW GDR COMMUNICATIONS EQUIPMENT AT THE LEIPZIG FAIR

Moscow ELEKTROSVYAZ' in Russian No 11, 1980 pp 53-57

[Article by I.S. Sverdlova with scientific consultants D.A. Grinshteyn, I.I. Grodnev, V.M. Minkin, L.Ya. Misulovin and V.O. Shvartsman]

[Text] Blessed by a more than 800-year tradition, the 1980 Leipzig Fair, held under the motto "For International Trade and Technical Progress," again confirmed its permanent significance for strengthening economic cooperation among countries of the world, trade relationships, the exchange of know-how and scientific and technical information and the acceleration of general progress. The spring fair (9 to 16 March 1980), in whose pavilions and open areas more than 9000 exhibitors from 66 countries demonstrated their products, was visited by guests from 100 governments, and more than 80 percent of them were specialists. They used the Leipzig Fair as an important source of new knowledge, in turn catalyzing progress in all areas of industry, agriculture, life and culture. More than 3500 scientists and engineers listened to reports on special topics provided by the fair's program, including on questions of automation, measuring equipment and communications equipment.

Exhibitors of socialist countries reflected the results of economic integration and the accomplishment of purposeful CEMA programs and demonstrated the high level of products which will determine commodity exchange in the next few years.

The largest exhibitor among the socialist countries was the Soviet Union, whose collective exhibition was opened in the presence of the head of the Soviet government delegation, USSR Minister of Communications and now USSR Council of Ministers Deputy Chairman N.V. Talyzin. A special exhibit within the framework of the Soviet exhibition was organized by the Belorussian SSR. Six hundred Soviet production enterprises and institutes presented their products at the fair. Seventy-five percent of the exhibits were demonstrated for the first time in Leipzig. The "Power Engineering" and "Electronics in Industry" complexes were the main ones at the exhibition. More than 150 exhibits had the emblem of socialist integration or were the result of international economic cooperation in its diverse forms.

The same ideas permeated the exhibition of the German Democratic Republic. Its products were shown by more than 400 combines, foreign trade associations and industrial enterprises of the GDR; a total of 5200 new and improved products was demonstrated.

Communications equipment, just as measuring equipment, was concentrated in pavilion No 15. Clearly delineated were trends in the extensive replacement of mechanical units by electronic, the integration of elements and functions on the basis of microelectronics, the development of digital methods and the replacement of metal conductors by glass fiber in cable equipment. Because of the employment of innovations in electronics the relationships between the weight of communications equipment and its productivity have been improved, the reliability of equipment has been improved and energy consumption has been reduced. Testing and measuring instruments for various purposes have reached a high degree of perfection. The rivalry of firms of capitalist countries has been clearly sensed in this area.

The exhibits of the GDR, of the Nachrichtenelektronik Combine (RFT) of Leipzig, in particular, occupied a very noticeable spot in pavilion No 15. The combine's communications apparatus and equipment presented at the fair in keeping with the exhibition program contained many new interesting solutions deserving attention. Let us dwell on some new items.

The center of the exhibition was the "Istok" [Source] Unified Integrated Communications System for Analog and Digital Transmission (YeSS ATs) (cf. ELEKTROSVYAZ', Nos 10 and 11, 1975). The system was created as the result of the joint work of research institutions and industrial enterprises of the GDR and USSR, mainly of the TsNIIS [Central Scientific Research Institute of Communications] Riga Division and the Nachrichtenelektronik and Robotron combines. Not only today's requirements of communications administrations, but also the requirements of the future, are taken into account in this system.

The system is designed for urban, rural and production communications. It interacts with ATS's [automatic telephone exchanges] and AMTS's [automatic long-distance telephone exchanges] of any type. Because of freely programmable central control equipment, the system offers users a great number of new communications services (abbreviated number dialing, conference communications, notification of the arrival of a new call during a conversation, return calling, locking the lines of a called user for a certain period, readdressing of calls, waiting with connection and return calling, direct communications without dialing a number, etc.). The modular nature of functional groups of the switching system peripherals and software make it possible to transform a station for any feasible case of utilization.

The gathering and processing of data for controlling the quality of the system's operation and the network are performed by means of the computer of a technical services center which has been created. Central exchanges can be used also without the services center's computer, when individual new exchanges are connected to the existing network or when the creation of a center is economically unfeasible.

The transmission of signals through low-frequency telephone channels and IKM [pulse code modulation (PCM)] channels can be accomplished without demodulation, over a single common spatially divided switching field. Low-capacity exchanges are controlled remotely from a central exchange through common control channels.

An exchange was demonstrated in operation at the fair, for communications by dial-type and pushbutton telephone sets of the "Al'fa" series.

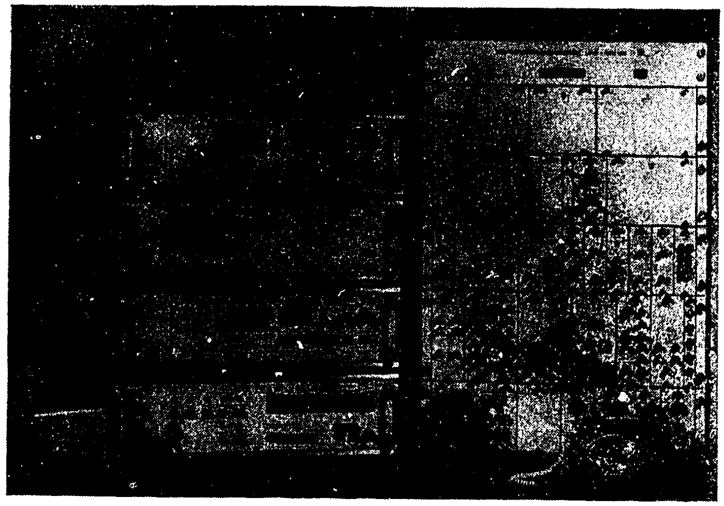
To the primary pulse-code-modulation transmission system has been added the PCM 120 secondary system, representing the second level of the hierarchy of digital transmission systems. Both systems constitute a single equipment series characterized by the use of unified design principles and identical functional units. Because of this the combined furnishing of terminal stations with equipment of both systems is made possible, with minimum space requirements at exchanges. The PCM 120 system is designed for organizing urban and suburban communications through cables of the existing network.

Training Instruments of the "Istok" Unified Integrated Analog-Digital Communications System (YeSS ATs)

The PCM 120 transmission system consists of two sets of secondary time-group-formation (VVG) equipment and line channel equipment, including terminal equipment structurally united with the VGG equipment and unattended intermediate stations (regeneration stations) (NRP's). The secondary pulse train at a speed of 8.448 megabits per second is arranged for by the method of character-by-character joining of four primary trains at a rate of 2.048 megabits per second. The equipment does not impose any requirements on the form and statistics of the information to be entered. The VVG equipment is designed in accordance with CCITT recommendation G.472; the method of positive staffing is used in it for the purpose of equalizing the speeds of the introduced and transmitted signals.

A non-coil-loaded symmetric low-frequency cable with strands 0.8 to 1.4 mm in diameter in paper or plastic insulation is used as a guide system.

The terminal equipment contains a master oscillator and remote power and remote monitoring equipment identical with that of the PCM 30 system.



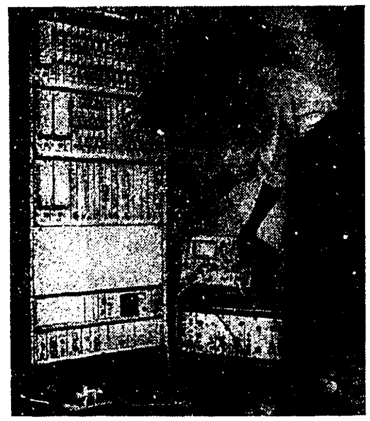
The PCM 120 Pulse-Code-Modulation Transmission System

The unattended regeneration stations are in the form of containers made of aluminum, containing regeneration, remote monitoring and service communications equipment. They are either placed in cable wells or are buried in the ground.

Depending on the length of the channel, remote powering (200/300 V, 80 mA) is carried out either from a single terminal station, or from two terminal stations, as well as from intermediate power stations.

The technical data of the PCM 120 system are as follows: transmission rate for information of primary train--2.048 megabits per second $\pm$ $50 \cdot 10^{-6}$; transmission rate for information of secondary train--8.448 megabits per second $\pm$ $30 \cdot 10^{-6}$; code at secondary junction--NDB-3; code at primary junction--NDB-3 or AM1 without transmission of clock frequency. Wave impedance of connecting cable at secondary junction--75 Ω (asymmetric), at primary junction--120 Ω (symmetric) and 75 Ω (asymmetric); attenuation at half-clock-frequency: of intermediate regeneration section--20 to 45 dB, of regeneration section near an exchange--0 to 25 dB.

The power requirement of the VVG equipment is 19 W (voltage of power supply, 60 V). Overall dimensions of VVG equipment: of unit--600 X 240 X 225 mm, of rack--600 X (2600, 2300, 1400) X 225 mm.



PCM 120 Pulse Code Modulation Transmission System: The two lower units on the rack are optical cable communications line equipment.

On the basis of an agreement regarding specialization within the CEMA framework, new electronic teletypewriter equipment in the F1000 series is being produced--the F1100 receiving and transmitting type and the F1200 receiving type. They have a number of important advantages, such as a low noise level, low consumption of electric power, operating convenience, and a modern look. As compared with traditional electromechanical equipment, the power consumption has been reduced by 50 W and equals a total of 110 W. Because of its high reliability and its noise-free operation and the ease of servicing the equipment, it can be installed directly in office areas of institutions.

The equipment operates with International Telegraph Code No 2 at a speed of 100, 75 and 50 bauds; switching from one speed to another does not require readjustment of the equipment. The line current is 16 to 70 mA. The power network voltage is 220 V + 10 percent, -15 percent. The characteristics of series F1100 equipment conform to the recommendations of CCITT. The equipment is designed for the exchange of information in Telex and Gentex networks, as well as in special networks in the two-conductor or four-conductor mode. Block printing is employed. The noise level created by the printer at a telegraph speed of 100 bauds is 47 dBa.

Unified elements connected by plug connections are employed in the design, because of which it is possible easily to replace malfunctioning elements.

Series F1100 Electronic Teletypewriter

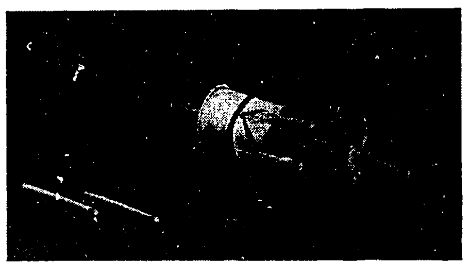
In its totality the F1100 series equipment contains three structural units--the main unit, a keyboard and a transmitter. The choice of combination is dictated by the area of application of the equipment. The basic unit includes a power supply, electronics, and a printer. The keyboard is similar to that of a typewriter so that operating personnel do not require special training. It is also possible to use a full keyboard with a set of service devices (automatic reorganization of letters and the like). The supply of characters is sufficient for adaptation to the alphabets of a number of countries.

The equipment has three registers which are switched automatically. Among the equipment's advantages is a 16-character storage making it possible to transmit at a rate of 400 characters per minute. An optical signal is produced when the keyboard is locked. The loss of information is excluded. The equipment includes an automatic carriage return, line shift and indication of readiness for use, and the like.

The equipment is produced in table and console variants. The dimensions of the equipment with the unit for transmitting from punched tape are 235 X 540 X 550 mm and it weighs 30 kg.

A powerful semiconductor laser has been created as the result of cooperation between specialists of the USSR Academy of Sciences Physics Institute imeni P.N.

Lebedev and the GDR Academy of Sciences Institute of Optics and Spectroscopy. It operates continuously at 300 °K for more than 10,000 h in succession. The mass employment of lasers for fiber optic communications systems is anticipated in the not too distant future. Special luminescent diodes and heterostructure lasers serve as signal emitters. Optical systems have demonstrated the capabilities of lasers when they are used for transmitting television images, for communication between computers and for cable television.



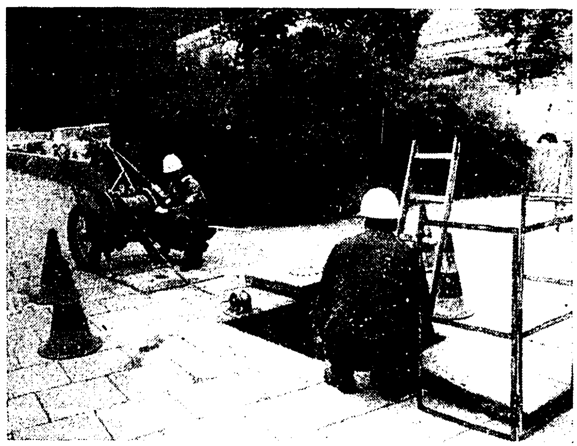
Optical Cable

The Berlin Institute of Electrical Communications Equipment demonstrated an experimental optical communications system at the Leipzig Fair. The line circuit is set up by means of a seven-strand optical cable in a plastic sheath with light guides made of quartz. The diameter of the strands is 0.13 mm and their attenuation is 6 dB/km. A steel stranded wire placed inside the cable serves the purpose of preventing it from stretching. The optical cable is assembled by means of cementing or welding. The optical fiber is connected to equipment by means of coaxial plug connections. Signals are transmitted through the cable by means of infrared radiation from a light-emitting diode. Photodiodes are used as an optoelectronic converter at the receiving end. Transmission takes place at a speed of 8.448 megabits per second.

The system includes a specially developed measuring complex which monitors attenuation and pulse dispersion in the light-emitting diodes and the operating parameters of the system. The complex produces signals regarding damage to cable and individual elements of the system.

Experience gained in use of an optical communications system has confirmed its high effectiveness.

An economical system for radio telephone communications with stationary and mobile UHF/microwave users, developed on the basis of many years of experience in creating and using wire and radio communications equipment (the Nachrichtenelektronik Combine), possesses good adaptability to various conditions. This system makes possible the construction of communications networks in areas with a poorly developed infrastructure and with a low population density, as well as in areas with difficult climatic and geographical conditions with the threat of damage to cable and overhead lines. This system, designed primarily for rural areas and production processes (oil and gas lines, etc.) occupying a great area, requires a low initial capital investment and furthermore makes it possible to carry out the steady growth of a network (continuing with mastery of the area) and to set up communications of a temporary nature.



Running an Optical Cable Into an Underground Telephone Line System

By means of special adapters the equipment can be connected to switching stations of the existing network. The system includes all users in duplex connections with the preservation of secrecy of conversations and high quality of communications.

Various methods are provided for transmission through various guide media, such as transmission through a low-frequency cable, high-frequency transmission through a cable or overhead line and high-frequency transmission through an RRL [radio relay line] with a narrow frequency band.

The system was developed in accordance with the recommendations of CCITT. It includes the following main units: a user's radio station (URS), a central radio station with coupling equipment (URB), a radio-to-line transfer unit (URT) and a radio relay coupling unit (URR).

The user's radio station (URS) is installed at the user's end in a place making possible direct radio communications with the central radio station (URB) and can be removed a distance of up to 5 km from the user's telephone equipment by means of a two-conductor line; a TCh [tone frequency] channel (0.3 to 3.4 kHz), the transmission of dialing and call (25 kHz) signals and of tariff pulses, as well as remote powering, are arranged for by means of this line.

The URS radio station has eight channels at different frequencies and transmitters with different powers. For the purpose of reducing the consumption of electric power, only the receiver, which cyclically scans channels, operates constantly. The identification of users is made possible by means of a five-digit code.

The URB central radio station consists of four transceivers, equipment for coupling with four-conductor lines (600 Ω, -26/+4 dBm or +4 dBm/-14 dBm levels), equipment for combining and separating for operating with one or several antennas, as well as equipment for monitoring the occupancy of channels. For the purpose of economizing on the consumption of electric power, the transmitter operates only in the conversation and call modes.

The URT radio-to-line transfer unit is located at the ATS and serves the purpose of coordinating the signals of the central radio station and the ATS. There is a separate module for each user and a matching unit for each duplex radio channel. The equipment distributes users over radio channels. It is designed nominally for 60 users and four duplex radio channels. Any particular combination is possible, right up to doubling the number of users and radio channels. If the user does not lift the receiver, the user's module limits the time for sending the call for the purpose of reducing the occupancy of the radio channel.

For the purpose of connecting the central radio station to the transfer unit it is possible to use the MTF 12/24 high-frequency transmission system operating through a high-frequency cable with strands 0.8 to 1.4 mm in diameter, with amplifying sections approximately 25 km long, or the FM 24-400 RRL equipment operating in the 320 to 470 MHz band.

The URR radio relay coupling equipment serves the purpose of arranging for relaying in the case of the absence of conditions of direct coverage between the user's and central radio stations.

Key parameters of the system: operating principle--multi-station access. Frequency bands: 87.5 MHz (frequency difference between transmitter and receiver, $\Delta f = 4.5$ MHz); 146 to 147 MHz ($\Delta f = 4.5$ MHz); 408 to 420 MHz ($\Delta f = 10$ MHz); and 440 to 470 MHz ($\Delta f = 10$ MHz). Number of channels--two, four or eight in the 1.1 MHz band. Frequency difference between channels--25 kHz. Power of transmitter--3 to 10, 6 to 20 and 0.6 to 2.0 W. Losses when operating with a single antenna: two transmitters--4.5 dB; four transmitters--9 dB. Operating temperature range-- -10 °C to +50 °C. Overall dimensions: URS--320 X 540 X 320 mm, URB--1200 X 575 X X 400 mm, URT--1200 X 600 X 225 mm, and URR--1200 X 1150 X 400 mm.

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SWEDEN'S ERICSSON, ITT COMPETE FOR DANISH ORDERS

Stockholm VECKANS AFFARER in Swedish 29 Jan 81 p 5

[Text] Copenhagen--L. M. Ericsson and ITT, the American telephone company, are competing for orders worth billions in Denmark. The country is converting gradually to digital telephone exchanges, and 20 billion kroner will be invested over the next few years.

Last fall L. M. Ericsson obtained the first order, worth 500 million kroner, and Denmark's trade union movement is afraid that the Swedish company will get a monopoly on the Danish market. That might endanger employment in the electronics industry.

The fact that the first order went to L. M. Ericsson led ITT to abandon its plans to start a new factory in Denmark that would have provided jobs for 300 people. ITT already owns the Standard Electric Kirk telephone factory in Horsens, where it has 1,200 employees.

If L. M. Ericsson also wins the next big orders from the KTAS [Copenhagen Telephone Company] in Copenhagen, the battle between the two giants will be considered ended.

The Chr. Rovsing Corporation, a 100-percent Danish electronics firm, has already dropped out of the competition for the billion-kroner orders. The government refused to provide a 20-million-kroner development contract when it was considered that the firm lacked the financial means for developing the digital exchanges.

But the trade union movement has not given up, and the central organization of metalworkers wants to investigate the possibility of cooperation between Chr. Rovsing, Standard Electric Kirk, Bang & Olufsen, and the Danish telephone companies. The metalworkers feel that domestic large-scale production is possible if there is close cooperation in the electronics industry.

Minister of Transport Jens Risgaard Knudsen emphasizes that consideration was given not only to price but also to the employment aspect.

He says, "The order will help to guarantee employment at L. M. Ericsson's factories in Denmark."

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END