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TYPE VUS-12 EQUIPMENT OPERATING EXPERIENCE

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Aerial toll telephone lines are designed for operation under difficult meteorological conditions.

A deterioration in meteorological conditions leads to variations in the attenuation of the circuits. Thus, the attenuation in an aerial 4-mm copper line for a frequency of 143 kc with a 25 mm thick sleet cover on the conductors is over 6 times greater than the dry-weather attenuation of the same circuit for the same frequency. Observation over a long period of time has shown that in the greater part of the USSR the period of greatest sleet formation occurs from November to March, the deposits attaining maximum thickness and hardness from December to January.

In order to compensate for the increase in transmission losses caused by the sleet deposits on the auxiliary repeater equipment (VUS) [vspomagatel'nyye usiliitel'nyye stantsii] has been provided.

The installation of VUS-12 equipment on aerial toll lines designed for 12-channel high-frequency service is currently under development. The initial experience with the operation of the new equipment fully confirmed its applicability to multichannel toll lines. Even partial installation of type VUS-12 equipment on one of the multichannel lines in the Leningrad toll district made possible an economy in transmission time of 17,611 channel-hours during the fall and winter season.

The auxiliary repeater equipment has the following operating peculiarity: it is disconnected most of the time but must be ready for immediate inclusion in the line. Furthermore, the equipment does not receive special, daily operational maintenance and must be repairable on location.

These conditions make special demands on type VUS-12 equipment concerning its continuous operation, exclusion of possibilities of accidental malfunctioning, complete mechanical and electrical reliability, and the operating reliability of all components and parts. The equipment must be designed for ready assembly.

Type VUS-12 equipment meets contemporary technical standards and has good operational and technical characteristics. However certain important shortcomings have already become apparent in its operation even after a relatively short operational period. These shortcomings can be classified as omissions in the development of the equipment and as purely production quality defects.

Power to type VUS-12 equipment is supplied from a central battery by means of the "conductor-ground" scheme. The utilization of this scheme solves very neatly such important questions as to the possibility of separately energizing the odd and even amplifiers, increasing the operational length of the central-battery circuit, and increasing the spacing of VUS equipment points between feeder repeater points. However experience has shown that the above scheme of supplying power to VUS equipment points completely breaks down when utilized on aerial toll lines located near electrified railroad lines. The effect of the latter on the power-supply circuit

of the VUS equipment completely disrupts the normal operation of the equipment.

A "conductor-conductor" scheme for supplying power to VUS equipment has been tested on one of the toll trunks in the Leningrad toll district. The conversion to this scheme is not difficult to carry out. The following changes must be made in the wiring of the feeder points (of the feeder reactor rack) (Figure 1): in the power transmission rack the circuit breaker P_2 must be disconnected, and the lead from terminal IIB_9 of the feeder reactor rack to the central-power transmission rack must also be disconnected; terminal IIB_9 of the feeder reactor rack comb must be connected to the negative of the plate battery (-206 v). The following modifications must be made in the VUS-12 equipment (Figure 2): the leads connecting terminals IIA_7 and IA_8 of the reactor rack comb to the central-power receiving rack must be disconnected and insulated; the ground leads to the No 1 and 2 amplifier housings must be disconnected; the "ground" terminals must be connected to the central-power receiving rack (terminal IIA_7 must be connected to the "ground" terminal of No 2 amplifier housing, and terminal IA_8 to the "ground" terminal of No 1 amplifier housing): and the bypass relay PTT which shunts the condensers C_1 and C_2 must be disconnected.

However, though it permits the operation of VUS-12 equipment on lines immediately adjoining electrified railroad lines, the "conductor-conductor" scheme in its present form not only reduces the maximum operating distance over which central power supply can be utilized but also makes impossible the operation of more than one remotely-energized repeater point in any given repeater district by depriving the VUS equipment of its emergency power supply.

Moreover, the utilization of the last-named scheme without special modifications in the design of the equipment will place a dangerous (positive) potential on the housings of the amplifiers when the equipment is operated, while the third housing will be grounded.

The utilization of the "conductor-conductor" scheme also changes the situation in the line circuit. Whereas with the "conductor-ground" scheme the feed voltage presents a hazard only to those who are working on grounded poles, the utilization of the "conductor-conductor" scheme extends the hazard to all poles on the line. Furthermore, when the "conductor-ground" scheme is used the accidental interchanging of the conductors results in the unwanted operation of the amplifier of the other group, which can be easily detected, whereas when the "conductor-conductor" scheme is used such an interchanging will make the equipment inoperative and the fault cannot be detected immediately.

It can be seen that the central-battery operation of VUS equipment points needs more development work.

In our opinion it would be worthwhile to make provision in VUS equipment currently being produced for simple conversion from the "conductor-ground" to the "conductor-conductor" power supply scheme.

When 2 VUS equipment points are provided in a given repeater district one of them can be equipped with an independent power supply, e.g., directly from a-c networks (in areas adjoining electrified railroad lines there is as a rule a reliable source of commercial power). However the power supply must be remotely controlled.

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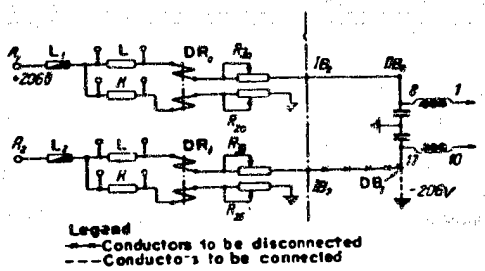

Figure 1

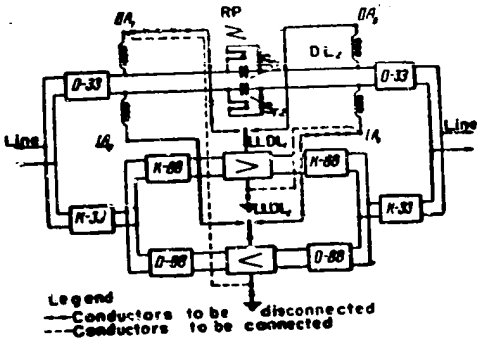

Figure 2

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Koshteyev, I. A., Osnovy teorii elektricheskoy svyazi:lineynyye sistemy s sosredotochennymi parametrami [Basic Theory of Electrical Communications: Linear Systems with Lumped Parameters], 1954, Moscow, Svaz'izdat, 370 pages, 8.45 rubles.

Discusses the frequency bands used in communications signalling and the properties of linear systems with lumped parameters -- dipoles, quadripoles, electrical filters, and equalizing quadripoles. Approved by the Main Administration of Educational Institutions of the Ministry of Communications USSR as a textbook for the higher communications schools.

Levitin, Ye. A., Supergeterodin [Superheterodyne], No 200, 1954, Moscow-Leningrad, Popular Radio Library, Gosenergoizdat, 112 pages, 1.60 rubles.

Presents the fundamental principles of the physical processes occurring in superheterodyne receivers and describes standard schematics for the separate stages of such receivers. The book is intended for radio amateurs who are familiar with the operation of the simplest receivers and have some do-it-yourself experience in this field.

"Giprosvyaz'" State Institute for Research and Development of Communications Equipment, Ministry of Communications USSR, Rukovodstvo po proektirovaniyu radiotranslatsionnykh setey [Manual for the Planning of Program Service Networks], 1954, Moscow, Svyaz'izdat, 151 pages, one insert.

The manual is intended for use in the planning of 2-wire and 4-wire program service facilities for urban, workers', and rural settlements. It gives instructions on the procedure to be followed in carrying out field survey work, schematics for the construction of program service networks for 500 w transmitting and receiving equipment for various distributions of the load in the program service sector, and production blueprints for the construction of program service facilities using 500 and 10 w equipment.

Technical Administration, Ministry of Communications USSR, Tekhnika svyazi: Apparatura abonentskogo telegrafa [Communications Technology: Subscriber Telegraph Equipment], a symposium (with appended schematics folder), 1954, Moscow, Svyaz'izdat, 112 pages, 12 inserts with schematics, bound in a folder, 4.65 rubles.

The symposium describes manual and automatic private telegraph exchange equipment. Discusses the broad general questions touching on the organization of telegraph subscriber service, compares the more important indexes of various types of switching equipment, discusses the new principles introduced with automatic telegraph equipment, and gives a general description of type ATR-10/20 and ATR-30/300 manual and type ATA-50 automatic telegraph systems.

Technical Administration, Ministry of Communications USSR, Tekhnika svyazi: Apparatur uplotneniya simmetrichnykh kabeley (tipa K-24) [Communications Technology: Type K-24 Carrier Equipment for the Compositing of Simplexed Cables], 1954, Moscow, a symposium, Svyaz'izdat, 75 pages, one insert, 2.20 rubles.

Gives the fundamental principles of type K-24 equipment concerning operating principles, the electrical characteristics of the channels, some equipment units, design data, and the principles of designing group [modulation] equipment. Gives data on simplexed cables and discusses the design of toll facilities for K-24 equipment installation. The symposium is intended for engineering and technical personnel engaged in the design, construction, and operation of toll cable circuits on which type K-24 equipment is to be used.

Mints, B. S. Indikatory urovnya v radioveshtaniya [Transmission Level Indicators for Radio Broadcasting Applications], 1954, Moscow, lectures on communications technology, Technical Administration, Ministry of Communications USSR, Svyaz'izdat, 35 pages, one ruble.

The lectures are intended to supply workers in radio broadcasting maintenance shops and stations with the necessary minimum of information on the design and operation of measuring instruments for application in the visual control of transmission levels in radio broadcasting. The specifications which must be met by instruments of this type are also discussed.

Orlov, M. S., Pupinizatsiya sel'skikh podzemnikh linii radiofikatsii [The Loading of Underground Rural Programme Service Lines], 1954, Moscow, Svyaz'izdat, 56 pages, 80 kopeks.

Describes loading systems used on program service lines and gives simplified methods for their calculation. The pamphlet is intended for engineers and technicians engaged in the design, construction, and operation of underground rural programme service lines.

Rastegayev, V. V., Rabota uchastkovo nadsmotrshtika gorodskoy radiotranslatsionnoy seti [The Work of Section Supervisors on Local Programme Service Networks], 1954, Moscow, Svyaz'izdat, 12 pages, 15 kopeks.

The author is a section supervisor on the Saratov programme service network and has repeatedly won first place in socialist competition and the distinction of "best in profession." He draws his material from his production experience.

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