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No. 26

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ELECTRONICS AND ELECTRICAL ENGINEERING

No. 26

This serial publication contains abstracts of articles from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

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Amplifiers

POLAND

UDC 621.375.9:621.311.6

BUCON, MARIAN, engineer, Institute of Physics, Silesian University

THE USE OF INTEGRATED OPERATIONAL AMPLIFIERS IN DESIGNS OF HIGHLY STABLE
REGULATED POWER-SUPPLY CIRCUITS

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish Vol 22 No 8, Aug 76 pp 281-283

[Abstract] The author describes three circuit designs and the principles of operation of highly stable power-supply systems resistant to overloads and short-circuits, based on semiconductor technology and regulated with use of integrated operational amplifiers. The pilot models of these power-supply circuits were realized by the Institute of Physics of Silesian University. A stabilization factor higher than 0.01% has been obtained for each of them. Figures 4; references 3: 2 Polish, 1 Western.

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USSR

RAYNERMAN, P. O., electrician, Odessa Dispatcher's Station of the Odessa-Kishinev Railroad

IMPROVING THE OPERATIONAL RELIABILITY OF THE 'MONO 25x2' AMPLIFIER

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 10, 1976 pp 25-26

[Abstract] Operational experience with "Mono 25x2" amplifiers has shown that they fail after 2 or 3 hours of continuous duty. The trouble has been traced to the extreme operating conditions of two EL-34 tubes in the power amplifier and two ECC-83 valve tubes in confined space of the amplifier cabinet. The heat generated by these tubes reduces the electrical strength of some components, resulting in capacitor leakage, breakdown of insulation and inter-electrode shorts. To eliminate the problem, the EL-34 tubes are mounted in a separate perforated metal cabinet, and the ECC-83 valve tubes are replaced by full-wave semiconductor-diode rectifiers using D226B diodes. Another frequent cause of trouble in the "Mono 25x2" amplifier is breakdown of an electrolytic filter capacitor due to excess voltage before the tube cathodes reach full heat. This is eliminated by shunting the capacitor with a resistor. These measures have been found to be effective. Figures 3.

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USSR

TESLENKO, V.I., engineer of "Orbita" Station

WHY PROVIDE A THYRISTORIZED AMPLIFIER FOR THE TYPE TNA-57 ELECTRIC DRIVE OF AN "ORBITA" STATION

Moscow VESTNIK SVYAZI in Russian No 10, Oct 76, pp 14-15

[Abstract] In the paper, which is a response to material concerning thyristorized units for the TNA-57 electric drives of an "Orbita" station [Vestnik Svyazi, 1975, No 12, p 23], the basis for its selection and a description of the circuit of a thyristorized amplifier developed by the signalmen of Okha, Sakhalinskaya Oblast', are given. At present the amplifier is used for power supply of the antenna electric drive as primary, and an electrical machine as reserve. Annual operation of the thyristorized amplifier showed its high economy, reliability and stability of operation under all conditions, with various wind loads on the antenna; and, moreover, use of the amplifier made it possible to improve working conditions significantly. Figures 3.

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USSR

UDC 621.396.67

BELOUSOV, S.P., GUREVICH, R.V., KLIGER, G.A., and KUZNETSOV, V.D.

MODEL SGD8/8RA ANTENNAS FOR LONG-RANGE TRANSMISSION

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 50-54 manuscript received
10 Dec 74

[Abstract] Model SGD8/8RA (8-tier) band antennas with cophasal feeding are used in the USSR for radio broadcasting over distances beyond 6,000 km. These antennas have distinct directional characteristics and have been designed to ensure high transmission levels within sectors of the most probable reception angles. Their directivity diagrams in the vertical plane and in the horizontal plane are calculated, with the effect of an aperiodic reflector assumed to be equivalent to that of a mirror image of the antenna in an infinitely large and ideally conducting plane surface of this reflector. The calculated diagrams do not quite agree with the actually measured ones, so that consideration is given to the possibility of better matching between the antenna and the feeder channel by means of compensating elements. This would also increase the gain and the traveling-wave ratio over the $(0.7-1.15)\lambda_0$ broadcasting bands ($\lambda_0 = 19.5$ m and 34.0 m). Figures 6; references 7: 5 Russian, 2 Western.

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USSR

UDC 621.396.67.095

NARBUT, V.P.

ON THE INFLUENCE OF ANTIBACKGROUND REFLECTING SCREENS ON THE LATERAL RADIATION OF REFLECTOR ANTENNAS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2205-2210 manuscript received 18 Aug 75

[Abstract] During development of highly-directional parabolic antennas much attention is paid to the suppression of lateral radiation by a choice of the mirror contour and the selection of optimum dimensions. Recently an antibackground screen has also been used for this purpose. The present paper gives a qualitative analysis and presents the results of an experiment for checking the efficiency of operation of such a type of screen. The author thanks B. Ye. Kinber for review of the manuscript and for helpful council. Figures 5; tables 3; references 5: 3 Russian; 2 Western.

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USSR

UDC 621.396.67:621.391.812

KUZNETSOV, V. D., FROLOV, O. P., and YAMPOL'SKIY, V. G.

IMPROVING THE EFFICIENCY OF USING ANTENNAS ON TROPOSPHERIC RADIO RELAY LINES

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 1-4 manuscript received
29 Oct 74

[Russian abstract provided by the source]

[Text] The paper gives the results of experimental studies that confirm the feasibility of increasing the efficiency of utilization of antennas on tropospheric radio relay lines. Block diagrams are given showing the layout of transmitting and reception equipment in a tropospheric radio relay station which enables more effective utilization of spaced antennas. Figures 8; references 4 Russian.

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USSR

UDC 621.396.677.012.12

BLAGODATSKIY, V.I.

ON THE DISTRIBUTION LAW OF THE AMPLITUDE RADIATION PATTERN OF AN
ANTENNA ARRAY WITH AN ARBITRARY VALUE OF AMPLITUDE AND PHASE ERRORS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct
76, pp 2211-2214 manuscript received 26 Aug 75

[Abstract] Calculating formulas are obtained for the parameters of the distribution law of the amplitude radiation pattern of a system with an arbitrary number of radiators for the case of random errors, arbitrary with respect to value, with sufficiently arbitrary (possible in practice) distribution laws. Figures 1; references 5: 2 Russian; 3 Western.

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USSR

UDC 621.396.677.012.12

KASHIN, V.A., KALACHEV, V.N.

OPTIMUM PHASE SYNTHESIS OF RADIATION PATTERNS OF ROUND APERTURE
WITH REDUCED LEVEL OF CIRCULAR LOBES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct
76, pp 2214-2218 manuscript received 17 Sep 75

[Abstract] It is found that binary phasing assures minimal losses of the directive gain of an antenna, in the case of suppression to a specified level of the individual lobes of a radiation pattern. With a well-defined approximation of them, it is possible to transfer the results obtained for a continuous round aperture to antenna arrays in much the same way as in done in a previous work by Kashin [Radiotekhnika i Elektronika, 1974, 19, 6, 1277]. Figures 4; references 4 Russian.

USSR

UDC 621.3.001.24

TAREYEV, B.M., doctor of technical sciences, VINITI [All-Union Institute of Scientific and Technical Information]

ESTIMATING THE CONTROLLABLE PARAMETERS OF MATERIALS AND COMPONENTS

Moscow ELEKTRICHESTVO in Russian No 9, Sep 76 pp 54-56 manuscript received 29 Jan 76

[Abstract] Widely used in science and engineering is a method of making a quantitative estimate of the relative variability of some physical magnitude (called the "controllable" magnitude) which is a function of another ("controlling") magnitude when the latter changes slightly. The formula generally used, which is based on introducing the logarithmic derivative, is quite acceptable. But the terminology and symbols used in published papers and documentation require standardization, and insufficient use has been made of convenient transformations of equations for relative changes in controllable magnitudes. The purpose of this paper is to introduce order into the method and to widen the possibilities of such an estimate. Emphasis here is on the parameters of materials and components used in electrical and radioelectronic

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USSR

TAREYEV, B.M., ELEKTRICHESTVO No 9, Sep 76 pp 54-56

engineering, particularly on temperature coefficients and nonlinearity factors, but the suggestions made have wide applicability. Several notational inconsistencies and ambiguities are discussed, some arising out of the joint use of English and Russian symbols, and some out of the use of different methods of plotting relationships. It is suggested that the result of the estimate be expressed by the Russian letter Λ , with the controllable magnitude in parentheses and the controlling magnitude indicated by a subscript, when necessary for clarity. A series of relationships incorporating this operator is given and discussed in detail. In particular, formulas are derived for the temperature coefficient of the resulting capacitance of a system of n parallel-connected and series-connected capacitors, respectively, and for the temperature coefficient of the dielectric constant of an arbitrary mixture of dielectrics subject to the Lichtenecker equation. Emphasis is placed on the clarity and flexibility of this system of notation. References 10: 10 Russian.

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USSR

UDC: 621.396.6

BORTNIKOV, V. T.

FORMALIZING THE SYNTHESIS OF THE STRUCTURE OF ELECTRONIC EQUIPMENT

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 33-38 manuscript received 13 Sep 74

[Russian abstract provided by the source]

[Text] The author considers a systems approach to the problem of automating the design of electronic equipment. The proposed technique requires complete formalization of all stages of design, including the stage of synthesizing the structure. An investigation is made of a statistical approach and a feasibility study is done on formalizing the process of synthesizing the structure of electronic equipment. Figures 1; references 2 Russian.

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USSR

NOSOV, YU. R.

INTEGRATED MINIATURIZATION OF ELECTRONIC EQUIPMENT

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 74-77

[Abstract] A summary of results of the Fourth All-Union Contest for the best work on integrated miniaturization of electronic devices held in 1975 by the Central and Moscow (municipal and oblast) administrations of the Scientific and Technical Society of Radio Engineering, Electronics and Communications imeni A. S. Popov. About 60 projects were entered in the competition, many being new series of ICs. Some data are given on electrical and time parameters and degree of integration. Modular, thin-film and printed-circuit techniques were applied to various computer-oriented and automatic control projects. Some new calculators were entered with liquid crystal displays and MOS LSI chips. Electro-optical devices included a matrix gas-discharge display panel and a mosaic video signal shaper based on charge storage devices (solid-state analog of the transmitting television tube). Display panels using electroluminescent powder were also entered as components of automatic control systems. A miniaturized IF filter entered in the competition gets around the problem of bulky induction coils by using

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NOSOV, YU. R., ELEKTROSVYAZ', No 9, Sep 76 pp 74-77

the surface acoustic wave effect with interdigital metal electrodes on a dielectric material. These electrodes act as transmitting and receiving transducers. A friction-driven motor powered by the piezoacoustic effect was entered with variable speed from 1 to 1000 rpm, efficiency of more than 70% and power consumption in the microwatt range.

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HUNGARY / UNITED KINGDOM

THWAITES, C. J., Tin Research Institute, England

QUALITY CONTROL ASPECTS OF SOFT SOLDERING

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 15 No 10, Oct 76
pp 299-305, 311

[Abstract] This article is a Hungarian translation (by HONTY, Laszlo) of a paper originally published in English in CIRCUIT WORLD, Vol 1, 1975, No 3, pp 30-36; it is the text of the author's lecture delivered at the Quality-Control Conference sponsored by the British Association for Brazing and Soldering. It presents proposals for the determination of the parameters of soft soldering and associated operations, describes means for the quality control of these operations based on the proposed methods, and discussed ways in which optimized product quality and reliability can be achieved. The discussion is in two parts: the first part covers the materials involved; the second part covers the operations involved. Figures 10; references 26: 2 German and 24 Western.

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USSR

DRAFT OF GOST [ALL-UNION STATE STANDARD] INSTEAD OF GOST 1496:61:
ELECTRICAL ENGINEERING. LETTER DESIGNATIONS OF PRINCIPAL ELECTRICAL
AND MAGNETIC MAGNITUDES

Moscow ELEKTRICHESTVO in Russian, No 10, Oct 76, pp 78-84

[Abstract] The present standard establishes letter designations for the principal electrical and magnetic magnitudes. The letter designations established by the present standard are obligatory for use in documents of all forms, educational textbooks, and technical and reference literature. The standard corresponds to the recommendation on standardization SEV [? Council for Mutual Economic Aid] RS 4472-74 and MEK [International Electrotechnical Commission] publications 27-1 and 27-2. Tables 4.

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USSR

UDC 621.315.21

TSYM, A.Yu. and KAMALYAGIN, V.I.

SHIELDING OF SYMMETRIC CIRCUITS FOR MULTIPLEXING WITH DIGITAL TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 8-11 manuscript received 11 Apr 75

[Abstract] A most important performance index of a digital transmission channel is the probability of error along the regenerative line segment. In the case of symmetric cables such errors depend mainly on the energy transfer at the far end of coupled circuits and on thermal noise. It thus becomes essential to shield such cables and also to normalize this protection compatibly with the characteristics of the digital apparatus. In order to solve the problem, one must first establish the relation between allowable error probability P_e and degree of shielding (attenuation) A_{sh} . This relation is analyzed here on the basis of the spectral theory of random processes. The results are summarized in a Table:

Digital transmission system	f_o, MHz	$A_{sh}(f_1), \text{dB, for } P_e =$		
		10^{-9}	10^{-10}	10^{-11}
Primary	2.048	30.0	30.4	30.9
Secondary	8.448	46.4	46.8	47.2
Tertiary	34.304	62.6	63.0	63.5
Quartary	139.264	76.2	76.6	77.1

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USSR

TSYM, A.Yu. and KAMALYAGIN, V.I., ELEKTROSVYAZ' No 8, Aug 76 pp 8-11

listing the minimum values of A_{sh} from all interference at the frequency $f_1 = 250 \text{ kHz}$. Since present standards specify a shielding of at least 78 dB at this frequency in 85% of all cases, hence existing high-frequency symmetric cables may, with proper correction factors taken into account, be multiplexed with up to tertiary digital transmission systems. Tables 1; references 1 Russian.

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USSR

UDC 621.316:621.854

PLATONOV, Vasiliy Vasil'yevich, candidate of engineering sciences, dotsent,
Novocherkassk Polytechnical Institute

STUDY OF THE SPATIAL DISTRIBUTION OF A SIGNAL ABOVE A DAMAGED CABLE LINE

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA in
Russian No 9, Sep 76 pp 935-939

[Abstract] The effectiveness of the induction method of locating damage in cable lines can be improved by studying the fundamental rules for the spatial distribution of a signal above a damaged cable line. Also, such a method can serve as the basis for developing new more effective methods. Spatial distribution of the signal is determined by the distribution of current in the damaged line, which is a function of the type and location of the damage, the conditions under which the line was laid, the number of grounds, the properties of the soil, and the parameters of receiving antennas. The intensity of the magnetic field above the cable line can be viewed as the product of the magnetic field intensity of the isolated leakage current and the magnetic field intensity

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USSR

PLATONOV, V.V., IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA No 9,
Sep 76 pp 935-939

of the pair of currents flowing through the twisted wires. These two components not only differ in magnitude but are also superimposed on one another at different intervals of space and time. Formulas are obtained relating the isolated leakage current to the coordinates of the center of the antenna with respect to the cable's axis, serving as the origin. It is assumed that the field is studied at a distance considerably greater than the cross-sectional dimensions of the cable and that therefore current flows through the wires in equivalent center strands, and that the field of the isolated leakage current directly above the cable route is determined by the current in the cable, which is considered a thin wire, and field irregularity at the limits of the circuit in consideration of actual antenna dimensions is not taken into account. The magnetic field intensity of the pair of currents flowing through the twisted strands is studied with regard to strand-twisting factors and the shielding effect of the cable's serving and armor. The most favorable antenna orientation is determined from the viewpoint of the relationship between the maxima of magnetic field intensity components of wire currents, determined from the formulas derived. Diagrams are

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USSR

PLATONOV, V.V., IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIK No 9, Sep 76 pp 935-939

given for the spatial distribution of the signal when locating the route and the point of shorting between strands, respectively. A fundamental formula is derived for designing equipment to be used for the induction method of locating damage in cable lines. The results proceed from a formula expressing the fundamental relationship between the current in the cable and the e.m.f. induced in the receiving antenna. Recommendations are given for ways of increasing the effectiveness of locating points of short-circuiting between the cable and serving when altering the field of the currents flowing through the twisted wires. Figures 2; references 2: 2 Russian.

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USSR

UDC 621.372.2.029.7

DUBROV, M.N.

STUDY OF THERMAL FLUCTUATIONS OF AN AIR REFRACTOR INDEX IN UNDERGROUND LIGHTGUIDE CHANNEL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2218-2221 manuscript received 15 Sept 75

[Abstract] In underground lightguide transmission lines practically all the path of the light beam passes through air which fills the line channel. Although the conduit is laid at a depth of 1--2 m, in a number of cases nonuniformity of the temperature existing in the ground proves to be adequate for activation of nonstationary convective or even turbulent movement of the air in the lightguide cavity. The thermal nonuniformities of the refractive index of the medium $n_1 = n - (n)$ which originate give rise to fluctuations of the optical line of the lightguide as well as the position, transverse dimensions and curvatures of the phase front of the beam, which in the final analysis are the cause of distortion of the amplitude and phase of the signal transmitted. During 1974-1975 regular measurements were made of the temperature fluctuations in the channel of a mirror lightguide line by V.P. Vard'ya and others [Radiotekhnika i Elektronika, 1973, 18, 2, 391]. Optical measurements by the

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USSR

DUBROV, M.N., RADIOTEKHNIKA I ELEKTRONIKA, Vol 21, No 10, Oct 76, pp 2218-2221

author were made at the same time. Recordings of the fluctuations of the air temperature were made with the aid of copper-constantan thermocouples and a Type R-348 potentiometer. Thermocouples made of wire 0.05 mm in diameter were used in the experiments. The quick-response sensitive junction of the thermocouple was fulfilled in the form of a spiral with a volume of approximately 1 mm³, and the second junction was seated on a copper bar with a mass of approximately 10 g, which together with other accessories, had a time constant in air on the order of several tens of seconds. Measurement of the thermo-emf with a R-348 potentiometer assured (together with the thermocouples used) a sensitivity to 10⁻⁴ °C and a time resolution on the order of 1 sec. The results of the experiments are principally shown in the form of graphs. The author thanks R.F. Matveyev and O.Ye. Shushman for assistance in the work and helpful discussion of the results. Figures 3; references 6: 4 Russian; 2 Western.

2/2

USSR

UDC 621.372.8.029.7

MATVEYEV, R.F.

ESTIMATION OF ENERGY LOSSES IN CURVED MULTIMODE LIGHTGUIDE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2086-2094 manuscript received 22 Aug 75

[Abstract] The paper is concerned with finding conditions in which there will be a low probability that the energy losses in an irregular lightguide of a prescribed length exceeds some maximum permissible magnitude. The present work deals only with a two-dimensional lightguide. A procedure is proposed for calculating the statistical tolerances on a curved multimode lengthy lightguide, based on an approximate replacement of the lightguide axis by a random sequence of conjugate segments with a constant curvature of each. Figures 3; references 2: 1 Russian; 1 Western.

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USSR

UDC 621.376.6:621.395.72

AFANAS'YEV, V. KH., VASIL'YEV, V. P., GOTGIL'F, L. N., SOROKIN, M. F., and SHPILEVSKIY, E. P.

THE MODEM-4800 SIGNAL CONVERTER

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 29-35 manuscript received 27 Oct 75

[Abstract] The article gives the basic technical specifications of the Modem-4800 unit for converting binary signals to a signal convenient for transmission over segregated (uncommutated) AF channels with four-wire termination in the duplex or semiduplex mode of operation. The specifications meet the recommendations of the MKKTT [International Telegraph and Telephone Consultative Committee]. The system operates at transmission rates of 4800 and 2400 bits per second. Standardized interfacing makes the Modem-4800 compatible with a variety of remote processing equipment utilizing the YeS computer facilities. Figures 5; references 4 Russian.

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USSR

UDC 621.391.832.22:621.396.621.59

FOMIN, A.F. and URYADNIKOV, Yu.F.

NOISE IMMUNITY OF CONTINUOUS-DATA TRANSMISSION SYSTEMS WITH PULSE-TYPE SERVO DEMODULATORS

Moscow RADIOTEKHNIKA in Russian Vol 31, No 9, Sep 76 pp 48-54 manuscript received 12 Mar 74; after revision 5 Apr 76

[Abstract] A general model of a transmission system is considered here which consists of a discretizer, a pulse-type modulator, a radio-frequency modulator, a pulse-type discriminator (phase, frequency, or time), the linear inertial channel of a pulse-type servo demodulator, and a low-frequency filter. The continuous input data constitute a stationary (in the broad sense) and normally random process of a known spectral power density. The problem of noise immunity and threshold characteristics is analyzed here first according to the continuous-systems theory with the output sampling frequency much higher than the effective width of the data spectrum or even approaching infinity, and then according to the pulse-systems theory with a finite output sampling frequency. Various special cases are considered and the results are compared with those pertaining to other transmission systems in earlier studies. Figures 3; references 10: all Russian.

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USSR

UDC: 621.376.56

KONSTANTINOV, S. N.

CORRECTORS IN THE REGENERATORS OF DIGITAL TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 12-14 manuscript received 10 Feb 75

[Russian abstract provided by the source]

[Text] The article examines one of the techniques for designing devices for correction and frequency-dependent AGC in the regenerators of digital cable communication systems. The procedure is based on using a rational transfer function to approximate the attenuation characteristic of the regeneration section. The author demonstrates the feasibility of designing devices for correction and frequency-dependent AGC on the basis of RC-elements. An example is given showing circuit design of devices for correction and frequency-dependent AGC. Figures 3; references 3 Russian.

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USSR

UDC: 621.394:621.317

DVORSKIY, E. E., TARNOPOL'SKIY, I. L., PARKHOMOV, YU. P., KOSINSKIY, L. N., PARIKOZHKA, I. A., BALANOVSKIY, L. I. and KUTASEVICH, V. P.

'TAKT' EQUIPMENT FOR AUTOMATIC MONITORING OF THE SUBSCRIBER SECTIONS OF SWITCHABLE TELEGRAPH NETWORKS

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 15-22 manuscript received 22 Jul 75

[Abstract] The article describes the "Takt" automatic monitoring equipment for switchable telegraph networks developed by the Kiev Division of the Central Scientific Research Institute of Communications in cooperation with the Odessa Affiliate of the Central Design Office. The equipment is compatible with Soviet crossbar switching stations of the AT-PS-PD, PAS-K, ATA-K type, and also with Yugoslav stations of the "Nikola-Tesla" type, as well as with ten-step systems of the ATA-57, APS-Sh and APS-ShR type. The "Takt" system can be connected to subscriber sections equipped with OUPD-200 terminal data transmission sets. The equipment monitors the subscriber section in conformity with preset criteria, produces a teletype record of nonconformities, blocks off inoperative subscriber sections from engagement with any working connections (with visual signal), and transmits information to the subscriber

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USSR

DVORSKIY, E. E., TARNOPOL'SKIY, I. L. et al., ELEKTROSVYAZ', No 9, Sep 76
pp 15-22

set being checked on the nature of the fault, while simultaneously sending data to the mapping equipment on the number of the faulty subscriber section and the nature of the fault. Detailed descriptions are given of the working principles of the different components of the "Takt" system. Figures 3; references 2 Russian.

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USSR

UDC 621.394:621.317

TARNOPOL'SKIY, I. L., DVORSKIY, E. E., YASKE, V. M., ROYTMAN, YE. I. and SHEVCHENKO, S. M.

EXPERIMENTAL RUN OF THE 'TAKT' EQUIPMENT

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 23-24 manuscript received
1 Apr 76

[Abstract] The article gives the results of experimental tests of the "Takt" system for monitoring subscriber sections of switchable telegraph networks. The tests were done on telegraph equipment in Zhitomir (laboratory model) and also in Volgograd and Minsk (pilot models). The results are summarized in tables. It was found that the working quality of the telegraph network is considerably improved by installation of the "Takt" system even for a period as short as one year. Tables 2.

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USSR

UDC 621.395.5

YARTSEV, G. YE., chief of the Department of Routing and Channels, Main Administration of Intercity Telephone Exchange Offices, Ministry of Communications of the USSR

IMPROVING THE QUALITY AND EFFICIENCY OF THE MAINLINE PRIMARY NETWORK

Moscow VESTNIK SVYAZI in Russian No 9, Sep 76 pp 24-26

[Abstract] The author reviews the steps implemented by the Main Administration of Intercity Telephone Exchange Offices of the Ministry of Communications of the USSR to improve the working quality of the primary network: using compensation methods to reduce interference between balanced cable lines; developing an instrument to locate waveguide inhomogeneities; replacing outdated vacuum-tube repeaters with transistorized equipment, etc. New terminal equipment is now in production to replace the old SUGO generator equipment and the USPP and USVP conversion equipment on existing lines as well as for installation on planned lines. In addition, an entirely new series of SIP-300 equipment is being produced to replace the SIP-60 and SIO-24 equipment in the largest offices of the network. Agreements have been made with East Germany to provide transistorized coaxial cable equipment up to 1980. Measurement instrumentation will be improved in the near future, again with the aid of

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USSR

YARTSEV, G. YE., VESTNIK SVYAZI, No 9, Sep 76 pp 24-26

East German supplies. The author discusses the following main areas of necessary work to improve quality and efficiency in enterprises and subdivisions of the primary mainline network: raising the level of technical proficiency and improving quality by introducing new working rules and new standards for routing and channels; monitoring and analysis of the quality of operation of the network; improving the supervision of routing work; raising the efficiency of the primary network.

2/2

POLAND

UDC 621.395.7

DOBISZEWSKI, ANDRZEJ, Telecommunication Equipment Assembly Enterprise
TELKOM-TELMONT, Warsaw

MAINTENANCE EQUIPMENT FOR PENTACONTA 1000 C URBAN TELEPHONE EXCHANGES

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 49 No 10, 1976 pp 294-297

[Abstract] The article enumerates equipment used for the maintenance of urban telephone exchanges and describes in great detail the operation of its principal items grouped under the following headings: connecting circuits tester for internal and outgoing circuits; sequence and memory subassembly; answering equipment; connecting robot; access and sender circuits tester; connection routing equipment; fault observation circuits; fault recorder; traffic recorder with direct readout; traffic counters; automatic control unit.

1/1

POLAND

UDC 621.395.8

WALASZEK, SLAWOJ, Institute of Communications, Gdansk Branch

NEW METHODS TO IMPROVE THE QUALITY OF OPERATION OF STROWGER EXCHANGES

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 49 No 7, 1976 pp 212-125

[Abstract] In spite of the purchase of licenses for modern PENTACONTA and CITEDIS (E10) exchanges, the Strowger exchanges now in operation throughout Poland will continue in use for many more years. This makes it imperative to use rapid means of reducing the time needed for finding faults by quick testing methods. One such method is suggested and its principle of operation is explained and illustrated by a block diagram. Methods employed in Great Britain and Australia in their Strowger systems, which in considerable economies are described. The characteristics of a quick-acting APA-ATS 54 Soviet tester are also presented. Figures 2; references 7: 1 Polish, 6 Western.

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USSR

UDC 621.395.44

AGATAYEV, A. A., engineer

SOME PECULIARITIES OF THE KNK-12 EQUIPMENT

Moscow VESTNIK SVYAZI in Russian No 9, Sep 76 pp 27-28

[Abstract] The Czechoslovak KNK-12 system is widely used in rural dial offices in the Soviet Union. For the technical specifications of the KNK-12 system the reader is directed to "Vestnik Svyazi" No 2, 1973. This article examines some of the specific features of the separate components of the KNK-12 system that make the equipment reliable in operation and simple to use. The equipment is used for multiplexing quadded cables to provide 12 channels per pair. The working attenuation is reduced by using transistorized active converters. A thermoelectronic discrete-action AGC system compensates for changes in line attenuation with fluctuations in soil temperature. The AGC system has separate control frequencies for each transmission direction. Each repeater also has its own AGC system. The equipment also provides a low-frequency channel for carrying local wire broadcasts.

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USSR

UDC 621.395.374

APEL', L. I.

THE DNEPROPETROVSK INTERURBAN TELEPHONE SYSTEM TODAY. EXPERIENCE AND PROBLEMS OF SYSTEM OPTIMIZATION

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 20-25 manuscript received 6 Feb 75

[Abstract] The chief engineer of the Dnepropetrovsk Interurban Telephone System discusses the progress made since 1971 in automating its operation, this system being one of the largest in the Ukraine. On the basis of statistical evidence, criteria are established for the inclusion of new routes. The major areas of accomplishment are dual-frequency semiautomation and automation, contactless transmission, and ten-step through dialing. The main problem in these areas is the engineering development and manufacture of sufficient components and test equipment. Experience indicates, furthermore, a need for factory adjustment of certain product lines to be installed in automatic and semiautomatic exchanges. It is also necessary to evaluate the actual traffic level along trunks and to establish official norms for it. Figures 3; tables 1.

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GOL'DIN, Ya.M.

A STATISTICAL METHOD OF EVALUATING THE PERFORMANCE OF MEDIUM-SIZE URBAN TELEPHONE NETWORKS

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76, pp 12-19 manuscript received
6 Apr 76

[Abstract] The chief engineer of the Vilnyus (Lithuanian SSR) City Telephone System describes a statistical method of objectively evaluating the overall performance of an urban telephone network, on the basis of normative quality indicators characterizing the performance of various station and line components. They include the total number of service failures per 100 receivers installed and the mean time of a service failure. The cost of service is assumed proportional to the quality of performance so that, naturally, an upper limit is imposed on the quality of operation and maintenance. The statistical data needed for this performance evaluation and subsequent system optimization cover, in the Vilnyus case, the 1970-1975 period in two stages (1970-1972 and 1973-1975). The statistics indicate that the number of service failures in a station is determined essentially by the equipment of the subscribers' exchange office, the number of dialing stages, the load level, and the length of service. On this basis, then, are established the empirical norms for performance parameters and the allowable limits. With the appropriate statistics available, this method may be used for evaluating other similar telephone networks. Figures 7; tables 1; references 5: 4 Russian, 1 Western.

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HUNGARY

UDC: 621.396.43:621.396.7.029(439)

CSIMINSZKY, GYOZO, Radio and Television Engineering Directorate, Postal Service,
and FUTO, PETER, Computer Technology and Coordination Institute

ENGINEERING AND MATHEMATICAL CONSIDERATIONS IN THE PLANNING OF THE OPTIMUM
EXPANSION OF THE HUNGARIAN MICROWAVE NETWORK

Budapest HIRADASTECHNIKA in Hungarian Vol 27 No 10, Oct 76 pp 299-302 manu-
script received 3 May 76

[Abstract] Optimization of the planned expansion of the Hungarian microwave network is carried out on the basis of a specific method of computation so that the probability of conflicts between the information transmission needs is minimized. The task of the microwave network is to transmit the television and ultrahigh-frequency messages to all parts of the country, and to assist in the maintenance of a nationwide telephone communication system. The current and planned network is illustrated with maps, and matrixes are developed for the mathematical and engineering calculations required for optimization. The approach involving the construction of transmission lines paralleling the

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HUNGARY

CSIMINSZKY et al, HIRADASTECHNIKA Vol 27 No 10, Oct 76 pp 299-302

present lines has been rejected in favor of the approach involving the construction of new transmission paths. According to the favored approach, the number of routes through which a signal can pass from one location to another should be maximized. This means that alternate routes are also considered. Elimination or minimization of the conflicts means that the probability of all possible routes from one location to another must not become occupied by the fact that they are randomly occupied by information already flowing through them. The method described for calculation can be carried out relatively easily with the aid of a computer. Figures 7; references 5: 2 German, 2 Hungarian, and 1 Western.

2/2

USSR

UDC 621.396:654.165

GLIK, Yu.I.

MEASURING THE PARAMETERS OF RADIOTELEPHONE MESSAGES IN THE "ALTAY" SYSTEM FOR COMMUNICATION WITH MOBILE UNITS

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 58-62 manuscript received 22 Oct 75

[Abstract] The "Altay" automatic ultrashort-wave system of communication with mobile units has now been in use in the USSR for over 10 years. Eight equally accessible and simultaneously operating channels form a single trunk, which is automatically scanned for a free channel. The capacity of such a trunk is equivalent to 24 channels, owing to the possibility of channel sharing. A single central office eliminates crosstalk between different sets of subscribers (services, departments). The growing demand for this system throughout the country calls for a system and performance optimization, for which field measurements are necessary. The radiotelephone message by this system was measured in Moscow with three model N-320/3-1 and three model N-320/3-2 recording ammeters, each with a damping resistor and a smoothing capacitor, and with counters for determining the number of calls from a subscriber as well as the number of calls lost because of a channel being busy. Sufficient information was thus obtained about the following message parameters: length of peak-load period, concentration factor, mean busy time, mean number of calls from one subscriber, $1/2$

USSR

GLIK, Yu.I., ELEKTROSVYAZ' No 8, Aug 76 pp 58-62

specific loading by one subscriber, waiting time, system utilization factor, communication utilization factor, and diversity factor. The numerical data will vary from city to city, or wherever the "Altay" system is used. Regularly scheduled measurements are necessary not only for design purposes but also for detecting changes in the system which can and must be corrected. Figures 4; Tables 1; references 4: all Russian.

USSR

UDC: 621.396.677

YAKUNIN, B. S.

IMPROVING THE QUALITY INDICES OF RADIO LINKS ON BLOCKED ROUTES

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 5-8 manuscript received
16 Feb 75

[Abstract] The paper describes a method of reducing losses between repeaters in a line-of-sight radio link. The technique is based on a specific section of the Kiev-Dnepropetrovsk relay line. It is shown that installation of a passive reflector on the high point of the block in this case is preferable to raising the active transmitting antenna at the end of the line closest to the block. The distance to the passive reflector is short enough so that the necessary signal level can be maintained with a reflecting antenna of comparatively small dimensions without any adverse effect on the quality indices of the repeater link. It is emphasized that the optimum method of improving quality indices of radio relay lines on blocked transmission paths has to be chosen with regard to the specific conditions of the terrain in each case. Figures 4; tables 1; references 2 Russian.

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USSR

UDC 621.397

BASOV, A.N., ODNOL'KO, V.V., and UZILEVSKIY, V.A.

TECHNIQUES OF PROCESSING THE PRINTED WORD

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 35-39 manuscript received
16 Apr 75

[Abstract] For improving and increasing the edition of books as well as journals and newspapers, as stipulated in the tenth Five-Year-Plan, consideration has been given to the techniques of offset printing and photo-typesetting as well as automatic continuous production lines and properly scheduled delivery. Concerning the communication aspect of the problem, a new apparatus complex was developed in the Scientific-Research Laboratory at the M.A. Bonch-Bruyevich Electrical Engineering Institute of Communications in Leningrad. This complex includes a teletypesetter with computer-aided encoding and decoding, phototelevision sets, and image optimizers. Many practical problems have already been solved at this stage. The adoption of television techniques by the printing industry will offer not only new solutions to the programming of duplication processes but also means of their automation. Figures 6; references 5: all Russian.

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EAST GERMANY

BERNSTEIN, K., Engineering College, Mittweida

USE OF MAGNETIC TAPE RECORDERS FOR IMPROVING DATA TRANSMISSION WITH THE DFE 550
DATA TRANSMISSION SYSTEM

East Berlin AUTOMATISIERUNGSPRAXIS in German Vol 13 No 10, Oct 76 pp 224-226
[supplement to MESSEN STEUERN REGELN in German Vol 19 No 10, Oct 76]

[Abstract] An interface is described for the coupling of the MB 1250 magnetic tape recorder developed at the Zella-Mehlis plant of the Computer Engineering State Enterprise in Meiningen and the DFE 550 data transmission system generally used in the German Democratic Republic. The interface has a Type A channel for data storage on tape (Interface SIF 1000) and a Type E channel for data transmission. The data must be assembled into blocks of 32 lines for entry through typewriters. The interface has a small buffer memory in the input logic to permit continuous data entry. Figure 1; reference 1: German.

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USSR

NIKOL'SKIY, K.K., candidate of technical sciences, TsNIIS [Central Scientific-Research Institute of Communications]

MORE ATTENTION TO PROTECTION OF UNDERGROUND COMMUNICATION STRUCTURES FROM CORROSION

Moscow VESTNIK SVYAZI in Russian No 10, Oct 76, pp 18-19

[Abstract] Problems are considered concerning the organization of work with respect to protection from corrosion during the process of planning, construction and operation of underground metal line-cable communication structures, under conditions of the mass introduction of new types of cables and new multichannel transmission systems.

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USSR

TIMCHENKO, I.YE., deputy minister of communications, UkrSSR

COMPLEX SYSTEM OF COMMUNICATIONS QUALITY CONTROL: RESEARCH AND PROBLEMS

Moscow VESTNIK SVYAZI in Russian No 10, Oct 76, pp 30-33

[Abstract] The paper describes the work of the Ministry of Communications, UkrSSR, on the introduction of a complex system of communications quality control (CSCQC) at communication enterprises of the republic, and the reasons for doing so. A detailed block diagram is presented which shows how the CSCQC is implemented. The block diagram includes three basic communication controls: quality control at the preparation stage, quality control at the productive stage, and quality control of labor. The first control includes seven developed standards; the second and third, four standards each. During the process of operation the scheme will be improved. Figures 2.

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USSR

VOSS, M.A., PARFENOV, Yu.A., and TSALIOVICH, A.B.

RURAL COMMUNICATION CABLES

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 1-7 manuscript received 25 Sep 75

[Abstract] Although 60% of all rural communication lines are still overhead, cables are being installed at a faster rate now so as to meet the growing demand for telephone, telegraph, and teletype service, according to projections of the tenth Five-Year-Plan. Most rural customers are located within 5 km and only 5% within 10-15 km from a central exchange office. The basic types of rural communication cable are the high-frequency KSPP single-quadruplex (copper conductors 0.9 and 1.2 mm in diameter, polyethylene insulation, braided sheath, and aluminum-foil shielding) and the low-frequency PRPPM single-pair (copper conductors 0.8-1.2 mm in diameter). The main technical problems which affect the cable installation are performance, reliability, and economy. These problems are being solved by design modifications, reinforcement, hermetization, and design standardization. Plastic encapsulation and corrugated steel armor are strongly considered as possible solutions for the future, along with a replacement of copper by aluminum. Of special interest is also development work underway on a special-purpose cable for multiplexing with digital data transmission systems at operating frequencies up to 2 MHz. Figures 2; tables 2; references 4 Russian.

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USSR

UDC 621.389

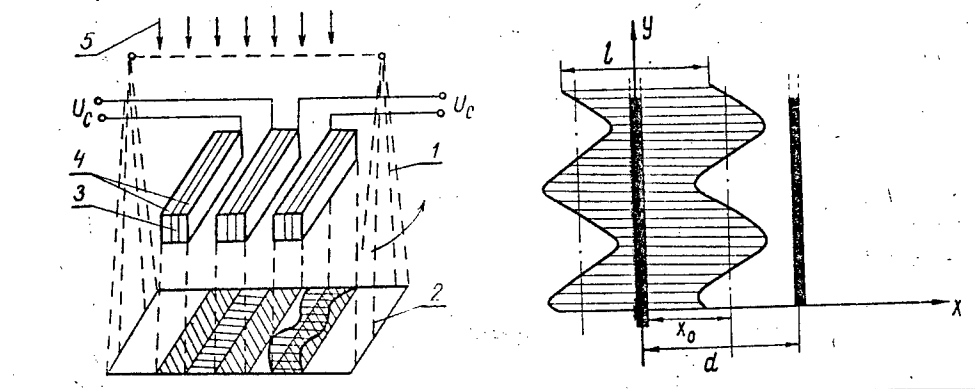
DMITRUK, V. A., and TARANENKO, V. P.

MULTICHANNEL ELECTRON-BEAM RECORDING OF INFORMATION ON DEFORMABLE MEDIA THAT MODULATE LIGHT

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19 No 9, Sep 76 pp 26-32 manuscript received 7 Jul 75; after revision, 4 Sep 75

[Abstract] Electron-beam recording on deformable media that modulate light can be divided into three processes: application of electric charges on the surface of the medium, development of the latent relief and optical readout. The authors analyze the process of charge application for different methods of modulating the recording electron beam and show that conventional methods of beam modulation result in a charge density on the surface of the carrier that is a nonlinear function of the modulating voltage. A displacement modulation method is suggested that gives a linear modulation characteristic. The principle of the displacement method can be understood from the figure. An electron beam 1 in the form of a ribbon is scanned over the carrier 2. The modulator is a set of metal signal plates 4 with insulating spacers 3. The signal voltage is applied to the plates which act as a shadow mask for the electron flux, forming lines on the medium. Optical readout is by a

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USSR

DMITRUK, V. A., and TARANENKO, V. P., IZVESTIYA VUZov, RADIOELEKTRONIKA,
Vol 19 No 9, Sep 76 pp 26-32

light beam with a shadow-mask modulator. Readout is in the direction 5 indicated by the arrows in the figure. The electron shadows must be in register with the light shadows over the entire field of the image. The displacement of the recording beam with application of the signal voltage is in the direction perpendicular to the line formed on the medium and is proportional to the instantaneous value of the applied voltage. Figures 5; references 13: 11 Russian, 2 Western.

2/2

USSR

529.781 (47 + 57:430.2)

PUSHKIN, S.B., FEDOROV, YU.A., KALAY, M. (GDR), and KANT, D. (GDR)

COMPARISON OF NATIONAL TIME AND FREQUENCY STANDARDS OF THE USSR AND GDR WITH THE AID OF TRANSPORTABLE CLOCKS AND TELEVISION SIGNALS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian, No 10, Oct 76, pp 54-56

[Abstract] In the bounds of the bilateral scientific-technical collaboration of the USSR and GDR, a comparison was made in December 1975 of the national time and frequency standards, with the aid of transportable quantum clocks and the signals of television broadcasting. During the experiment the time scales of UTC [Universal Time Coordinated] (ACMB), UTC (ZIPE [Institute of Earth Physics]) were compared with UTC (SU) by the use of television signals, the transit time was measured of television signals, as well as the transit time of television signals with respect to the channels of Intervideniya [Inter-View] on the Moscow-Berlin route, and an evaluation was made of the fluctuations of the transit time of television along long-distance television channels. The results of the comparison are presented and their metrological analysis is given. A block diagram of the overall measurement scheme is shown. Figures 2; tables 1; references 7: 5 Russian; 2 Western.

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POLAND

UDC 621.317.1

FIDELIS, EUGENIUSZ and KOSMOWSKA, ALINA, Central Research Institute of Normalization, Warsaw

METHODS OF REDUCING THE TIME IN RELIABILITY INVESTIGATIONS

Warsaw ELEKTRONIKA in Polish Vol 17 No 9, 1976 pp 324-328

[Abstract] Three methods are examined which can be used in reliability investigations to reduce the time necessary to obtain information about the objects investigated. The first method is based on an investigation of "strongly" correlated characteristics; the second--on positional statistics; and the third--on comparing probabilities of the failure of objects operating under conditions different from normal. These methods of rapid investigation are discussed in detail and are substantiated by mathematical formulas. References 7: 4 Polish, 2 Russian and 1 Western.

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USSR

UDC 621.317.335.2.083

VSEVOLOZHSKIY, L. A., and FILINOV, V. A.

METHODS OF MEASURING NONLINEAR CAPACITANCE

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 10, Oct 76 pp 72-74

[Abstract] The peculiarities are analyzed of various methods of determining the dependence of the static and dynamic capacitances of a nonlinear object on the applied voltage. Possible sources of error are discussed. A distinctive feature of an investigation of nonlinear capacitance is the large volume of information material which is obtained from a single object, which hinders the processing of results, particularly in the case of a large number of measurements. Apparently the most efficient solution of this problem would be the development of specialized analog-digital measuring complexes. Figures 5; references 12: 2 Russian, 10 Western.

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USSR

UDC 621.317.361.029.66:621.375.826

DANNIN, YU.S., TATARENKOV, V.M., and SHUMYATSKIY, P.S.

ABSOLUTE MEASUREMENT OF THE FREQUENCIES OF SUBMILLIMETER AND INFRARED BAND LASERS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian, No 10, Oct 76, pp 59-61

[Abstract] The method of absolute measurement of laser frequencies involves comparison of an unknown frequency ν_x with the harmonics of the known frequencies of lasers and microwave generators. For the purpose high-speed nonlinear elements are used (point-contact diodes--metal--semiconductor, metal--oxide--metal, point-contact superconducting Josephson junction, Schottky diode) with a speed of response on the order of $1/\nu_x$, which, for the submillimeter and infrared band, amounts to 10^{-12} and 10^{-14} second. The source of the multiplied frequency must be sufficiently powerful (~ 100 mW) because the efficiency of conversion of frequencies by nonlinear elements is small. The characteristics created for the multiplier circuit are presented for lasers of the submillimeter and infrared range, based on molecules HCN ($\lambda = 337$ micron), D₂O ($\lambda = 84$ micron), H₂O ($\lambda = 28$ micron) and CO₂ ($\lambda = 10.53$ micron) and measurements from 337 to 10 microns, inclusively of the frequencies of these lasers

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USSR

DANNIN, YU.S., et al IZMERITEL'NAYA TEKHNIKA, No 10, Oct 76, pp 59-61

with the aid of the amplifier-mixer diodes tungsten--silicon (W--Si) and tungsten--nickel (W-Ni) are described. The error of measurements of $5 \cdot 10^{-7}$ was determined by the indeterminacies of fixation of the peaks of the laser generation lines. An increase of precision of the measurements will be attained in the case of mutual joining of laser frequencies with one another. Figures 4; references 20: 5 Russian; 15 Western.

2/2

USSR

UDC 621.317.725.038.089.62

FEDEROV, A.M., KRESTOVSKIY, V.V., KISELEV, V.S., RAZUMOVSKIY, S.A., and SHCHEGLOV, V.A.

DEVICE FOR CHECKING ELECTRONIC VOLTMETERS OVER A WIDE FREQUENCY RANGE

Moscow IZMERITEL'NAYA TEKHNIKA in Russian, No 10, Oct 76, p 88

[Abstract] The paper describes the UPV-1000-5 device for checking electron voltmeters with a voltage level of 1 mV--100 V in the 1 kHz--1000 MHz frequency band. The device was developed at the All-Union Scientific-Research Institute of Metrology imeni D.I. Mendeleyev. The UPV-1000-5 passed the state acceptance tests and is series produced by the Leningrad Plant "Tsentreropribor." To order, it is necessary to indicate "Device UPV-1000-5. 10035 TU." Figures 2; references 8 Russian.

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USSR

UDC 629.781:629.783:525

PALIY, G.N., IVANOVA, YU.D., MALOV, A.G., and OKSENTYUK, A.R.

USE OF EARTH SATELLITES FOR TRANSMISSION OF EXACT TIME SIGNALS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian, No 10, Oct 76, pp 62-64

[Abstract] The paper briefly reviews satellite systems which are used in the USSR and abroad for synchronization of time scales. The results are presented of experimental investigations of two-sided and single-sided transmission of time signals in the make up of a television signal through a "Molniya" type satellite and a network of "Orbita" receiving points. Block diagrams are shown of the systems involved. The authors thank S.N. Mordovin, V.S. Krasulin, V.M. Krylov and V.P. Lushin for assistance in creation of an experimental system of synchronization of satellite television signals. Figures 3; tables 1; references 15: 4 Russian; 11 Western.

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USSR

FIRSOVA, T.V., KAMYSHNIKOV, V.V., and BURYAKOVSKIY, D.N., coworkers of the Kubyshev Electrical Engineering Institute of Communications

ELECTRONIC TIMER FOR TELEGRAPH

Moscow VESTNIK SVYAZI in Russian No 10, Oct 76, pp 22-23

[Abstract] At present, during technical servicing of telegraph networks, a visual method is used to fix the time of beginning and end of testing (adjustment) of a communication channel, the moment of entering a message, etc. In order to determine the time and record it in a document, at least 20--30 sec are required. The paper describes an electronic timer, especially developed to help shorten this operation. The electronic clocks of the unit are a highly-stabilized time keeper. The hour and minute markings are brought out to a visual display and to printing. In addition to their basic purpose, the electronic clocks can be used as a generator of pulses for secondary clocks. Use of integrated circuits makes it possible to decrease the dimensions of the clocks, substantially to increase their reliability and to simplify their manufacture. Figures 1.

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USSR

STRIZHEVSKIY, B.N., SHAFER, D.V., and SHEKHTER, A.B.: Engineers of Odessa Branch of the Central Design Office, Ministry of Communications, USSR

MEASUREMENT OF DYNAMIC LEVELS OF BROADCAST TRANSMISSION AND MODULUS OF INPUT RESISTANCE OF FEEDER LINES IN MULTIPROGRAM WIRE BROADCASTING SYSTEM

Moscow VESTNIK SVYAZI in Russian No 10, Oct 76, pp 15-18

[Abstract] The paper describes a device developed at the Odessa Branch of the Central Design Office, Ministry of Communications, USSR, which makes it possible to measure the dynamic levels of the signals of several programs (simultaneously) and the modulus of input resistance of the feeder lines of wire broadcasting (without interruptions in the delivery of the broadcast). The device is intended for operation at the transformer substations of three-section radio relay networks of three-program broadcasting. The principle of operation of the device is based on the use of a cathode-ray tube as an indicator of the voltage of the electric signals. The concept built into the device can also find use during the creation of control and measuring devices for station equipment of a Central Wire Broadcasting Station. Introduction of such devices facilitates improvement of the quality of broadcasting and an increase of the efficiency of measurements fulfilled by service personnel. Figures 2.

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USSR

UDC 621.383

BULAN'KOV, N.I., ZHURAVOV, V.D., PLOTNIKOV, A.F., SELEZNEV, V.N., TOKARCHUK, D.N., and FERCHEV, G.P., Institute of Physics imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

OPTICALLY CONTROLLABLE MEMORY ELEMENT BASED ON AN MNOS-STRUCTURE WITH GaAs SUBSTRATE

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 9, Sep 76 pp 2078-2080
manuscript received 18 Mar 76

[Abstract] MNOS-structures are suitable for memory elements with optical counting, based on the Frantz-Keldysh effect, and thus without the drawbacks of photoelectric counting. In view of this, MNOS-structures with GaAs substrates and dielectric layers (silicon dioxide and silicon nitride) were produced by plasmachemical deposition for a study of their switching characteristics. Their dielectric strength was $(1-2)10^6$ V/cm under a constant voltage and $(5-6)10^6$ V/cm under voltage pulses 10^{-3} s long. The change in the potential of plane zones was found to be proportional to the change in the charge of traps and inversely proportional to the capacitance of the dielectric (Si_3N_4) layer. That potential may change by 2-4 V during switching by positive voltage pulses of a few microseconds. Switching by negative voltage pulses shorter than 10 μs is possible only under illumination, namely with a wavelength corresponding to the intrinsic absorption band of the semiconductor, so that the relaxation time of the excess space charge becomes shorter.

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USSR

BULAN'KOV, N.I., ZHURAVOV, V.D., PLOTNIKOV, A.P., SELEZNEV, V.N., TOKARCHUK, D.N., and FERCHEV, G.P., KVANTOVAYA ELEKTRONIKA Vol 3, No 9, Sep 76, pp 2078-2080

As a result of a narrower depletion layer, the voltage drop across the dielectric increases and, after it has exceeded the threshold, the charge of traps in the dielectric also changes. The experiment in this study was performed with a He-Ne laser as the light source giving a luminous flux density of 20 MW/mm^2 and with switching pulses of 50 V amplitude. The charge may remain trapped for a long period, with the potential of plane zones shifting by less than 15% within 0.5 h and by 20-25% within 15-20 h after the structure has been switched. Figures 3; references 4: all Russian.

Microelectronics and General Circuit
Theory and Information

USSR

UDC 621.372.01

FILIPSKIY, YU. K.

DYNAMIC PROPERTIES OF SELECTIVE CIRCUITS IN THE CASE OF FREQUENCY JUMPS

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 70-74 manuscript received 16 May 75; after revision, 22 Sep 75

[Russian abstract provided by the source]

[Text] An investigation is made of selective circuits when there are symmetric jumps in the input signal frequency both inside and outside of the passband. The analysis is based on the method of the dynamic transfer constant. The author finds the law of the change in the envelope and frequency of the response for an isolated tank circuit and for a system of coupled resonant circuits. It is shown that frequency is a less inert parameter than amplitude, which results in isolated frequency spikes, especially in the first instants after a jump. Figures 5; references 4 Russian.

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USSR

UDC 621.382.882

ARUSTAMYAN, V. YE.

TRANSISTOR-TRANSISTOR LOGIC CIRCUITS BASED ON MULTICOLLECTOR TRANSISTORS FOR
LARGE-SCALE INTEGRATED CIRCUITS

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 66-69 manuscript received 14 May 75

[Russian abstract provided by the source]

[Text] The author considers the feasibility of basing TTL circuits on multi-collector transistors. A system of basic TTL elements is proposed and fundamental relations and experimental results are given that show the advantages of these circuits with respect to number of components, power consumption and the feasibility of using them in LSI circuits. Figures 2; tables 1; references 2 Russian.

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POLAND

UDC 621.389

CHROBAK, PRZEMYSŁAW, and FORTUNA, ELZBIETA, Industrial Institute of Electronics

THE BONDING OF SEMICONDUCTOR ELEMENTS TO SUBSTRATES IN THICK-FILM HYBRID MICROCIRCUITS

Warsaw ELEKTRONIKA in Polish Vol 17 No 7-8, 1976 pp 265-269

[Abstract] The authors review and discuss various methods of assembling semiconductor structures by bonding their elements, diodes, transistors and monolithic circuits, to the conductor tracks of thick-film hybrid microcircuits. The techniques described are based on local low-energy heating of the place of junction and gluing. Figures 7; tables 2; references 6 Western.

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USSR

UDC 621.383.45

KAZYULIN, V. I.

AN OPTRON BASED ON A LONGITUDINAL MICROPOWER PHOTOTHYRISTOR AND A GALILIUM ARSENIDE LIGHT-EMITTING DIODE

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 86-87 manuscript received 10 Jul 75; after revision, 7 Jan 76

[Abstract] The paper describes an IC optron based on longitudinal photothyristors and GaAs LEDs and housed in a standard TO-5 transistor can. The maximum working voltage of the optron (switching voltage of the dark thyristor) was 30-40 V. The maximum working current (limiting permissible current through the emitter junction of the thyristor) was 5 mA, and the residual voltage across the thyristor was 1.1 V for a working current of 1 mA. When the voltage across the photothyristor is 80% of the working voltage (32 V), the differential photosensitivity of the optron is 15.5 V/mW. The operating temperature range is from -60 to +120°C (maximum working voltage decreases with increasing temperature). As the actuating current decreases, the drop in switching voltage with increasing temperature becomes sharper. Maximum working frequency is 300 kHz. Figures 3; references 4 Russian.

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USSR

UDC 621.383.45:546.289.59

BASKAKOV, A. N., KOZAR', A. V. and PIROGOV, YU. A.

NOISE CHARACTERISTICS OF OPTICAL RECEIVERS WITH MICROWAVE BIASING

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19 No 9, Sep 76 pp 62-65
manuscript received 9 Apr 75

[Russian abstract provided by the source]

[Text] The authors find the threshold sensitivity of a photoresistor receiver with microwave biasing, taking account of oscillatory-recombination, thermal and background noises. It is shown that the limiting sensitivity of a video receiver with microwave biasing cannot reach the quantum limit and is determined by oscillatory-recombination noises. Figures 1; references 5: 4 Russian, 1 Western.

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USSR

UDC 621.391.1

PAVLOVA, G. Ya. and PIVOVAROV, Yu. L.

EVALUATION OF SIGNALS WITH A KNOWN WAVEFORM AGAINST A NONSTATIONARY BACKGROUND NOISE IN PHOTOELECTRON MULTIPLIERS

Moscow RADIOTEKHNIKA in Russian Vol 31 No 9, Sep 76 pp 26-29 manuscript received after revision, 3 Feb 76

[Abstract] Photoemission detection in the optical range is characterized by the predominance of shot noise due to dark-current emission with photon fluctuations in the phonon radiation and shot noise due to fluctuations of the optical signal, both noises having a normal distribution. Here the problem is considered of evaluating the parameters of a photomultiplier signal of a known waveform when nonstationary noise also appears in the background. In order to develop an algorithm for this evaluation, it is necessary to find the likelihood function of the observed random process. According to the maximum-value principle, this leads to a solution of the equation for the likelihood ratio. This equation may be expressed in terms of the sum of the mathematical expectation and a normally distributed random function, the latter having a mathematical expectation equal to zero and a dispersion equal to that of the process. It is solved by a Taylor expansion around the $1/2$

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PAVLOVA, G. Ya. and PIVOVAROV, Yu. L., RADIOTEKHNIKA No 9, Sep 76 pp 26-29

true value of the sought parameter. The accuracy of this method is tested here on the basis of a comparison between the time delays of a signal appearing in a synthesized receiver and in a correlational receiver respectively, when a nonstationary noise is superposed on the deterministic signal with a Gaussian noise. The rms error of a synthesized receiver is found 2-3 dB lower than that of a correlational receiver, when the signal-to-noise ratio is low with nonstationary noise predominant. As the signal-to-noise ratio increases, the difference in accuracy between both receivers diminishes. Figures 1; references 3 Russian.

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USSR

UDC 621.396.96

ABRAMOVICH, YU. I., KOSHEVOY, V. M. and LAVRINENKO, V. P.

DETECTION OF A SPATIALLY EXTENDED TARGET

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 96-98 manuscript received 18 Nov 74

[Abstract] The authors consider the problem of optimizing a linear filter in detection of a signal reflected from a target against a background of normal interference in the case of a high-resolution radar where a point model of the target is inadequate for describing the reflected signal. It is shown that the problem of synthesizing a discrete filter for detection of a spatially distributed target involves maximization of the ratio of the signal to the sum of the reflection interference plus noise, and an expression is given for this ratio. Numerical results are given showing that ignoring the nature of the correlatedness of the target in optimization may lead to appreciable losses in the signal-to-interference ratio. References 7: 4 Russian, 3 Western.

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USSR

UDC 621.396.621

AKIMOV, V.N., BURDZEYKO, B.P., and SHAKHGIL'DYAN, V.V.

STATISTICAL ANALYSIS OF AN AUTOCOMPENSATOR WITH A TWO-CHANNEL RECEIVER

Moscow RADIOTEKHNIKA in Russian Vol 31, No 9, Sep 76 pp 61-66 manuscript
received 14 Feb 75

[Abstract] A single-ring autocompensator is a simple device for improving the interference immunity of communication and radar systems. It consists of two heterodynes, two intermediate-frequency wide-band filters, two linear mixers, and a filter tuned to the frequency separation between both heterodynes. The autocompensator ring operates on the basis of the correlation coupling between signals in the main channel and signals in the other channel, the latter being usually equipped with a nondirectional antenna. The fundamental equation is analyzed for the condition where the time constant of the tuned filter is much longer than the correlation intervals of both processes. This equation is replaced by a stochastic equation based on an equivalent (with respect to the first moments) Gaussian process and diffusive Markov process respectively. This equation is solved for the case of a zero time delay, and the interference suppression factor is calculated. With no fast-response requirement, the latter depends on the power of receiver noises within the equivalent band of the compensator ring. With a fast-response requirement, on the other hand, it depends on the interference-to-noise ratio and the effective compensator gain. Figures 6; references 5: 4 Russian, 1 Western.

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USSR

UDC 621.396.964.34

DENISOV, V. P. and LIGOTSKIY, A. V.

POTENTIAL ACCURACY OF A MULTIBASE PHASE DIRECTION FINDER THAT OPERATES ON
FLUCTUATING SIGNALS

Kiev IZVESTIYA VUZov, RADIOELEKTRONIKA in Russian Vol 19, No 9, Sep 76
pp 11-17 manuscript received 19 Jun 75; after completion, 21 Jan 76

[Russian abstract provided by the source]

[Text] The article examines the potential accuracy of a multibase phase direction finder operating on spatially fluctuating signals in the presence of internal noises. It is shown that a multibase phase direction finder that maximizes the plausible estimate of a bearing with respect to measured phase differences almost fully realizes the potential capabilities of its antenna system. Computational formulas are derived. Figures 4; references 11 Russian.

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POLAND

UDC 621.382

MANIEWSKI, Roman, Institute of Organization and Management, [Polish Academy of Sciences] and Ministry of Science, Higher Education and Technology, Institute of Electronic Technology at CEMI

INFLUENCE OF CADMIUM CONTENT ON THE STABILITY OF HALL GENERATORS MADE BY DEPOSITION OF CdHgTe

Warsaw ELEKTRONIKA in Polish Vol 17 No 7-8, 1976 pp 258-260

[Abstract] The results are discussed of statistical tests of the time- and temperature-related stability of Hall generators manufactured by the deposition of CdHgTe at the Institute of Electronic Technology in Warsaw. Analysis is made of the influence of the cadmium content in the starting material on the properties of these generators. The author concludes that the content of cadmium in the CdHgTe solid solution depends on the use of Hall generators to which they will be put. For their use in the "input-output" systems the high content of cadmium is indicated, whereas if their destination is to be metrological, the cadmium content should be considerably limited, the best

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POLAND

MANIEWSKI, Roman, ELEKTRONIKA No 7-8, pp 258-260

seems to be $x = 0.1$. The temperature characteristics and stability of the devices tested still leave much to be desired, and further work on the improvement of their technology is necessary. Figures 7; references 2 Polish [Author's Doctorate Dissertation and Intradepartmental Report].

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POLAND

UDC 621.389

SZYMCZAK, Andrzej, Institute of Electronic Technology, Warsaw Polytechnic

BASIC PARAMETERS OF MICROWAVE DETECTORS WITH SCHOTTKY DIODES

Warsaw ELEKTRONIKA in Polish Vol 17 No 9, 1976 pp 314-320

[Abstract] The basic parameters of microwave detectors with Schottky diodes were determined and the interdependence between these parameters is given. Some metering circuits for measuring parameters of microwave detectors are presented and their possibilities are discussed. Figures 12; references 15: 3 Polish, 1 Russian, 11 Western.

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HUNGARY

NENYEI, ZSOLT, dr, graduate chemical engineer, department head, United Incandescent Lamp and Electric Company, Semiconductor Development Branch

ENCAPSULATION OF SEMICONDUCTOR DEVICES. PART 1

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 15 No 10, Oct 76 pp 289-298

[Abstract] The theoretical, design, construction, manufacturing, testing and application aspects of the encapsulation of semiconductor devices are reviewed. In this first part of the series, the following subjects are discussed, mainly on the basis of references to the literature: Fundamental aspects of capsule formation (surface stability and microclimate, design aspects of heat generation, effect of the capsule on high-frequency operation); encapsulating operations (metal-glass bonding, metal-ceramics bonding, hard and soft soldering, resistance welding, cold welding, plastic encapsulation, surface treatment, and galvanization). Figures 8; tables 4; references 15: 3 German, 4 Hungarian, 1 Japanese, and 7 Western.

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USSR

UDC 621.314.572:621.316.7:621.376.54

USYSHKIN, YE.I., candidate of technical sciences: Moscow

CONSTRUCTION OF AN ALGORITHM FOR "ASYNCHRONOUS" MODULATION OF
UNDISTORTED SQUARE WAVES.

Moscow ELEKTRICHESTVO in Russian, No 10, Oct 76, pp 59-63 manu-
script received 27 Apr 76

[Abstract] In the case of known methods of pulse width modulation (PWM), control of the operating frequency is accompanied by distortions which for "synchronous" PWM appear in the lower part of the operating frequency band and for "asynchronous" in the upper. In the paper the possibility is shown of a radical improvement of a synchronous PWM on the basis of obtaining more complete information concerned the initial modulating signal and use of the additional possibility of modulation of the phase of square waves. It is shown that in practice a new algorithm of PWM assures adequacy of the present spectra of initial and pulse signals in a specified frequency band. During this, the minimum carrier frequency is in principle only 3 times, and according to the engineering method 4 times, larger than the maximum operating frequency of the initial signal. With known
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USYSHKIN, YE.I. ELEKTRICHESTVO, No 10, Oct 76, pp 59-63

methods of PWM, the carrier frequency must exceed the maximum operating frequency by more than 10--12 times. As long as the spectra of pulse and initial signals are adequate, then with the given pulse method of amplification, frequency phase and nonlinear distortions are absent. Consequently, the unit of pulse conversion, functioning according to the given method, may be considered to be linear, which is its essential difference from known methods of PWM. A distinguishing feature of the proposed method of modulating square waves is the fact that construction of a pulse combination in each step of modulation is accomplished on the basis of a current analysis of the spectrum of the "cutout" of the initial signal in a given step. Moreover, in accordance with the proposed method, the possibilities of modulation are completely realized -- they are essentially combined with respect to width and phase features. Realization of the new method does not present difficulties in the case of the contemporary level of development of the microcircuit technics of function generators because it requires only accomplishment of simple operations: integration, multiplication, division and addition, as well as elementary logical operations. Realization of the given method of modulation on the basis of microprocesses is promising. Figures 4; references 4:
3 Russian; 1 Western.

POLAND

UDC 621.396.61

WIELAND, JERZY and WLOCH, ANDRZEJ, Higher Naval School and Institute of Automation and Radio Communication, Gdynia

SAWTOOTH-CURRENT HIGH-VOLTAGE THYRISTOR GENERATOR

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish Vol 49 No 10, 1976 pp 290-293

[Abstract] The authors describe the operation of the SCR saw-tooth-current high-voltage thyristor generator which is powered during reverse cycle, and analyze it mathematically. A numerical example is given, calculated with aid of a Hewlett-Packard 9610A minicomputer. In conclusion, advantages and disadvantages of such generators are discussed in some detail. Figures 5; references 11: 4 Polish, 7 Western.

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USSR

UDC 621.385.64

BETSKIY, O.V., and KAZAMANOV, V.A.

ON THE DECREASE OF THE SECOND HARMONIC POWER IN A M-TYPE OSCILLATOR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2245-2246 manuscript received 3 Oct 75

[Abstract] The results are presented of an experimental investigation of the effect of anode voltage in a M-type pulsed oscillator at the level of power of the fundamental frequency and the second harmonic. Based on the investigation, the possibility is discussed of decreasing the power of the second harmonic without a significant reduction of the output power at the fundamental frequency, and the efficiency without worsening the quality of the oscillation spectrum. Graphs are shown of the experimental dependences of the powers at the fundamental frequency and the second harmonic, on changes of the anode voltage for two values of a steady magnetic field. Figures 2; references 4 Russian.

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EAST GERMANY

MORITZ, Joachim, graduate physicist, Department of High-Pressure and Very-High Pressure Lamp Development, NARVA State Enterprise, Incandescent Lamp Factory in Berlin

DETERMINATION OF THE VOLTAGE GRADIENTS IN VERY-HIGH PRESSURE XENON DISCHARGES

East Berlin ELEKTRIE in German Vol 30 No 8, 76 pp 427-430

[Abstract] Studies were carried out to measure the voltage gradient in Type XBO 101 very-high pressure xenon lamps under various pressures (up to 80 kp per sq cm) and currents (between 5 and 25 amperes). Since the tests were made on actual lamps and thus under real-life conditions (namely in a short-arc lamp), the results have immediate practical usefulness. The purpose of the test was to ascertain the true voltage gradients which are contradictorily reported in the literature. In the test lamps, the electrode distances ranged from 1.45 to 4.5 mm, and the arc lengths were the same in all. The calculated gradients and the measured gradients for the experimental conditions employed are presented in diagrams and tables, and the data are compared to published

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EAST GERMANY

MORITZ, ELEKTRIE Vol 30 No 8, 76 pp 427-430

information. There was good agreement between calculated and measured data. This confirms the validity of the method of calculation described. Thus, it was established that gradients may be calculated reasonably accurately for lamps with given parameters. There were differences between published data and measured data, some significant differences as high as 20 percent. Figures 3; tables 4; references 13: 6 Russian, 7 German.

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USSR

UDC 525;523.164

SCHANDA, E., SCHAEERER, H., and HOFER, R., Bern University, Switzerland

DISPERSION AND RADIATION CHARACTERISTICS OF A NATURAL MEDIUM IN THE 3-MM BAND

Moscow RADIOTEKHNIKA in Russian Vol 31, No 9, Sep 76 pp 3-9

[Abstract] The object of this study was to establish the feasibility of 1) attaining a resolution of a few angular minutes in thermoradiograms with an antenna of reasonable dimensions, and 2) analyzing the radiation characteristics of some natural media within the still insufficiently well explored 3-mm band, for the purpose of interpreting such thermoradiograms. The instruments for this study included a radiometer operating at 92 GHz, with a bandwidth of 1.0 GHz and a sensitivity of 3°C antenna temperature per 1.0 Hz filter band. A Cassegrain antenna 1.5 m in diameter ensured a resolution of 8-10 angular minutes. Thermoradiograms from various observation angles and with various polarization modes have been obtained for such media as films of crude oil under water, smooth wood at 25°C, fine-grain sand at 15°C, humus soil, a lawn, and an asphalt road. On the basis of such measurements, natural surfaces are classified into homogeneous ones with a plane interface, nonhomogeneous ones with a sublayer, and bounded rough ones. Lambert surfaces were not considered in this study. Figures 8; references 8: all Western (Swiss).

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POLAND

UDC 548.15:535.36

ADAMCZYK, ANTONI, dr., Institute of Physics, Warsaw Polytechnic

STATICAL LIQUID-CRYSTALLINE DIFFRACTION GRATINGS

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish Vol 22 No 9, Sep 76 pp 313-315
manuscript received 15 Sep 75

[Abstract] The author describes a newly discovered phenomenon of light diffraction in liquid-crystalline structures and its application in the creation of statical diffraction gratings. In contrast the hitherto used dynamic diffraction gratings occurring under the effect of an electrical field upon thin films of nematic liquid crystals, it became possible for the first time to create statical diffraction gratings in cholesterol liquid crystals. Line density in statical gratings is considerably greater than in dynamic ones, being on the order of several thousand per millimeter, whereas the intensity of light diffracted by gratings is very high. As the cholesterol phase, the use was made of mixtures of nematogenes and optically active substances, mesomorphic at room temperature. Figures 5; references 6: 2 Polish, 2 Russian and 2 Western.

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USSR

UDC 621.371.001.5

ISAYKIN, A.V., YARYGIN, A.P.

DIFFRACTION OF A PLANE WAVE AT A PLATE WITH VARIABLE SURFACE
IMPEDANCE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct
76, pp 2201-2203 manuscript received 2 Sep 75

[Abstract] Recently considerable attention has been given to diffraction at infinite surface impedances. However, in the interests of practice it is necessary to have the characteristics of a field scattered by finite structures. In the present communication the results are presented of theoretical and experimental investigations of the scattering of a plane wave by a rectangular plate with a linearly variable surface impedance. Figures 2; references 6 Russian.

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USSR

UDC 621.391.2

CHERTOV, V.G., SHERESHEV, A.B.

OPTICAL PROCESSING OF LOW-FREQUENCY SIGNALS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct
76, pp 2224-2226 manuscript received 3 Sep 75

[Abstract] Spectral processing of low-frequency signals is a time-consuming operation for electron devices. Consequently, it is natural to turn to methods of optical processing of information, which are based on the fundamental nature of coherent optics, to produce a Fourier transform with the aid of a lens. However, in direct form these methods are unsuitable because they are adapted for processing of information recorded on transparencies with amplitude distribution. The present paper is concerned with an optical system producing a Fourier transform of a transparency with lines recorded on it, which are a graph of the time process $f(x)$ investigated, e.g., photography from an oscillograph screen or the tape of an automatic recorder. Figures 3; references 2: 1 Russian; 1 Western.

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USSR

UDC 621.391.2

RYABOVA, E. N., and ANISIMOV, YE. N.

BROADBAND MIXER

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 10, Oct 76 pp 2238-2242 manuscript received 20 Feb 75

[Abstract] A broadband microwave mixer section (which has a low voltage standing-wave ratio in a band in excess of 25 percent) is often required. However, for a reduction of the noise factor of the mixture, the following are required: 1) The resistance of a source brought to the junction of a diode must be on the order of 100-200 ohms; and 2) At the mixture input a low-pass filter is necessary, isolating the diode junction from the resistance of the source at harmonics of heterodyne and higher combination frequencies. The present work considers the possibility of constructing a broadband mixer section which meets the above requirements in a band in excess of 25 percent. For this purpose the simple structure of a transformer of resistances in the form of a Chebyshev low-frequency filter is used. The filter is constructed

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RYABOVA, E. N., and ANISIMOV, YE. N., RADIOTEKHNIKA I ELEKTRONIKA No 10, Oct 76 pp 2238-2242

on the basis of a ladder network consisting of series inductances and parallel capacitances and assures matching in the Chebyshev sense with arbitrary values of the ratio of the values of the resistances at its input and output. Figures 9; references 3 Russian.

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DUBININ, V.A.

RECTANGULAR SEPARATION AND THE CLASSIFICATION PROBLEM

Moscow RADIOTEKHNIKA in Russian Vol 31, No 9, Sep 76 pp 19-25 manuscript received 5 Nov 74

[Abstract] It is often necessary to select, on the basis of measurements, one among several hypotheses concerning the classification of an object according to defined parameters. This problem is conveniently solved by means of the separation function which, in geometrical terms, locates the object in the space of measured parameters. The applicability of the rectangular separation function is tested here, on the basis of error probability, for the case of two classes to consider. First the parameters of both classes are assumed known and then the parameters of only one class are assumed known. The probability of erroneous class distinction as well as the probability of erroneous class identification are evaluated as functions of the class separation. For a large number of parameters $n > 2$ it is most expedient to apply the Monte Carlo method and use a computer. Figures 8; references 2: 1 Russian, 1 Western.

Components and Circuit Elements Including
Waveguides and Cavity Resonators

USSR

UDC 621.3.042;621.314.2

DVORNIKOV, Sergey Mikhaylovich, graduate student, Moscow Power Engineering Institute

SELECTION OF CORE MATERIALS FOR LOW-POWER, HIGH-FREQUENCY TRANSFORMERS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIK in Russian No 9, Sep 76 pp 951-957 manuscript received 27 Jun 74; after completion, 4 Mar 75

[Abstract] High-quality electrical-engineering steel, ferronickel alloys, and ferrites are used to reduce the mass and volume of low-power transformers used in radioelectronic and other equipment for operation at a frequency of 400 Hz and above. Theoretical and experimental studies have shown, however, that the selection of material is influenced not only by operating frequency, but also by the transformer's power and the amount of permissible overheating of its coil. This paper is concerned with methods of selecting the core material for a specific power output when designing high-frequency low-power transformers with minimum mass and volume, utilizing a standardized series of cores. The first method entails calculating and comparing the specific mass and specific volume of the transformer when using different core materials.

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USSR

DVORNIKOV, Sergey Mikhaylovich, IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIK No 9, Sep 76 pp 951-957

The optimum core material is that which makes it possible to design a transformer with minimum mass and volume. The second method is based on determining the cutoff power with specific values of frequency and permissible coil overheating, or the cutoff frequency with specific values of power and permissible coil overheating. The term "cutoff" here designates the value beyond which it is necessary to go from one material to another for optimum design. Thus it is possible to delimit the areas of application of different core materials from the viewpoint of power and frequency. Procedures are given for calculating specific mass and volume and cutoff power and frequency. The calculation formulas obtained can be used for single-phase low-power high-frequency transformers with sinusoidal supply voltage, designed with regard to permissible coil overheating. Charts and a table for selecting core materials are constructed to conform with results calculated. Figures 3; tables 1; references 5 Russian.

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USSR

UDC 621.314.228

RUSIN, Yu. S.

DIMENSIONAL SIMILARITY CRITERIA FOR TRANSFORMERS AND CHOKES

Moscow RADIOTEKHNIKA in Russian Vol 31 No 9, Sep 76 pp 83-86 manuscript received after completion 6 Oct 75

[Abstract] The principles of the theory of similarity are applied here to two classes of electromagnetic devices, namely small power transformers and chokes. The π -theorem is applied respectively to nine or eight physical quantities in five dimensions, representing the basic variable design and performance parameters as well as a few constants. Criterial numbers are thus obtained which can be further lumped into a single complex defining the geometry of the system as well as the optimum core and winding design. The advantages of this analysis are threefold: designs can be easily compared with respect to electromagnetic and thermal performance, so that series of sizes can be optimally established; the effect of any parameter change on the overall performance can be easily evaluated without tedious calculations; and the severity of any operating mode can be easily determined. Tables 2; references 5: 4 Russian, 1 Western.

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USSR

UDC 621.372.8.001.5

ZAKHAR-ITKIN, M.KH.

THE CONSERVATION OF ENERGY LAW AND NONSELF-ADJOINT OPERATORS IN WAVEGUIDE THEORY

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2040-2051 manuscript received 6 June 75

[Abstract] A problem is studied concerning the attenuation of active power in a transmission line. The paper takes as a reference the generalized telegraph equations of S.A. Schelkunoff [Bell System Techn. J., 1955, 34, 5, 995], corrected in accordance with a previous work by the author, which assures fulfillment of the theory of reciprocity. The energy method of investigating wave guide equations is used. The conservation of energy law is formulated in the paper as a property of the coefficients of the generalized telegraph equations, necessary and sufficient for the constancy of the energy transmitted (in the absence of dissipation) or for a decrease of the energy in the direction of its transmission (for a waveguide with losses). During this the power of a multimode wave guide is considered as a value of Hermitian form, satisfying the differential equation developed in the paper. Reduction of this form to the canonical form (to the sum of squares) makes it possible to determine and to calculate

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ZAKHAR-ITKIN, M.KH., RADIOTEKHNIKA I ELEKTRONIKA, Vol 21, No 10, Oct 76, pp 2040-2051

attenuation modes of the active power of a wave guide. The complex adjoint waves of a multimode waveguide without losses are obtained and investigated in the work as a solution of the generalized telegraph equations with fixed coefficients. It is shown that these complex waves are a linear combination of eigen and adjoint functions. References 11: 10 Russian; 1 Western.

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USSR

UDC 621.372.82

VAGANOV, R.B., VESELKOV, G.P.

THE IRIS LINE OF VARIOUS APERTURES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2203-2205 manuscript received 29 Aug 75

[Abstract] A new quasi-optical channel is investigated, which is a modification of an iris lightguide and is a system of equidistant plane-parallel opaque screens with coaxial apertures of various diameters. Such a channel makes it possible to realize more efficient transmission than with the aid of an ordinary iris line. The beam treatment of the action of the irises gives simple relationships from which the dimensions of each aperture can be found. Figures 1; references 3: 2 Russian; 1 Western.

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USSR

UDC 621.372.822

UDALOV, V.V.

ANALYSIS AND SOME APPLICATIONS OF A BROAD RECTANGULAR WAVEGUIDE
WITH GRATINGS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76,
pp 2073-2079 manuscript received 7 Apr 76

[Abstract] A theoretical analysis is made of the propagation of fast electromagnetic waves in a broad ($K\alpha \gg 1$) rectangular metal waveguide with two symmetrical gratings of round conductors. As a result of an analysis on the basis of equivalent boundary conditions, a dispersion equation is obtained for the case of H-polarization in such a structure. The characteristic values are calculated of the waves of the rectangular waveguide in question. The amplitude coefficients are found, which depend on the parameters of the gratings and their location. The results are presented of an experimental investigation of the waveguide elements (coupler, attenuator) fulfilled on the basis of the structure indicated. The results of the experiment agree sufficiently well with preliminary calculations and show that such a device can operate efficiently as an attenuator, matched load, directional couple, and filter of wave types in the millimeter and $1/2$

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UDALOV, V.V., RADIOTEKHNIKA I ELEKTRONIKA, Vol 21, No 10, Oct 76,
pp 2073-2079

submillimeter wave bands. The author thanks B.Z. Katsenelenbaum, A.N. Sivov and M.V. Persikov for helpful discussion of the work, and Ye.I. Nefedova and N. P. Santalov for assistance during calculations on an electronic computer. Figures 5; references 12: 10 Russian; 2 Western.

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USSR

UDC 621.372.852.2

BORODULIN, A.A.

ON THE ATTAINABLE PARAMETERS OF A MICROWAVE SWITCH AND REFLECTIVE PHASE SHIFTER WITH A SINGLE SWITCHING ELEMENT

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian, Vol 21, No 10, Oct 76, pp 2103-2108 manuscript received 4 May 75

[Abstract] As shown in the literature, the fundamental concept of the "quality" of a switching element receives more and more application during calculation of the parameters of microwave regulating devices. However, certain important dependences of these parameters on the quality of the switching element are not rigorously established and the concept of quality itself is determined in different ways. The present paper conducts a sufficiently rigorous and general analysis of two microwave devices which contain a switching element, and the concept of its quality is determined more accurately. Figures 6; references 9 Russian.

USSR

UDC 621.374.5.55

KHANOVICH, I.G. and DRUKKER, V.Z.

AMPLITUDE-FREQUENCY CHARACTERISTICS OF ELECTROMECHANICAL DELAY LINES

Moscow ELEKTROSVYAZ' in Russian No 8, Aug 76 pp 46-49 manuscript received 22 Dec 75

[Abstract] Electromechanical delay lines with metallic-ribbon acoustic wave guides have recently found wide use as basic components in television apparatus, communication systems, and various radioelectronic devices. Their advantages over conventional delay lines are small size and mass, simple construction, and low manufacturing cost. They also ensure a wide passband for signals from piezoelectric transducers with a relatively low resonance frequency. The amplitude-frequency characteristics of such delay lines are analyzed here, with the piezo transducer assumed under either a unilateral or a symmetric load. The results of this analysis indicate that: 1) the transmission coefficient is maximum at a frequency below the natural frequency of the transducer, at a still lower frequency under a symmetric than under a unilateral load; 2) the maximum transmission coefficient is 3-4 times lower but the passband is 1.3-2.0 times wider under a symmetric than under a unilateral load; 3) the selectivity is maximum in the optimum wide-band case, where it also is almost independent of the loading mode, but in other cases it is still 1.2-1.7 times worse under a unilateral than under a symmetric load; and 4) a $\pm(10-50)\%$ manufacturing variation in the thickness of the interlayer may not affect the bandwidth by more than 10%. Figures 6; references 2: both Russian.

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PETROSYAN, S.S.

TRANSIENT PROCESSES IN DIGITAL FILTERS

Moscow RADIOTEKHNIKA in Russian Vol 31, No 9, Sep 76 pp 35-39 manuscript received 30 Jan 75; after revision 5 Sep 75

[Abstract] Transient processes are analyzed which occur in digital filters after certain test signals have appeared at the input. The pulse characteristic and the transfer function are assumed known. The mathematical analysis consists of an analog-to-digital conversion, a discrete Laplace transformation, a zeta transformation, an inverse-zeta transformation or discrete convolution, and a digital-to-analog conversion. First an input oscillation $s(t)$ with some spectral density $S(j\omega)$ is considered, then a harmonic oscillation at the input to general filter, a low-frequency filter, and also a high-frequency filter. Of interest is a harmonic input signal of a frequency equal to one half the discretization frequency. Figures 6; references 2: 1 Russian, 1 Western.

USSR

UDC 62-50:62-501.14

ZHABREYEV, Vyacheslav Sergeyevich, candidate of technical sciences, dotsent, Chelyabinsk Polytechnical Institute

SYNTHESIS OF AN OPTIMUM COUPLING COMPENSATING FOR THE RANDOM FACTOR OF DRY FRICTION, TAKING INTRINSIC NOISE INTO ACCOUNT

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA
in Russian No 9, Sep 76 pp 977-980 manuscript received 15 Jul 74

[Abstract] Previous papers have been devoted to an analysis of the influence of dry friction on the dynamics of follow-up systems and to consideration of various circuits for compensating for dry friction, but without allowing for its random nature and the noise of the compensating coupling's pickup. Here a technique is offered for synthesizing a compensated drive, based on the theory of nonlinear filtration. The drive is represented in the form of a schematic diagram whereby the input voltage is converted into driving torque by the transfer function of the input circuits, and the transfer function of the components of the drive converts this driving moment into velocity, the drive's components being enveloped in a feedback circuit caused by dry friction.
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ZHABREYEV, V.S., IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA
No 9, Sep 76 pp 977-980

friction. To this diagram is added a compensation circuit. The moment of resistance is compensated by its rating, obtained as the result of tracking the process and processing the signal in the filtration system, whereby the process is made up of the signal plus the intrinsic noise of the pickups and system, which is depicted as white noise. Systems of equations are derived for fully determining the schematic diagram of a system for estimating dry friction torque and a formula is derived for determining the r.m.s. error in estimating parameters, i.e., the accuracy of compensating for dry friction torque. Quasi-optimum equations are obtained for estimating the moment of resistance, which are taken into account in devising the schematic diagram of a compensated drive. This diagram contains a channel for estimating dry friction and compensating for it. The optimum compensation system is non-stationary since the time constant for integration increases with an increase in time after the instant at which switching occurs. Figures 3; references 5: 5 Russian.

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VORONKOV, Viktor Sergeyevich, senior engineer, and POZDEYEV, Oleg Dmitriyevich, candidate of technical sciences, department head [Zav. sektorum]: Scientific Research Institute of Applied Mathematics and Cybernetics attached to Gor'kiy State University

INFLUENCE OF HIGH-FREQUENCY DISTURBANCES ON FUNCTIONING OF A MAGNETIC SUSPENSION

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA in Russian No 9, Sep 76 pp 945-950 manuscript received 9 Oct 74

[Abstract] The magnetic suspension, which is used widely, makes it possible to suspend ferromagnetic objects without contact and to achieve low spin resistance factors, particularly with regard to spin around the axis coinciding with that of the suspension itself. Electrical interference or mechanical disturbances can affect devices with a magnetic suspension under certain operating conditions, and if the disturbances are sufficiently great they can influence the functioning of the suspension substantially. To determine the influence of disturbances it is necessary to examine the dynamics of the suspension, taking into account the nonlinearity of the characteristics of components of the automatic regulation system. Here a study is made of the

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VORONKOV, V.S., and POZDEYEV, O.D., IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA No 9, Sep 76 pp 945-950

stability of a magnetic suspension when high-frequency disturbances act upon it, and a determination is made of those parameters of a suspension with which disturbances will not cause a loss of stability. The conditions for the stability of the particular suspension studied were determined in earlier papers, where it was found that its stability grows worse with an increase in the time constant of the driving component. The present study demonstrates theoretically and experimentally that high-frequency disturbances lead to an increase in this time constant owing to reduced differential resistance of the d.c. amplifier, and when the amplification factor in the corrective network is low, to a reduced transmission coefficient for the automatic regulation system. This leads to worsening of stability or loss of stability if in the absence of disturbances the suspension's parameters are close to the boundary of the stability region. Stability in the presence of disturbances can be increased by increasing the amplification factor and lowering the time constant by connecting an ohmic resistor in series with the electromagnet. Figures 5; references 6: 5 Russian, 1 Western.

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USSR

UDC 621.3.066.2:621.376.5

BULIN-SOKOLOV, Igor'Valentinovich, candidate of technical sciences and ZHESAN, Anatoliy Vasil'yevich, graduate student, Leningrad Polytechnical Institute

CONCERNING ASYMPTOTIC STABILITY OF SYNCHRONOUS OPERATING MODES OF PULSE-WIDTH SYSTEMS FOR A MICRO-D.C. ELECTRIC DRIVE

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA in Russian No 9, Sep 76 pp 994-1002 manuscript received 4 Apr 74, after completion, 30 Dec 74

[Abstract] A study of the dynamics of systems for regulating the rotational velocity of micromotors is very important from the practical viewpoint in light of the fact that wider use has been made of micro-electric drives in various fields of engineering in recent years. Experience has shown that regulating systems with pulse-width modulation of the control signal are the most promising. A pulse-width modulator modulates the control signal entering from the output of a sensitive element, and from the output of the modulator comes a pulse train, the width of whose pulses is uniform and equal to the voltage supplied to the motor. Regulating systems most often use unipolar modulators, i.e., unipolar voltage pulses enter the motor, but bipolar modulators can also be used. Most widely used is that operating mode for the 1/2

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BULIN-SOKOLOV, I. V., and ZHESAN, A. V., IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ELEKTROMEKHANIKA No 9, Sep 76 pp 994-1002

system whereby the rotational frequency to be regulated oscillates at the initial pulse frequency. This is called the synchronous mode. Often the initial frequency is a multiple of the preset rotational frequency for the motor. In reality the synchronous mode exists only if it is stable. In this paper a study is made of the integral asymptotic stability of synchronous modes of a system with pulse-width modulation having the specific structure shown. One of the essential requirements of the systems considered is that they make possible a synchronous mode of operation with abrupt variations in the load factor. It thus becomes necessary to solve the problem of the stability of a certain set of synchronous modes. The conditions to be fulfilled for the absolute stability of the system are derived. An example of determining the conditions for the absolute stability of a system with bipolar pulse-width modulation with assigned parameters is given. Preliminary analysis of the stability of several electric drive systems with unipolar pulse-width modulation has demonstrated the effectiveness of applying the method suggested here. Figures 4; references 10 Russian.

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USSR

UDC 621.313.291

KHOZHAINOV, A.I., dr of technical sciences, professor; KUZNETSOV, S.YE., candidate of technical sciences; and TURENKO, M.YA., engineer: Leningrad

UNIPOLAR D-C ASYNCHRONOUS MOTOR WITH HERMETICALLY-SEALED MOLTEN METAL CONDUCTOR

Moscow ELEKTRICHESTVO in Russian, No 10, Oct 76, pp 40-45 manuscript received 21 Oct 75

[Abstract] The paper presents a description of the device, the elements of theory, and data on experimental investigations of a unipolar electrical motor of a new type, the armature of which is immersed in a hermetically-sealed chamber with molten metal and which contains teeth [zubets] made of conducting ferromagnetic material. This assures transmission by an electromagnetic path of energy to a hollow rotar, connected with the working shaft of the electrical motor. The investigations conducted completely verified the working capacity of the unipolar synchronous electrical motor, the advantages of which, as composed with a conventional unipolar motor with an armature immersed in molten metal, include high reliability, which is assured by hermetical sealing of the continuous
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KHOZHAINOV, A.I., et al ELEKTRICHESTVO, No 10, Oct 76, pp 40-45

molten metal contact, a wide range of kinds of mechanical characteristics, depending on the fulfillment and material of the rotor, and lightened operating conditions for the source of electrical energy in the case of a stalled rotor of the motor. In connection with the relatively large effective gap, the energy characteristics of the electrical motor under consideration are lower than with comparable machines. However, they can be sufficiently high with the use of electromechanical copper as the material of the inter-teeth insert and the molten metal alloy NaK for the conductor. Approximate evaluations show that in this case, for a motor of average high speed and power on the order of 10 kW, the efficiency can be found in the limits of 50 ÷ 60 percent. Figures 8; references 11 Russian.

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USSR

UDC: 621.313.322-81

KHUTORETSKIY, G. M., engineer, and TROFIMOV, A. M., engineer, Scientific-Research Institute of the Leningrad "Elektrosila" Electric Machine Building Association

THE TVV-800-2 800 MW HYDROGEN-WATER-COOLED TURBOGENERATOR

Moscow ELEKTRICHESKIYE STANTSII in Russian No 10, Oct 76 pp 46-52

[Abstract] The paper gives test results on the TVV-800-2 turbogenerator with technical specifications. One of these units has been in duty as the main generator at the Slavyansk State Regional Power Plant since January 1972. The results of stand tests and operational experience show that the engineering decisions incorporated into the design of this machine are sound. In particular, the following indices show the high reliability and quality of the design: low temperature of the rotor winding; low level of vibration of the head sections of the stator winding with exceptional stability; low level of vibration of the stator frame and housing as well as other structural components -- bearings, contact rings, etc.; stable and reliable operation of shaft seals. At the same time, research has shown that further improvement of some components is needed for a still greater quality of performance. Since this turbogenerator is to be the basis for development of Soviet power over the

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KHYTORETSKIY, G. M. and TROFIMOV, A. M., ELEKTRICHESKIYE STANTSII, No 10, Oct 76 pp 46-52

next ten years, the Leningrad "Elektrosila" Association will continue to work on improving the engineering level of the machine; the preliminary results of operation with the early models show that the design features used have great promise for application in turbogenerators of even greater power. Figures 9; references 7 Russian.

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USSR

UDC 621.315.61.001.4

IYERUSALIMOV, M.YE., dr of technical sciences; LABUDEV, S.A., candidate of technical sciences; DEREVYANKO, YE.F., KAZANOVICH, A.M., TSETSYURSKIY, A.N., engineers

HIGH-VOLTAGE UNIT FOR DETERMINING ARC RESISTANCE OF ELECTRICAL INSULATION MATERIALS

Kiyev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 5(89), Sep-Oct 76, pp 6-7

[Abstract] The Department Faculty of Electrical Insulation and Cable Technics of the Kiyev Polytechnical Institute developed and produced a compact portable unit, with the aid of which the resistance is determined of materials to the effect of arcs created by a low current of high 50 Hz AC voltage. The circuit and special features of the unit are described. The unit is suitable not only for accelerated determination of the arc resistance of compression moulded and formed electrical insulation of organic and nonorganic origin, but also for determination of the structure and composition of materials, their form, and their maintenance of a band with a nonorganic filler. Figures 1.

USSR

UDC: 621.316.722.1.013.4.014.2

TROITSKIY, V. A., doctor of technical sciences, BELYI, N. G., engineer, NAGAYTSEV, V. A., engineer

A THREE-PHASE VOLTAGE STABILIZER WITH MAGNETIC COMMUTATION

Moscow ELEKTROTEKHNIKA in Russian No 9, 1976 pp 37-39

[Abstract] The article describes the design and gives the circuit diagram of the ATRMK-16/0.5 symmetric voltage stabilizer with power of 16 kVA developed by the Institute of Electric Welding imeni Ye. O. Paton of the Ukrainian Academy of Sciences. Oscillograms are given showing the transient processes in the voltage stabilizer. Analysis shows that stabilizers with magnetic commutation yield nearly sinusoidal secondary voltage and limited short-circuit current. They are more reliable than their transformer-thyristor analogs, do not have semiconductors in the working current circuits and contain fewer elements in the control circuits. References 5 Russian.

USSR

UDC 621.311.4.027.3.6:69-412

FAYNYUD, G. M., engineer, ERMAN, Z. B., engineer, and ZAYTSEV, L. I., engineer, Elektroual'montazh Trust, Energoset'proyekt, Ural Division

STANDARDIZED MODULES FOR THE BUILDINGS OF 110-500 kV SUBSTATIONS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 10, Oct 76 pp 38-42

[Russian abstract provided by the source]

[Text] The paper gives a structural description of a substation based on transportable modular sections set up in one of the hard to reach regions of the Tyumenskaya Oblast. The technical and economic advantages of the modular design are discussed. An examination is made of the outlook for expanding the line of equipment and area of application of transportable modular units. It is shown that changes must be made in the Standards for Technological Design of Step-Down Substations for the conditions of poorly accessible territories. Figures 5.

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USSR

UDC 621.311.6.001.24

BERTINOV, A.I., dr of technical sciences, BOCHAROV, V.V., engineer, MIZYURIN, S.R., RESNIKOV, O.B., candidates of technical sciences, and LOMONOSOV, L.YE., engineer: Moscow

CHARGING OF ENERGY STORAGE CAPACITOR THROUGH AN L-C CONVERTER

Moscow ELEKTRICHESTVO in Russian, No 10, Oct 76, pp 18-22 manuscript received 23 Apr 76

[Abstract] Inductive-capacitive converters of a voltage source into a source of constant current charge (CCC) are widely used in devices for charging energy storage capacitors from an a-c source. A peculiarity of the operation of CCC in these devices is the broad spectrum of harmonics of the currents and voltages which are determined by the recurring charging of the energy storage capacitor and the switchings of the valves [ventil'] of the rectifiers. The design of a CCC circuit with a rectifier-capacitive load is not found in the literature. The present paper is concerned with filling this gap. A calculation is made of the process of charging an energy storage capacitor through a single-phase CCC, fulfilled according to a T-shaped Boshner circuit and a double half-wave rectifier. The methods of

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BERTINOV, A.I., et al, ELEKTRICHESTVO, No 10, Oct 76, pp 18-22

calculation discussed make it possible to determine the time dependences of all the currents and voltages of the charging device, its energy indices (power coefficient, efficiency), as well as the extent of the effect on the quality of the voltage of the supplying synchronous generator. A comparison of the results of calculations with experimental data showed that the analytical method has an error of 8--12 percent and the method of analog simulation, 3--5 percent. The analytical method can be applied to systems with charging of an energy storage capacity for not less than 5--10 periods of supplying emf. Both methods can be recommended for engineering calculations. Figures 3; references 4 Russian.

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USSR

UDC 621.315.55.014.12:538.311

BARANOV, M.I., engineer; BELYI, I.V., and KHIMENKO, L.T., candidates of technical sciences: Khar'kov Polytechnical Institute

SURFACE EFFECT AND DISTRIBUTION OF ELECTRODYNAMIC FORCES IN THE CYLINDRICAL CURRENT CONDUCTORS OF A COAXIAL SYSTEM WITH A PULSE CURRENT

Moscow ELEKTRICHESTVO in Russian, No 10, Oct 76, pp 1-8, manuscript received 2 Mar 76

[Abstract] In pulsed double-wire lines for transmission of electrical energy, during investigation of plasma and measurement of large pulse currents, a coaxial system of current conductors is widely utilized. In the case of design and analysis of the electromagnetic and mechanical processes in the current-conducting elements of such a system, one of the basic problems is an investigation of the pulsed penetration of an electromagnetic field into its tubular or solid cylindrical conductors and the distribution of transitional 3-dimensional electrodynamic forces in the materials of the current conductors. The paper considers a coaxial system consisting of two tubular straight-line conductors of cylindrical form, serving the forward and return current conductors for pulse current in the

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BARANOV, M.I., et al ELEKTRICHESTVO, No 10, Oct 76, pp 1-8

circuit of the voltage source. During flow of the current in the electrical circuit of the voltage source, the external surface of the inner current conductor and the interior surface of the outer current conductor are subjected to the effect of the waves of a transient electromagnetic field. During an investigation of their pulsed penetration into the conducting cylinders of the coaxial system, consideration is limited to the case where it is possible to neglect the displacement currents in the dielectric gap between its current-conducting parts. A solution is presented of a one-dimensional version of the above. The tubular conductors of the coaxial system with invariable radial dimensions are assumed to be infinitely long. Formulas are obtained for a solution of the intensity of the electromagnetic field in the inner and outer current-carrying systems in the case of a stepped pulse of the exterior magnetic field. On the basis of the results of a solution of the field problem the distributions are investigated of the 3-dimensional electrodynamical forces in the inner and outer tubular current conductors of the coaxial system in a transient process with inclusion of current, variable with respect to the law of a damped sinusoid. Figures 5; references 11: 8 Russian; 3 Western.

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USSR

UDC 621.315.072.2.017.004.18.001.24

KRIVUSHKIN, L.F., engineer, Ukrainian division of Energoset'proyekt Institute

PROBABILITY ESTIMATE OF REDUCTION OF POWER LOSSES BY VOLTAGE REGULATION OF 500- TO 1150-kV POWER TRANSMISSION LINES

Moscow ELEKTRICHESTVO in Russian No 9, Sep 76 pp 12-14 manuscript received 2 Jun 75

[Abstract] Determination of the feasible reduction of annual power losses by regulating the voltage of power transmission lines under operating conditions is necessary for an estimate of financial savings thus obtained, as well as for designing lines of this capacity and selecting the parameters of voltage-regulation equipment for them. Analysis of operating records for 500- to 750-kV lines has demonstrated the absence of a specific daily loading pattern and a clearly marked relationship between this pattern and the loading pattern of the system itself, explained by an increase in the load components of lines owing to incorporation in the USSR Unified Power System. The value of the load at any moment of time can thus be described only by the methods

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KRIVUSHKIN, L.F., ELEKTRICHESTVO No 9, Sep 76 pp 12-14

of probability theory. Also to be taken into account is the fact that, in parallel operation of two lines of different capacity, in a number of instances variation in losses in the lower-voltage line when employing voltage regulation is higher than the variation in losses in the higher-voltage line. To be taken into account also is the probabilistic nature of the effect of weather conditions along the line's route, determining the degree of corona power losses, both from the viewpoint of occurrences during the course of the year and the involvement of different sections of the line's route. The possible reduction of corona power losses in any one specific situation is directly dependent on the degree to which the line's route is subject to bad weather. Because the distribution of weather conditions along the line's route and the value of the line's load are stochastic processes it is necessary to base a determination of feasible reduction of power losses on probability estimates. A formula is derived for determining the mean probability of total power losses in a specific situation, taking into account four independent probability parameters: Line voltage, line load, the degree to which the line's route is subject to bad weather, and specific corona power

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KRIVUSHKIN, L. F., ELEKTRICHESTVO No 9, Sep 76 pp 12-14

losses. From this formula a formula is derived for determining the expected reduction in losses by utilizing voltage regulation. Of note is the discovery that there is no direct proportionate relationship between the amount of loss reduction and line length. The calculation technique developed here has been proven applicable in practical design situations, and a special program is being written for using it for computer calculations. References 3 Russian.

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USSR

UDC 621.316

STOZHKOVA, A.I., engineer

USE OF FIBER-GLASS INSULATION ON 35 kV OVERHEAD LINES

Kiyev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 5(89), Sep-Oct 76, pp 14-15

[Abstract] In 1973 more than 1500 km of 35 kV overhead lines were placed in balance by the Zaporozhskiy enterprise of the high-voltage electrical networks (PVES) of Dneproenergo [State Administration of the Dnepropetrovsk Oblast Power System Management]. The majority of the lines were completed with combined insulations, i.e., the upper conductor is made fast with the aid of a ShD-35 post-type [shtyrevoy] insulator, and the two lower conductors are in suspended chains built-up of P4.5 insulators. The post-type insulators often failed, as a result of which ignition of the supports and breakdowns in the lines took place. Instead of the ShD-35, fiber-glass insulation was developed for installation on 35 kV overhead lines, which consists of a fiber-glass bar 520 mm long and 22 mm in diameter. A ShZhB-10, or any post-type insulator applicable to 6--10 kV electrical transmission lines for mounting a conductor, is fastened to the bar with the aid of a polyethylene cap. The Zaporozhskiy PVES began to install fiber-glass insulators of 35 kV overhead lines in March 1974.

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STOZHKOVA, A.I., ENERGETIKA I ELEKTRIFIKATSIYA No 5(89), Sep-Oct 76, pp 14-15

At present, of the approximately 300 such insulators in use, none has failed. Fiber-glass insulation increases the reliability of electrical supply and can be recommended for use in other power systems.

USSR

USE OF ELECTRICALLY CONDUCTIVE CONCRETE RESISTORS IN ELECTRIC POWER INSTALLATIONS

Moscow ENERGETIK in Russian No 9, Sep 76 p 39

[Abstract] Modern electric power systems still suffer the consequences of higher short-circuit currents and inadequate disconnect capacity of circuit breakers in high-voltage (110-500 kV) lines, with many of the circuit breakers operating under other than rated conditions. Their replacement is impractical because of low factory output of new units and reduction of short-circuit current levels requires multiple network splitting, all of which adversely affects the system economy and reliability. The problem of increasing the capacity of circuit breakers is better solved by shunting the latter with electrically conductive concrete resistors of properly matched parameters. The material of such resistors ("Byetel") is a composite which has been researched and developed jointly by the Energotekhprom and the Sib NII. Pilot and industrial production of the model RBShN resistor was begun in 1974. Since then 250 model VVN-1-110-6, 20 model VVN-220-10, and 10 model VVN-220-15 installed circuit breakers have been brought up to date. Other applications for these resistors include attenuation of network transients, braking

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of generators, lowering the rate of voltage recovery, limiting asymmetric currents, etc. The heavy demand for these devices calls for a fast and substantial boosting of their production. Inasmuch as these devices constitute a significant scientific-engineering breakthrough, both laboratory and industrial backup research must be intensified in the following directions: 1) to establish precise performance specifications compatible with the material characteristics as well as the ultimate operating conditions, 2) to improve the existing designs, 3) to explain the physical processes involved in arc quenching and, on the basis of this knowledge, improve the resistor parameters, and 4) to develop new resistor models. ORGRES [State Trust for the Organization and Rationalization of Regional Electric Power Plants and Networks] has been assigned the task of evaluating all field experience with these resistors and to complete this study by 1977.

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Certain Aspects of Computer
Hard and Soft Ware

POLAND

UDC 531.717.81:681.323.004.14

KARPINSKI, TADEUSZ, docent, dr., engr., LUKIANOWICZ, CZESLAW, M. A., engr.

SOME PROBLEMS CONNECTED WITH COMPUTER-AIDED THREE-DIMENSIONAL ANALYSIS OF
SURFACE ROUGHNESS

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish Vol 22 No 9, Sep 76 pp 316-317

[Abstract] The basic problems connected with a description and a three-dimensional analysis of surface roughness are presented. A method is proposed for calculating parameters of surface roughness with the use of a computer, and a rational way, from the viewpoint of information theory, of surface quantization is described. The application of this method in practice will make it possible, without impairment of the accuracy of measurements, to reduce the amount of information being processed and thereby to decrease the cost of evaluation of the surface roughness parameters. Figures 2; references 6: 2 Russian, 4 Western.

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USSR

UDC [62-83:681.14].001.1

SLEZHANOVSKIY, O. V., doctor of technical sciences, GROMOV, V. S., engineer, BURKOVSKIY, YE. S., candidate of technical sciences, ZHILKO, E. I., engineer, KUVSHINOV, I. A., candidate of technical sciences, and KHUTORETSKIY, V. M., engineer

THE OUTLOOK FOR USING CONTROL COMPUTERS IN AN AUTOMATED ELECTRIC DRIVE

Moscow ELEKTROTEKHNIKA in Russian No 9, 1976 pp 1-3

[Abstract] A brief discussion of the use of control computers in drives for steel rolling mills. The use of control computers as digital regulators has the following advantages over local systems: higher productivity of the controlled object through the use of flexible mathematical models, adaptive control and the capability of optimizing operating conditions; high precision in the regulation of various complicated processes; high reliability, small dimensions and low weight; wide-range applicability -- a change of working conditions or modification of purpose involves only using a new program without any structural alterations. Soviet industry now has the capacity for making microcomputers for use in drive controls. Examples are given showing how minicomputers and microcomputers can be incorporated into automated electric drive systems for steel rolling mills. Figures 2.

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USSR

UDC 681.327.8.008

GINZBURG, V. M. and SHVARTSMAN, O. V.

DECENTRALIZED CONTROL OF A DATA TRANSMISSION NETWORK WITH MESSAGE SWITCHING

Moscow ELEKTROSVYAZ' in Russian No 9, Sep 76 pp 25-29 manuscript received 16 Apr 76

[Russian abstract provided by the source]

[Text] A decentralized algorithm is proposed for controlling flows of information in a network with message switching that is used for data transmission in a resource-sharing computer system. It is proved for a simplified mathematical model of the network that this algorithm maximizes the operating efficiency of the network. Results of computer modeling of the network are presented. Figures 5; references 3: 2 Russian, 1 Western.

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EAST GERMANY

KRUG, W., Institute of Air and Refrigeration Engineering, Dresden

A MODULAR SYSTEM FOR THE DIGITAL SIMULATION AND OPTIMIZATION OF CONTINUOUS SYSTEMS

East Berlin MESSEN STEUERN REGELN in German Vol 19 No 10, Oct 76 pp 347-350

[Abstract] A modular program system was described for the digital simulation and optimization of continuous systems. Modular systems are defined as program packets which solve the problem on hand on the basis of subprograms for various tasks through a notating main program. Static simulation is accomplished with the aid of the STA-VER and WNEU programs; there are four programs for the dynamic simulation of continuous systems: BORIS 1, BORIS, RK4BOR, and DYVER. They are suitable for the solution of linear and non-linear part-model structures, where block structures and systems of differential equations may occur singly and mixed, with macrostructures. Constant and variable step integration may be accomplished. Model identification and an example of application with BORIS are described. Tables 9; references 5: all German.

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