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EAST
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USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ELECTRONICS AND ELECTRICAL ENGINEERING

No. 40

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

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CONTENTS	PAGE
ELECTRONICS	
Amplifiers	1
Antennas	5
Certain Aspects of Computer Hard and Soft Ware; Control, Automation, and Machine Planning	15
Certain Aspects of Television and Photography	31
Communications, Networks, Data Transmission and Processing	37
Components and Circuit Elements Including Waveguides and Cavity Resonators	68
Converters, Inverters, Transducers	82
Electroacoustics	84
Instruments and Measuring Devices and Testers; Methods of Measuring	86
Microelectronics, Integrated and Logic Circuits; General Circuit Theory and Information	100
Oscillators, Generators and Modulators	109
Photoelectrics; Photoelectric Effect	110
Quantum Electronics, Lasers, Maser, Holography, Quasi-Optical	112
Radars; Radio and Other Navigation Aides	117
Receivers and Transmitters	121
Semiconductors; Dielectrics; Luminescence; Solid State; Films	123
Theoretical Aspects	133

CONTENTS (Continued)

Page

ELECTRICAL ENGINEERING

Electrical Engineering Equipment and Machinery	134
Electron Tubes; Electrovacuum Technology	143
General Production Technology	144
Power Systems	153

USSR

UDC 621.375

MAXIMIZATION OF SIGNAL-TO-NOISE RATIO IN AMPLIFIER STAGES WITH NEGATIVE
FEEDBACK

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 26-34 manuscript re-
ceived 21 Feb 77

BARAMIDZE, V. A.

[Abstract] The conditions are determined for maximization of the signal-to-noise ratio of amplifier stages with negative feedback of the series type. It is concluded that it is always necessary to combine the use of deep-seated negative feedback with conditions which assure maximization of the signal-to-noise ratio. Otherwise, the negative feedback can prove to be useless, and in certain cases a significant destabilizing factor. A farther increase of the stages of d-c and a-c amplifiers will be found during development of cascode, differential and cascode-differential d-c and a-c amplifiers, able to compensate for temperature drift, and brought to the input where the principles considered in this and two previous papers by the author are used to increase the coefficients of discrimination and rejection. Figures 4; tables 3; references 8 (Russian).

HUNGARY

UDC 621.375.1.018.424

DESIGNING AN AMPLIFIER HAVING AN OUTPUT IMPEDANCE OF LESS THAN 0.5 OHM FROM D.C. TO 100 MHz

Budapest HIRADASTECHNIKA in Hungarian Vol 29 No 2, Feb 78 pp 47-52 manuscript received 27 Oct 77

SZARAZ, GYORGY and KORZSINEK, KAROLY, Research Institute for the Communications-Technological Industry

[Abstract] The designing of a versatile and universally usable circuit is described, and it is shown that the output impedance of a conventional circuit as a function of frequency is less desirable than in the version presented. The amplifier has the following performance parameters: output impedance between 0 and 100 MHz, $\leq 0.5\Omega$; maximum d.c. load current, 100 mA (current limitation at higher levels); maximum output impedance, ± 20 V; voltage amplification, +2-fold; and establishment time corresponding to an accuracy of 1 percent, ≤ 0.5 msec. The theoretical calculations used in the designing process are described in detail, and data about the output stage, regenerative circuit, and device performance presented and illustrated with diagrams and wiring charts. The device may be readily made in a hybrid version also. Figures 12; references 3: 2 Hungarian, 1 Western.

USSR

UDC 621.375.13:531.7812

AMPLIFIER OF LOW-LEVEL SIGNALS FOR STRAIN MEASUREMENTS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 p 44

SUD'IN, S. L. and TIMOFEYEV, V. T., candidates in technical sciences

[Abstract] In strain measuring devices, a-c bridge circuits have received wide dissemination. The development of d-c bridge circuits which have a wider frequency band of the amplified signals, a less complex power supply of the strain bridge, a smaller multiplicative error of the amplifier, as well as operational advantages, is restrained by the errors of existing operational amplifiers which do not assure the necessary stability of the zero level suppression of inphase interference and upper boundary frequency. The development described in the literature of the differential circuits for highly-stable broad-band operational amplifiers with a modulation-demodulation channel makes it possible to solve this problem. On the basis of such an amplifier, the authors developed an amplifier of the signals of a strain bridge. It has the structure of a differential scaling amplifier with a current input, and outputs for current and voltage. Both outputs can be used simultaneously. The principal technical characteristics of the strain amplifier are presented. For several years the strain amplifier has been used for stability tests of aviation technology. Figures 2; references 3 (Russian).

USSR

UDC 621.375.126

NOISE FACTOR OF MICROSTRIP MICROWAVE AMPLIFIER USING A TRANSISTOR

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 14-17 manuscript received 19 Nov 76

SMOGILEV, K. A. and SIDOROV, N. V.

[Abstract] An expression is obtained for the noise factor of a microstrip microwave amplifier using a transistor, and the conditions for its minimization. An example is given in which the noise factor is found for an amplifier of this type with specific parameters. An amplifier stage is calculated using the data obtained. Constructively, the amplifier stage is accomplished using a substrate of "polikor" with a thickness of 1 mm. The passive part of the scheme is accomplished by the method of thermal vaporization in a vacuum, which makes it possible to apply to the substrate a conducting layer of copper with a thickness of 5 microns (with a sublayer of chrome) which assures good characteristics of the conducting elements in a given frequency range. The amplifier developed has a power amplification factor $K = 3.2$ and a noise factor of 2.6, which is close to that calculated. Figures 3; references 5 (Russian).

HUNGARY

CHECKOUT OF STEREO AMPLIFIERS IN THE ORION FACTORY

Budapest BHG ORION TERTA MUSZAKI KOZLEMENYEK in Hungarian Vol 23 No 4, 1977
pp 169-175

Mrs NYERGES, ERNO, graduate electrical engineer, member of the Instrument Department staff at Orion Radio and Electrical Enterprise

[Abstract] The procedures used at Orion Radio and Electrical Enterprise for checking out the fully transistorized SE 1015 stereo amplifiers are described. The checkout is performed in the SM-87 Stereo-Amplifier Test Station developed for this purpose. Only five plug connections need to be made, and a total of 22 switchings, to make all relevant measurements. The station can be used in 12 different measuring modes, using five different test frequencies. The two channels are measured simultaneously. There are built-in 4-ohm load resistors. It permits the adjustment and measurement of the four amplifier input sensitivities, as well as the determination of distortion, frequency response, crosstalk, noise, RIAA correction, and bass/treble controls. Together with an oscilloscope (TR 4560 Transiscope D) it permits full alignment and checkout to be accomplished. The station consists of two main parts: the generator and the receiver. It has three outputs. The station was described in detail and illustrated with charts, block and circuit diagrams, and photographs. Figures 7; table 1.

EAST GERMANY

CIRCUITRY OF INTEGRATED OPERATIONAL AMPLIFIERS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 23-24, Dec 77 pp 770-774

FRIEDRICH, WOLFRAM, graduate engineer

[Abstract] The circuits and performance characteristics of integrated operational amplifiers are briefly described and discussed for the benefit of trainees, illustrated with three well-known amplifiers: A 109, 1UT 401, and μ A 741. Transistors and diodes can be easily integrated; resistors and capacitors can be integrated with some difficulty; inductions cannot be integrated for all practical purposes. Differential amplifiers are widely used in discrete circuit engineering. The needed performance characteristics could be achieved with justifiable expenditure only by integration. Constant current sources are used in these amplifiers and also for the realization of high dynamic working resistances and in level-changing circuits. Reference voltage sources are seldom used in operational amplifiers. The output stage, together with the input difference amplifier, basically determines the performance characteristics of the operational amplifier. The output stages are usually equipped with protective circuits. The most advanced of such protective circuits feature transistors controlled by resistors. Figures 14; references 8 (German).

USSR

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MODERN PROBLEMS OF THEORY AND TECHNOLOGY OF ANTENNAS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 3-8

VASKRESENSKIY, D. I., dr in technical sciences, professor

[Abstract] This paper is the introduction to a special issue of IZV. VUZ: RADIOELEKTRONIKA concerned with electrodynamics and antenna-waveguide devices. The paper does not attempt to cover completely all aspects of contemporary antenna theory and technology. However, the following are particularly discussed: 1) Problem of synthesis of antenna systems; 2) Problems connected with development of Far/Phased antenna arrays; 3) Problems connected with development of an antenna with a feedback signal and active arrays; and 4) Weakly directional antennas. An overall view is given of the principal problems of modern antenna technology for a large number of radio engineers and radio physicists not working directly in the antenna field. References 4: 2 Russian, 2 Western.

USSR

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ELECTRODYNAMIC THEORY OF ANTENNA ARRAYS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 9-21 manuscript received 30 Apr 77

IL'INSKIY, A. S.

[Abstract] The paper surveys 61 Russian and 13 Foreign works concerned with numerical methods of investigating theoretical problems of antenna arrays. Only a general outline is given of the principal trends in the development of the electromagnetic theory of antenna arrays. Problems of planning radiating systems and numerical methods of calculation of antenna arrays, however, are discussed in some detail. Particular attention is paid to the work of Soviet authors, because in foreign literature on the theory of antenna arrays little attention is given to works of the Soviet school. References 74: 61 Russian, 13 Foreign.

USSR

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INTERCOUPLING IN CONVEX ANTENNA ARRAYS WITH ARBITRARY SHAPE OF APERTURE RADIATORS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 22-29 manuscript received 15 Mar 77

INDENBOM, M. V. and FILIPPOV, V. S.

[Abstract] As is known from the theory of plane antenna arrays, the effects of interaction play a role in determining the characteristics of antenna arrays of aperture radiators. An investigation of intercoupling in antenna arrays of aperture radiators, located on an arbitrary convex cylindrical surface, is of value. The results of investigations of such arrays are known, in particular for the case of one-dimensional antenna arrays of infinitely long slots, with known distribution of a field in the slots. The present paper is concerned with an overall solution of the problem of a two-dimensional antenna array of random aperture radiators on the basis of a general approach to an analysis of intercoupling in convex cylindrical arrays of large electrical dimension. A representation of the radiation pattern in a convex cylindrical array is obtained in the form of the sum of the contribution of direct waves from excited radiation, the sum of the contribution of fast "creeping" waves, and the contribution of slow "creeping" waves. The results are presented of a numerical calculation of slot elliptics, in particular in circular antenna arrays. Figures 4; references 5: 4 Russian, 1 Western.

USSR

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MACHINE METHOD OF ANALYSIS AND PARTIAL PARAMETRICAL SYNTHESIS OF CAVITY-SLOT ANTENNA STRUCTURES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 30-35 manuscript received 20 Mar 77

GRINEV, A. YU. and KOTOV, YU. V.

[Abstract] The intense incorporation of the methods of contemporary computational mathematics into antenna theory is, first of all, connected with the fact that computational mathematics, equipped with electronic computer techniques, makes it possible to proceed to a solution of practical problems in complete electrodynamic arrangements. In a whole series of cases such complete consideration not only facilitates planning of antenna structures, but also assists improvement of the electrodynamic characteristics. The present paper is concerned with an investigation of cavity-slot antenna structures by numerical methods. These structures are nonprotruding, have small longitudinal overall dimensions, can be used during realization of scanning antenna arrays (as well as separate radiators) with linear, circular and controllable polarization of the radiation field. The object of the work is to

obtain, using an algorithm developed by A. S. Il'inskiy and others, the dependence of the total input conduction of the radiator in question on the geometry of the slot and cavity, the number and points of excitation necessary for immediate engineering planning as well as to analyze the broadband properties of cavity-slot radiators. Figures 9; references 4 (Russian).

USSR

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SPHERICAL ANTENNA ARRAY WITH RING-SHAPED SPACING OF RADIATORS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 36-41 manuscript received 25 Mar 77

FILIPPOV, V. S. and SHATOKHIN, B. V.

[Abstract] The paper considers one of the possible methods of constructing a spherical antenna array--an array with a ring-shaped arrangement of the radiators with respect to the parallels of a spherical surface, and analyzes the characteristics of directivity as a function of the parameters which determine the spacing of the elements of the array. Significant merits of the ring-shaped arrangement are the high degree of uniformity and simplicity of determination of the coordinates of the radiators. On the basis of the method developed for analytical presentation of the discrete distribution of radiators on a spherical surface, simple calculating relationships are obtained, which make it possible to determine the level and configuration of the side lobes of the directional diagram of a spherical array of the type considered. Figures 6; references 9: 4 Russian, 5 Western.

USSR

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ITERATIVE METHOD OF ANALYSIS OF LINEAR AND PLANE ANTENNA ARRAYS WITH USE OF FAST FOURIER TRANSFORM

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 55-61 manuscript received 8 Jul 76; after revision 20 Apr 77

MASHKOV, V. A., KHZMALYAN, A. D. and CHAPLIN, A. F.

[Abstract] The paper proposes an iterative method for solution of systems of equations with a Toeplitz matrix (and with a block-Toeplitz matrix each block of which is a Toeplitz matrix) which makes it possible with comparative simplicity to find the solution of high-order systems (order of increase of the number of operations-- $N \log_2 N$). The proposed method can also be employed for

systems of equations of small dimensions. However, its advantages are displayed more fully with a large N. The above method for solution of systems of linear equations with a Toeplitz matrix, which appears during an analysis of linear and plane antenna arrays, requires a considerably smaller number of operations at each step than well-known direct methods of solution. In addition, the necessary number of iterations for a number of problems is found to be small which makes it possible to obtain a significant economy in the time for solution. The volume of an electronic computer memory necessary for realization of the method is also small. Figures 5; references 9: 7 Russian, 2 Western.

USSR

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PECULIARITIES OF APPLICATION OF MODULES WITH FREQUENCY MULTIPLICATION IN ACTIVE TRANSMITTING ANTENNA ARRAYS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 69-73 manuscript received 1 Apr 77

GRANOVSKAYA, R. A. and SHKALIKOV, V. N.

[Abstract] Active antenna arrays with frequency multiplication are considered to be arrays in each module of which, in addition to an amplifier, a frequency multiplier is located. Because the presence of a frequency multiplier in a module of an active phased antenna array (AFAR) leads to a number of specific peculiarities, both of the modules and the array as a whole, the paper conducts a qualitative examination of the properties of an AFAR. It is shown that in an AFAR with frequency multiplication, the distributing system and the system of phasing can be simplified, and the characteristics improved of straight-through and reflecting type AFAR. Use in AFAR modules of multifunctional devices such as an amplifier-phase shifter, multiplier-phase shifter and amplifier-multiplier contributes to a simplification of the structure of the module and the systems for its control, as well as a decrease of phase errors and an improvement of the parameters of the directional pattern. Figures 3; references 12: 11 Russian, 1 Western.

USSR

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OPTIMIZATION OF PARAMETERS FOR FOCUSED ANTENNA ARRAYS OF ARBITRARY GEOMETRY

Kiev IZV. VUZ: RADIOTEKHNKA in Russian Vol 21 No 2, 1978 pp 84-90 manuscript received 6 Jun 77

SAZONOV, D. M. and TISHCHENKO, S. A.

[Abstract] The paper considers the problem of optimizing the parameters of antenna arrays which focus the electromagnetic field in the near zone of space. One of the possible characteristics of optimization is selected, and by maximization of this parameter the problem is solved of locating an optimum excitation of the elements of an arbitrary antenna array. In passing, an analysis is made of the problem of the field of space inside of which the solution obtained is valid. Optimization is discussed of the parameters of an antenna array by the method of maximization of the ratio of two quadratic Hermitian forms. A general method of optimization is lacking for random antenna arrays comprising interacting elements and focusing their emission. The statement of the problem considered and its solution make it possible to transfer the technique of synthesis of arrays from the distant zone of an array to the intermediate and near zones and enables calculations to be carried out on an electronic computer in comparatively simple programs. Figures 3; references 4: 2 Russian, 2 Western.

USSR

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OPTIMIZATION OF PARAMETERS OF MATCHING DEVICES OF ACTIVE MULTIELEMENT SCANNING ANTENNAS IN A FREQUENCY BAND

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 91-95 manuscript received 22 Mar 77

GRINEVA, K. I., GOSTYUKHIN, V. L. and TRUSOV, V. N.

[Abstract] In antennas consisting of a system of radiators, in the process of electrical scanning, the input resistances of the radiators prove to be a function of the position of the antenna beam. It is known that the energy losses which take place during this because of reflection from the antenna array can be decreased by the introduction of matching devices into the channels of the radiators. The present paper considers the problem of choosing the optimum parameters of such matching devices for scanning antenna arrays. The characteristics of the active output stages and the variable impedances are taken into account in assuring the maximum possible value of the amplification factor in the frequency band. Figures 4; references 5 (Russian).

USSR

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ENERGY GAIN IN ACTIVE PHASED ANTENNA ARRAYS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 102-107
manuscript received 25 Mar 77

ZEMTSOV, G. P. and KUZ'MINA, G. A.

[Abstract] The paper is concerned with an evaluation of the energy gain of an active receiving-transmitting phased antenna array (FAR) in comparison with a passive system. The conditions are shown in which this gain is substantial. Calculated formulas and graphs are presented, on the basis of which it is possible to make recommendations with respect to a substantial simplification of the scheme of an active array. It is shown that although the gain does not depend in an implicit form on the number of amplifiers, but an indirect dependence exists because the efficiency of a channel with an increased number of radiators is decreased by virtue of the development of losses in the splitters and increase of the overall length. Consequently, with an increase of the number of radiators (during narrowing of the directional pattern of the antenna array) the energy gain in active receiving-transmitting phased arrays will be increased in comparison with passive arrays. An active receiving-transmitting FAR is energetically more advantageous than a passive system. The energy gain is larger, the larger the losses in the feeder, the smaller the noise temperature of the amplifiers and the radiators and the larger the amplification factor of the power amplifiers of the transmitter. It is possible, moreover, to simplify the circuit of an active FAR because of a substantial reduction of the number of active elements with a small decrease of the overall energy gain. Figures 6; table 1; references 3 (Russian).

USSR

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OPTIMIZATION OF THE STRUCTURE OF SPHERICAL ANTENNA ARRAYS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 121-123 manuscript received 2 Apr 77

SHATOKHIN, B. V.

[Abstract] The present short communication derives an algorithm for optimization of the structure of spherical antenna arrays. A functional diagram is presented. With the aid of the algorithm described, optimization of the distribution of 272 elements is accomplished. The change of the directional pattern of the antenna as the result of optimization is shown. Figures 5; references 2 (Russian).

USSR

UDC 621.396.96

DETECTION OF A RANDOM FIELD BY AN ARRAY OF SPATIALLY SEPARATED LINEAR APERTURES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 33-36
manuscript received 6 Dec 76

RYBAKOV, B. S. and SEITOV, V. N.

[Abstract] Detection of a uniform field with a certain mean intensity and space-time correlation by an array of apertures with spatial or angular separation is analyzed. The detection characteristics are calculated, after the field parameters at the receiver input have been converted to statistical parameters of signals at the antenna output. In this case single-channel systems are found to be more efficient than multichannel systems with the same space utilization and level of intrinsic receiver noise. Angular separation of apertures is, under these conditions, more effective than spatial separation. The tendency of the correct-detection probability to increase with increasing antenna aperture, while the false-alarm probability remains constant, is unaffected by large spatial distortions of the field. Figures 2; references 8 (Russian).

USSR

UDC 621.397

EVALUATION OF PARAMETERS OF ACTIVE PHASE ANTENNA ARRAY BASED ON SEMICONDUCTORIZED BIPOLAR SELF-EXCITED OSCILLATORS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 108-112
manuscript received 27 Mar 77

PONOMAREV, L. I., YEL'TSOV, A. K. and DIKHODED, YU. V.

[Abstract] A promising trend in the development of active phased antenna arrays [AFAR] is the use as active modules of bipolar semiconductorized microwave self-excited oscillators based on avalanche transit time diodes and Gunn diodes. In connection with this, the present paper investigates circuit methods for improving the parameters of an AFAR, and analyzes the effect of the actual characteristics of semiconductorized self-excited oscillators on the principal antenna parameters. A possible classification is shown of methods for synchronization of bipolar self-excited AFAR. As a result of the analysis, expressions are obtained for evaluation of the efficiency, the limiting frequency and the scanning sector of certain schemes of AFAR based on bipolar self-excited oscillators. Also discussed are phase errors in the antenna aperture, caused by spread of the parameters of the self-excited oscillators. Figures 6; references 6 (Russian).

USSR

UDC 621.396.677.4:621.396.96

INVESTIGATION OF GENERALIZED MODEL OF A PHASED ANTENNA ARRAY

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 62-68 manuscript received 12 Mar 77

MIKHEYEV, S. M. and POPOV, V. V.

[Abstract] By means of a scattering matrix of the actual elements and circuits which form a phased antenna array [FAR], the total scattering matrix of the antenna array is determined and an expression is found for the radiation field of a FAR which describes the interaction of the radiators in the array, the quality of operation of the phase shifters, discrete control of the phase and the distributing circuit of the system. The principal circuits of the FAR are presented in the form of a combination of three basic microwave multiterminal networks: the distributing system, the phase shifter block and the array of radiators. The electrodynamic properties of these multiterminal networks are considered to be at the basis of the natural waves, which make it possible in a general way to determine the structure of the scattering matrix of these multiterminal networks. It is shown that the minimum of distortions during operation of the FAR is attained in distribution systems with dissipative elements. Figures 5; references 10: 9 Russian, 1 Western.

USSR

UDC 621.396.677.49

TRANSFORMATION OF SPACE-TIME SPECTRUM BY ANTENNA ARRAYS WITH SIGNAL PROCESSING BY THE METHODS OF COHERENT OPTICS

Kiev IZV. VUZ: RADIOTEKHNIKA in Russian Vol 21 No 2, 1978 pp 74-83 manuscript received 25 Mar 77

GRINEV, A. YU. and VORONIN, YE. N.

[Abstract] The paper is concerned with the use of optical methods for processing of space-time signals of an antenna array which are associated with the known value of coherent-optical processing which connects the space-time spectrum of the radio emission at the input with its image at the output. It is shown that the system function coincides with the directional pattern of the antenna array. The dispersion properties of an antenna array with coherent-optical processing are investigated. Expressions are obtained for the directive gain of an antenna with coherent-optical processing in monochromatic and non-monochromatic cases. A clear geometrical interpretation of the operation of an antenna array with coherent-optical processing is proposed. Figures 3; references 7: 4 Russian, 3 Western.

CONCERNING THE EFFICIENCY OF ELECTROMAGNETIC RADIATORS SURROUNDED BY A DIELECTRIC ENVELOPE

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 58-63 manuscript received 27 Mar 76

DRABKIN, A. L. and KRASIL'NIKOVA, V. A.

[Abstract] The results are presented of a theoretical investigation of the losses in dielectric envelopes which surround the simplest antennas (short dipoles or loop antennas of small size). Thinwalled (5-10 mm) envelopes of spherical form with a diameter of 0.1-0.2 m are considered in connection with their use in the meter and short-wave bands. A simple engineering method of calculating the losses is derived and compared with a more rigorous method developed in the U.S. by R. Row. The comparison confirms the reliability of the proposed method. The analysis conducted shows that with spherical envelopes with dimensions small in comparison with the wavelength, the efficiency of loop antenna radiators with homogeneous lengthwise distribution of current is higher than dipoles (under equal conditions otherwise). The loss resistance in the conductors of loop antenna radiators is much larger than the resistance resulting from losses in the envelope. Consequently, for an increase of the efficiency it is most practical to locate loop antenna radiators in a low-temperature environment. The efficiency of radiators in the envelope increases with an increase of the radius of the envelope and a decrease of its thickness, dielectric constant and the tangent of the loss angle. This paper was reported at the section of theoretical radio engineering, Leningrad Branch of NTORES [Scientific and Technical Society of Radio Engineering, Electronics and Communication imeni A. S. Popov]. Figures 6; references 6: 2 Russian, 4 Western.

EAST GERMANY

FRAUNHOFER DIFFRACTION ON ANNULAR APERTURES

East Berlin FEINGERAETETECHNIK in German Vol 26 No 12, Dec 77 pp 551-553

HILD, R., graduate physicist, Physics Section, Friedrich Schiller University, Jena

[Abstract] The far-field behavior of structures resembling zone plates are investigated. The layouts discussed in the literature may be regarded as special cases of the results presented. The intensity distribution in the far field is regarded as the sum of the amplitudes created in the individual rings resulting from diffraction. A structure of ten zones was considered as an example: this structure offers many possible combinations of the available parameters, such as variation of the complex amplitude transmission of the individual zones and the distances between the zones. It was concluded from the theoretical study that significant modifications of the intensity distribution may be realized, compared to non-structured diffraction, in apertures with annular structure by the appropriate selection of the complex amplitude transmissions of the individual zones and the distances between the zones. The physical features of diffraction on circular and annular apertures, as well as the phase effects were taken into consideration. Figures 8; references 8 (Western).

Certain Aspects of Computer Hard and Soft Ware;
Control, Automation, and Machine Planning

EAST GERMANY

MICROPROCESSORS AND MICROCOMPUTERS. PART 1

East Berlin FERNMELDETECHNIK in German Vol 18 No 1, 1978 pp 19-24

ZAREMBA, J., Chamber of Technology, Electronics Section of Humboldt University, East Berlin

[Abstract] This series of articles is intended to provide material for self study about microprocessors and microcomputers. The articles assume knowledge of digital circuit technology; they are oriented toward microprocessors and microcomputers likely to be available in the German Democratic Republic in the foreseeable future; they will stress practical applications rather than theoretical fundamentals; and they present questions in order to check whether the information was properly comprehended (the answers will always be printed with the next installment). The first part of the series discusses the following subjects: Digital computer arithmetics (fixed and floating decimal point systems), the structure of digital computer systems; microprocessors (the U 808 D microprocessor); current problems of nomenclature standardization in communications technology (relationship between word and concept, need for acronyms, trade names as generic terms, regulations for standardized terminology); and goals and tasks of a working team. Insofar as nomenclature standardization is concerned, the author advocates the establishment of a system geared to the needs of industry in the socialist countries. Figures 5; tables 2; references 16: 1 Russian, 15 German.

EAST GERMANY

MICROPROGRAM STARTING DEVICE FOR THE U808D MICROPROCESSOR

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 23-24, Dec 77 pp 798-800

KOEHLER, THOMAS, graduate engineer

[Abstract] The starting device displays the data output by the processor, enters data and microcommands in the processor, causes program stop at pre-selectable locations, and permits interrupt operations. It consists of the following components: The trap (enabling the halt of the program at a pre-selected location), data entry/buffer unit (to permit feeding data to the processor), run control unit (to enable step-by-step running of program parts and to report interrupt operations), and the display unit (displaying the address bus, data bus, processor status, and operational cycle signals). The following signals are required for the display of data and the operation of the starting device: address bus, data bus, status, and timing pulse signals. The following signals are transmitted by the starting device to the central processor unit: synchronization, interrupt-request, input data bus, and

memory-block signals. The processor data may be updated; for this purpose, a WAIT and a STOP status are available. The system may also be used to test microprograms. To some extent it is also possible to use it in searching for hardware defects because, in conjunction with the microprocessor, it permits the triggering of certain test functions. Figures 5; references 1 (German).

EAST GERMANY

MICROPROCESSORS IN TELEPHONE EXCHANGE TECHNOLOGY

East Berlin FERNMELDETECHNIK in German Vol 18 No 1, 1978 pp 4-8

CIMANDER, W., and WINTER, W., Chamber of Technology, Dresden

[Abstract] The fact that microprocessors are adaptable to a large variety of tasks with the aid of appropriate software makes them very interesting for use in communications technology in general and for use in telephone exchange technology in particular. They are especially promising in the following areas: central control of memory-programmed telephone exchange systems with large numbers of subscribers; handling of part tasks in conventional or new exchange systems (such as routine checks); solving specific, narrow problems in old and new exchange systems (acquisition and processing of dialed digits, monitoring and switching-through of coupling fields); and control-engineering functions in decentralized devices or systems (such as secondary exchanges and concentrators). In order to acquire experience, a microprocessor-controlled automatic dialer and a scan processor were developed for telephone dialing systems. It preprocesses the dialing information, periodically checks the state of the connected lines, records any changes, summarizes the received dialing pulses, and passes the preprocessed subscriber information to the supraordinate computer. It handles information on "line busy," interference, dialing start, summarized digits dialed, and "line free" for each subscriber. Initial experiences with the system were favorable. Figures 11; tables 3; references 2: 1 German, 1 Western.

EAST GERMANY

MICROCOMPUTER TECHNOLOGY. PART 3

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 641-644

LINDNER, STEFAN, Dr of engineering

[Abstract] This part of the series of articles discusses transistor-transistor logic, integrated injection logic, emitter-coupled logic, and unipolar circuits (static MOS circuits and single-channel technology). The major parameters of the TTL families 74, 74L, 74H, 74S, and 74 LS are tabulated (pulse flank duration, average delay time, measuring conditions, average loss power, velocity power products, input load factor, output load factor, static signal-to-noise ratio, and comparable models. The users must observe the restrictions applicable to TTL compatibility. For example, the U 808 microprocessor can only drive low-power TTL load circuits. The advantages of the integrated injection logic include high packing density, few manufacturing steps, low loss power, high speed, high loss-power and speed range, and easily achievable TTL compatibility. Figures 11; table 1.

EAST GERMANY

MICROCOMPUTER TECHNOLOGY. PART 6

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 29-30

LINDNER, STEFAN and KUEBART, RUDOLF, drs of engineering

[Abstract] This part of the series of articles discusses briefly the following subjects: development trends in circuit engineering, a basic assortment of circuit types, and international development trends in microcomputer configurations. Increasing degrees of integration increase the intelligence of the systems with fewer auxiliary circuits. Reduction in the number of components and the associated connections increases reliability and better system availability. An increase in the number of components per chip increases working speed and drastically reduces the costs. However, these desirable improvements are at the expense of manufacturing. It is desirable therefore to aim at large series and the use of universal, standardized circuits (central processor units, memories, and the like). In addition, the number of potential users decreases as the component units become increasingly complex. All this indicates that the development era is not over by far. Various measures are employed to increase the degree of integration; they are briefly reviewed. The latest microcomputers made domestically and abroad feature elimination of the decoding complexity, of level adaptation, and demultiplexers of data and address buses. Additional functions now integrated include timing-pulse generation, entry of interrupt vector addresses, and integration of the input/output units in memory circuits. Tables 2.

EAST GERMANY

MICROCOMPUTER TECHNOLOGY. PART 7

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 pp 97-100

KUEBART, RUDOLF, Dr of engineering

[Abstract] This part of the series discusses the following subjects:

(1) Central processor unit (discussed on the basis of the examples U 808 D made by the Radio Works State Enterprise in Erfurt, the 8080A made by INTEL, and the Z 80 made by Zilog); (2) memory circuits (discussed on the basis of examples of static RAM, dynamic RAM, ROM, and EPROM circuits of various types); (3) interface circuits (components for series data input/output, and for parallel data input/output). The properties of the memory are very important for the proper cooperation between central processor unit and memory; these properties as well as other properties for the various memory circuits of the MOS design are presented in tabular form. The microcomputer performance is determined primarily by the properties of the central processor unit; the most important properties of the above-listed units are also tabulated. Figures 4; tables 2.

EAST GERMANY

MIKAM 1: AN "INTELLIGENT" CONTROLLER FOR CAMAC MEASURING SYSTEMS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 pp 95-96

GLASNECK, CLAUS-PETER, and GLEIBMAN, ERNST M., Joint Institute for Nuclear Research, Dubna, Soviet Union

[Abstract] The MIKAM controller which is described and illustrated permits operation in an autonomous fashion and also with a supraordinate computer. It allows data exchange in both directions using any desired module connected to the CAMAC data-transmission system; the control and processing of interruptions; the processing of incident data; connection with an input/output device such as a teletype or display; and connection with a central computer. The MIKAM 1 consists of a microcomputer circuit board and an interface to the CAMAC data transmission network. The microprocessor used is an INTEL 8080 (programmable 1.5K-bit fixed memory, 0.5K-bit read/write unit, interrupt control, an interface for display or teletype (terminal), and real-time clock). The interface adapts between the 8-bit processor data network and the 24-bit CAMAC terminal. Expansion by extra CAMAC modules to 63K bits is feasible. The advantage of the MIKAM 1 as an intelligent controller is that the computer is accommodated in the device frame, thereby eliminating adaptation and power supply problems. Figure 1; references 10: 2 German, 1 Russian, 7 Western.

EAST GERMANY

DESIGN AND CONSTRUCTION OF A COMPUTER LINK USING THE CAMAC STANDARD

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 11, 1977 pp 458-460 manuscript received 8 Aug 77

NEUBERT, P., Chamber of Technology, Dubna and Dresden

[Abstract] Projects carried out at the Measuring Center of the Nuclear Problems Laboratory at the Joint Institute of Nuclear Research in Dubna, USSR, for the increased use of computer systems in nuclear-physical experimentation are described. Computer systems of CAMAC modules were established, where the basic modules were developed for a variety of uses, and various process computers (HP 2116C, HP 21MX, M 6000, ES 1010, KRS 4200) were made available. Finally, the conditions for the evaluation of the physical experiment data were significantly improved by the installation of an ES 1040 system. The CAMAC standards are used not only as the basis of the instrumentation system but also as interfaces between the individual components of the computer system. The three levels represented feature the ES 1040 central computer, the KRS 4200 front-end processor, and various experiment-control computers. The latter systems feature a HP 2116C, a M6000, and the RTE II operating system in the multiprogramming mode. Plans call for the development of suitable cross software for the small computer in the ES 1040. Thus, program development will increasingly shift to the central computer. But the alphanumeric display, the medium-speed printer, and the perforated-tape units of the small computer will remain the communication points of the user. Figures 4.

CZECHOSLOVAKIA

UDC 62-501.22

METHODS OF GENERATION OF UNCORRELATED SIGNALS FOR IDENTIFICATION OF DYNAMIC CHARACTERISTICS OF CONTROLLED SYSTEMS

Prague AUTOMATIZACE in Czech Vol 20 No 11, Nov 77 pp 295-299

PEKAREK, O., engineer, TIA Institute, Czechoslovak Academy of Sciences;
HAVLICEK, A., TZCHT Institute Czechoslovak Academy of Sciences, Prague

[Abstract] Use of a pseudo-random binary signal for identification of dynamic systems of lower orders is well known. When the study of a system is based on several input signals, a single generator of several uncorrelated pseudo-random binary frequencies can be used if a period long enough for a comparison with a dominant time constant of the system is available. Identification experiments under operating conditions of chemical process plants usually deal with long-time period constants and the measurements are conducted under conditions of high levels of interference. The method of pseudo-random binary signals is suitable for this application because of its reproducibility and its easy use in statistical evaluations. The method of generation of additional uncorrelated pseudo-random binary signals, based on the original signal, can be used in instruments, simplifying the problems of identification

of dynamic properties of a multidimensional system. Logical circuits for these regularly distributed functions have a simple design. The method developed by the authors has operational advantages when compared to methods using multiplication of pseudo-random binary sequences by vectors of the lines of Hadamard's matrix, because the newly formed signals have the same period as the basic signals. This is a distinctive advantage for chemical processes with operations extending over long periods of time. Figures 14; references 5; 3 Czech, 2 Western.

USSR

UDC 62-505:621.385.7

OPTIMAL DESIGN OF ELECTRONIC CIRCUITS BY THE λ -TRANSFORMATION METHOD

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 4, Apr 78 pp 86-94 manuscript received 3 May 77

GADAKHABADZE, I. G., DZHIBLADZE, N. I. and CHICHINADZE, V. K., Tbilisi

[Abstract] The problem of optimizing the elements of a given electronic circuit with respect to static or dynamic performance parameters is approached here by the λ -transformation method. The operating mode of an electronic circuit is described by a system of ordinary differential equations. Their solution is based on finding the design parameters constituting an m -dimensional vector p which, by physical considerations, is not arbitrary but must remain within a certain region of allowable values. The quality of the transient process, in the case of optimization with respect to dynamic performance, is characterized by the functional $I = \int_{t_0}^{t_f} [x(t), p(t)] dt$ (where $x(t)$ is

an n -dimensional state vector) whose extremum will correspond to the optimum transient process. The gist of the λ -transformation method is to find this extremum by transforming the original function $I(p)$ of many variables to a continuous monotonically decreasing function $\lambda(\zeta)$ of one variable and transforming the independent vector variable p to a vector-function $p(\zeta)$ of the same variable. The argument of ζ is the scalar value of function $I(p)$. The algorithm of this method of solution has been constructed and programmed for calculation on an M-222 computer. Its implementation is illustrated using as an example a single-stage common-emitter transistor amplifier with optimum nominal base, emitter, and collector resistances, fixed capacitances, and constant input voltage. The method yields the global extremum of a function of many variables and is particularly effective with the use of a high-speed digital or a hybrid computer. Figures 4; references 13: 9 Russian, 1 German, 3 Western.

USSR

UDC 621.14:621.311

COMPUTER TECHNOLOGY IN CONTROLLING THE OPERATING CONDITIONS OF POWER SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 11, Nov 77 pp 13-18

GORNSHTEYN, V. M., KRUMM, L. A., RUDENKO, YU. N., SEMENOV, V. A., SOVALOV, S. A., TSVETKOV, YE. V. and CHERNYA, G. A., Moscow

[Abstract] The paper reviews the stages of utilizing digital computers to control the operating conditions of power systems in the USSR. The process started in the mid-sixties with the introduction of Ural-2 computers in a number of power systems. By the late sixties and early seventies, many systems were installing the more advanced series M-220 and BESM-4 computers. At this point, work began on radical improvement of operational control of power on the basis

of development of an automated dispatcher management system (ASDU) for all levels of power systems from the Unified Power System of the USSR down to individual power systems. The main principles of organization of this automated management system are: a multiple-stage structure reflecting the territorial hierarchy of operative-dispatcher management with reorganization of dispatcher stations to use computer technology; extensive use of digital computers at all stages of the territorial hierarchy to solve problems on various time levels of management; development of a data collecting and transmitting system and creation of a unified information system for planning and management of operating conditions; extensive use of automation in management of power systems and generators under normal and emergency conditions; combining centralized and localized automatic facilities. The first phase of this system is now basically completed. By mid 1977, 38 third-generation computers had been installed in central dispatcher stations and were being used in planning operating conditions. Some details are given on the hardware and software now in use, the problems that are being solved and the specific jobs of individual power systems. The particular methods used in solving different classes of problems are explained. An outline is given of the expected changes and planned improvements in hardware and software of the automated dispatcher management system.

DESIGN OF PRINTED CIRCUITS USING COMPUTER PROGRAMMING SYSTEM SYSDEB77

Prague AUTOMATIZACE in Czech Vol 21 No 1, Jan 78 pp 9-15

FRIS, ZDENEK; KRIZ, JIRI; SERVIT, MICHAL and SCHMIDT, JAN, engineers. FEL Computer Center, Czech Technical University, Prague

[Abstract] The programming system SYSDEB77 allows automatic designing of a circuit configuration, generation of tapes for the control of drafting tables, and for the control of coordinate drills for the manufacture of discs. It also provides the recording and maintaining of the required data banks. The SYSDEB77 system was developed at the Computer Center of the Faculty of Electronics of the Czech Technical University at Prague, using a TESLA 200 computer. It was prepared for automated design of discs of two-dimensional connections. It drastically reduces the time needed for the design work and reduces the possibility of errors. It is comparable to the similar Western systems PUZZLE and APRICOT. The system can design 98 to 100 percent of the required sub-units. Its limitations are caused by the character of the TESLA 200 computer. The system is suitable for the design of single or two layer discs of two-dimensional connections in any class of accuracy. Its best application is in the design of two layer discs in the accuracy class 4. The maximum size of the connection diagram is 252 x 252 mod. The TESLA 200 computer should have a memory of 128K bytes. The time needed for the design of two layer discs 52 x 62 mod with 11 components (8 IO, 27 connections, 128 connected sub-units) is 25 minutes. For a disc 90 x 140 mod with 40 components (23 IO, 108 connections, 336 connected sub-units) the required design time is 90 minutes. Generation of tapes for the control of the Corograph or Digigraf recorders is included in the quoted values. Figures 9; references 10: 4 Czech, 1 Russian, 5 Western.

USSR

UDC 621.382.81

PARTICULARS OF DESIGN AND MANUFACTURE OF MICROELECTRONIC DEVICES FOR DATA EXCHANGE

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 20 No 5, 1977 pp 120-124 manuscript received 8 Jul 76

ALEKSANDROV, V. V. and KARPUKHIN, A. V.

[Abstract] The paper deals with problems that arise in miniaturization of high-frequency multichannel systems for exchange of information between computing devices that make up a computer complex. On the basis of thin-film techniques, an outline is presented of design and manufacture of the receiving and transmitting parts of frequency-selective hybrid integrated circuits that utilize the frequency-sharing principle for exchange of information between component machines within a digital computer complex. A method is proposed for computerized design of data exchange devices. The method was checked out on models that confirmed the theoretical conclusions. The results were used for designing the receiving and transmitting parts of an exchange system in which the main elements were LC self-excited oscillators and LC active filters in the form of functionally complete modules. The paper was recommended by the Department of Microelectronics, Khar'kov Institute of Radio Electronics. Figure 1; references 6: 5 Russian, 1 Western.

USSR

UDC 621.396.49

SYNTHESIS OF COMPACT GROUPS OF FREQUENCY-TIME MATRIX SIGNALS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 45-51 manuscript received after completion 2 Jan 77

GLOBUS, I. A. and DALMATOV, S. B.

[Abstract] The work provides a description of methods for synthesis of rational groups of frequency-time matrix (ChVM) signals, the output of which equals a number--the maximum possible for specific values--of time samples, and frequency and active elements. It is found that synthesis of the maximum compact full groups of rational ChVM signals without overlapping of frequencies is possible only in the cases $n = 3$ and $n = 4$, $l = 7$. Synthesis of compact complete groups of rational ChVM signals with values $N > 0.5 N_{\text{group}}$ (with a time base $L < 2 l_{\text{group}}$) with $n \geq 4, l > 7$ is possible only with fully determined values of the time base l , equal to the base of a group of n -elements of one-frequency signals, and with values of $t = P^\alpha$, P is single, α is whole. Furthermore, use of the method of superposition of interval and frequency arrangements makes it possible very simply to solve problems--important for a number of practical applications--and synthesis of ChVM signals with a minimum interval between active elements of more than one sample. For this it is sufficient

to take as the interval arrangement the triangles T with a minimum interval $\alpha_0 > 1$. Figure 1; tables 4; references 7: 6 Russian, 1 Western.

USSR

UDC 681.3.056

PROGRAMMING A TEST SYSTEM FOR AUTOMATIC ANALYSIS OF ACOUSTIC EMISSION

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 77-78 manuscript received 10 Jun 77

BYDANOV, G. A., VYSOTSKIY, YE. D., DOBRYDNEVA, I. A. and SHITIKOV, B. I.,
Moscow

[Abstract] A test system has been programmed for automation of experimental studies regarding the use of acoustic emission for inspection of power reactors, specifically the housings and the equipment in the first loop. The automated test system consists of piezoelectric transducers and a YeS-1010 computer which operates in real time. This computer processes input data in the spacetime domain and presents the output data in the form of a phase and surface distribution of acoustic emission intensity. It has been programmed so that the experimenter can enter the initial conditions of an experiment, the list of data processing procedures to be followed, the desired form in which the results are to be presented, and have the characteristics of the data interpretation process described at any time. It is possible to compress or fix the scale of a data field, to copy, shift, and combine data fields, to normalize and collocate data fields, and to evaluate the statistical characteristics of a data field. Data are stored on a magnetic drum with standard access, they can also be edited and catalogued. The material of this paper was presented at the conference "Automation of Scientific Investigations Based on the Use of Electronic Computers" (Novosibirsk, 1977).

USSR

UDC 681.32:62-501.52

STABILITY OF DIGITAL SERVOSYSTEMS WITH CODE-TO-PHASE CONVERSION

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 4, Apr 78 pp 69-74 manuscript received 3 May 77

KORSHUNOV, A. I., Leningrad

[Abstract] Digital servosystems are used as the interface between a digital controlling machine and controlled objects. A digital input signal is first converted to the phase of a rectangular pulse, with a phase shifter as the sensing feedback element. The error of such a servosystem is determined by the shift of the zero-crossover of the phase-shifter voltage relative to the center of the rectangular input pulse. Schematically a digital servosystem can be represented by a discrete element which shapes bipolar rectangular pulses and a linear continuous element, both in series with a feedback loop around them. The stability of such a system is analyzed here, on the basis of the transfer function and by the Lyapunov methods, in the small and on the whole. The results of this analysis are then applied to a digital servosystem with a second-order continuous element and numerical values are obtained. Figures 3; references 2 (Russian).

USSR

UDC 681.142.6:519.27

DIGITAL GENERATOR OF STOCHASTIC PROCESSES BASED ON SIMPLE DIGITAL CIRCUITRY

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 20 No 12, 1977 pp 39-42 manuscript received 14 Apr 77

LEUSENKO, A. YE., YARMOLIK, V. N. and PETROVSKIY, A. A.

[Abstract] A method is proposed for generation of stochastic processes with a preset spectral power density based on the use of narrow-band stochastic processes, constructed by means of the simplest digital circuitry. The proposed method for generation of a narrow-band stochastic process is based on the use of a binary counter, the coefficient of re-computation of which is changed in a random manner within preset limits. A stochastic process with a given spectrum is obtained at the output of the highest order of a binary counter. The paper was recommended by the Department of Electronic Calculating Machines, Minsk Radio Engineering Institute. Figures 2; references 3 (Russian).

CZECHOSLOVAKIA

INSTALLATIONS FOR REMOTE DATA TRANSMISSION

Prague AUTOMATIZACE in Czech Vol 20 No 11, Nov 77 pp 312-313

HELLMAN, ZDENEK and PUZMAN JOSEF

[Abstract] Equipment supplied by the firm Telefunken SIG of Ulm in West Germany is discussed. The firm offers three units for the assembling of independent screen terminals suitable for conversational operations in computer terminals. The Telefunken SIG terminals can be connected locally as a peripheral unit of the main computer, even when they are used for the transmission of information to distant locations. For a distance of 125 meters a rate of 9,600 bytes/sec can be used, for 1000 meters a rate of 1,200 bytes/sec. Permanent printed records of the displays can be made. The SIG units can be connected to multipoint or circular circuits and be accessible to several users. Transmission rates are 50 to 9,600 bytes/sec. The units are provided with keyboards and display screens. The smallest unit is SIG 46 with 64 various keys; SIG 50 incorporates 65 keys, and SIG 51 has 105 keys. Power supply is 220 V, 50 cycles, 160 to 170 Amps. Figure 1.

EAST GERMANY

MULTIDIMENSIONAL ELECTRIC SPACE-TIME MODELS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 11, 1977 pp 460-465 manuscript received 25 Jul 77

GUTENMACHER, L. I., Odessa, USSR; WUNSCH, G., and JUGEL, A., Chamber of Technology, Dresden

[Abstract] The authors demonstrate the theoretical possibility of the construction of multi (more than four)-dimensional models in space and time and the combination of such models with a digital computer. A hybrid computer system may be designed on this basis. The authors review published models of multidimensional bodies and discuss new electric models. Because there are no physical constants in the space-time models, a new general element is introduced which is unified for all models: the autonomous voltage source Δu , as the universal "element" in space and time. On the basis of references in the literature, the authors discuss the structure of the network model and analogies; the hybrid computer model; the modeling with cellular structures; and random processes in cellular structures. The models of stochastic cellular structures described and further developed permit the examination of such major matters as the relationship between microscopic events (cell) and macroscopic laws (overall system) in space and time. Figures 8; references 13: 10 Russian, 1 German, 2 Western.

EAST GERMANY/SOVIET UNION

MULTIPLE-STATE ELEMENT IN PHASE-PULSE TECHNIQUE

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 11, 1977 pp 472-476 manuscript received 31 May 77

PESHKOVA, S. A., Department of Computer Technology, Moscow Power Engineering Institute, and AUER, M., Information Technology Section, Dresden Technical University

[Abstract] The carrier of the information in a phase-pulse multiple-state element is the phase of a square-pulse sequence. The angle does not change continuously, but assumes only certain values corresponding to the individual states. To solve the problems concerning the control of the phase-pulse multiple-state element, as well as to evaluate the velocity and reliability of the transition of the element from one state to another, it is advisable to develop a mathematical model for the element. Phase-pulse multiple-state elements may be realized in miniaturized form with the aid of integrated circuits. Some such elements have already been described in the literature. A specific element discussed in some detail uses a sequence of square pulses as information carrier. It possibly has as many as 256 states. It is based on components (integrated circuits) made in the German Democratic Republic. Digital circuits may be used in the comparator also without reducing the number of states. In such elements the switching-engineering complexity does not depend on the number of decision thresholds. Figures 14; table 1; references 18: 10 German, 6 Russian, 1 Polish, 1 Western.

EAST GERMANY

EXAMPLES FOR THE USE OF TWO-DIMENSIONAL LINEAR TRANSFORMATIONS FOR THE PROCESSING OF DIGITAL IMAGE INFORMATION

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 96-99 manuscript received 7 Jul 77

LIECKFELDT, P., Electronics Institute, Academy of Sciences, Neubrandenburg

[Abstract] The goal of the study was to process image information available in digital form on magnetic tape with a digital computer with the aim of improving the image quality, specifically to emphasize certain information for display. The information to be processed is in the form of a two-dimensional intensity distribution. Linear software filters are developed for the processing of the video information. The transmission function of a filter is variable over a wide range. The filtration by a linear system can be easily

realized in the frequency range as the multiplication of the Fourier-transformed image with transmission function. To permit this to be accomplished, the video information must be transformed in the frequency range. Filtration in the spatial frequency range and in the sequence range is described. The processing system may be used for improving X-ray television system images. In the experiments described, a PRS 4000 small computer was used. The programs required were written in the FORTRAN language. Figures 10; references 11: 8 German, 3 Western.

EAST GERMANY

AN ALGORITHM FOR THE TREATMENT OF TRANSMISSION ERRORS IN DIGITAL TELEMETRY DATA

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 11, 1977 pp 453-457 manuscript received 6 Jun 77

KLAWITTER, MARGRET, LIECKFELDT, P., MELINKAT, K., and MOHNKE, Institute of Electronics, Academy of Sciences of the German Democratic Republic, Neustrelitz

[Abstract] Satellite telemetry information is processed in ground-station computers using software which reacts flexibly to transmission errors and perturbances. The processing involves initial, frame, and word synchronization of the information transmitted in a pulse-code modulated fashion, recognition and handling of transmission errors, and the decoding of the transmitted data to recover the actual information. The algorithm required was programmed in the SYPS 4000 assembler language of the PRS 4000. A framework program assumes control and service functions such as making available and storing the data sets, address management within the data sets, and detailed logging of the procedures. Parts of the algorithm to be adapted to the specific structure of the telemetry system to be processed are in subprograms so that the programs can be readily adapted to various telemetry systems. An extensive test program for the algorithm was also developed. The entire system has been in use with success for handling satellite telemetry information in digital form. Figures 5; references 5 (German).

EAST GERMANY

STATUS, OUTLOOK, AND POSSIBLE APPLICATIONS OF MAGNETIC BUBBLE MEMORY PRINCIPLES

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 10, 1977 pp 402-407 manuscript received 9 Mar 77

STRAUBEL, R., Berlin

[Abstract] A comprehensive review of the published literature is made of the "classic" bubble-memory principle; present state of the "classic" principle (technical data such as frequency of the driving rotation field, area surface density, chip size, Permalloy structure, access time, costs); developers and manufacturers (Hitachi Ltd., Nippon Electric, Texas Instruments I.c, Rockwell International, Bell Laboratories, IBM, Mullard Research Laboratories); comparison with other memory principles and possible applications (in terms of and utilizing the "volatility" of the information, mechanical movement, data access, capacity, access time, and price in bits/cent); and new bubble-memory principles (such as the bubble-domain grid memory). Some among the new principles are claimed to provide many times higher memory-engineering performance than the "classic" principles. Many new principles are in the stage of trial and experimentation. Major breakthroughs are expected in the 1980's. Figures 6; table 1; references 62: 11 German, 51 Western.

USSR

BASIC TRENDS IN MODERN TELEVISION DESIGN

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 11, Nov 77 pp 26-30

NOVAKOVSKIY, S. V.

[Abstract] The article briefly outlines the range of selection in television models currently available to the Soviet consumer. The following directions of improvement in television design are considered: transition to fully solid-state construction; the use of integrated circuitry; the use of standard interchangeable circuit modules; conveniences such as touch tuning, digital channel display indication, remote control, recording and playback of programs, wireless headsets, stereophonic reception and so on; use of advanced circuit technology such as multifunctional IC's, FET's with linear characteristics, printed circuits and so on; the use of fire-retardant materials; incorporation of troubleshooting equipment; improvement of sensitivity and selectivity, reduction of microwave and x-ray emissions, and improvement of reliability of color TV operation. Figures 2; tables 4.

EAST GERMANY

CHROMAT 1060: THE FIRST MEMBER OF A NEW COLOR TELEVISION RECEIVER GENERATION

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 9, May 77 pp 295-302, 305-307

WELZEL, H. J., and ERLER, H., dr, Television Equipment Factory State Enterprise, Stassfurt

[Abstract] A detailed description with full circuit diagrams, block diagrams and a photograph is given of the Chromat 1060 color television receiver. The description covers the main units, namely the housing with picture tube (59 LK 3Ts; diagonal size 59 cm, deflection angle 90°), loudspeaker (L 2203), and convergence circuit board; receiver section; chassis; and power supply unit. The chassis has a 450 mm by 225 mm circuit board; the decoder, video stage, synchronizer, vertical tilt, and high-voltage transformer with cascade rectifier are accommodated on it. The receiver features seven integrated circuits, and has a total of nine plug-in modules. Attention has been given in the design to make servicing convenient and easy. Figures 3; table 1; references 5 (German).

EAST GERMAN

CONSTRUCTION, OPERATION, AND APPLICATIONS OF A270D, A259D, AND A230D INTEGRATED CIRCUITS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 8, Apr 77 pp 248-253

KRUEGER, HANS-HEINRICH, graduate engineer, Semiconductor Factory State Enterprise, Frankfurt/Oder

[Abstract] Three integrated circuits made at the Semiconductor Factory State Enterprise are described and illustrated with circuit diagrams, block diagrams, and tables. The circuits were developed specially for color television receivers, and are used to build the video stage for the reception of SECAM color transmissions. (1) The A 270 luminous density amplifier amplifies the Y signal of the contrast adjustment (linear control) and adjusts the basic brightness independently of picture content, contrast, and temperature changes. Additionally, it limits beam current and shuts down the color carrier in black-and-white transmissions. (2) The A 295 is a SECAM decoder; it separates the color-type signal from the full color TV signal, converts the sequential color-type information into simultaneous information, demodulates the color-type signal, and blocks the color channel in black-and-white transmissions. (3) The A 230 is the RGB matrix with blanking signal circuitry, serving also as the source of reference voltage for blackness values in color-difference signals. Except for the video output transistors, which cannot be integrated, the three circuits cover the entire video stage of color receivers such as the Chromat 1060. Figures 10; tables 3.

USSR

UDC 621.397.6:621.317.799:621.372.54

A FILTER BANK FOR IMAGE MEASUREMENTS IN INTERURBAN CHANNELS

Moscow ELEKTROSVYAZ' in Russian, No 1, Jan 78 pp 30-32 manuscript received 5 Feb 76

BABKIN, YE. V.

[Abstract] A special filter bank has been built for analyzing on an oscillograph the waveform of television signals and for measuring their parameters as well as the interference level in interurban image channels. A switching system is provided here so that the filters can operate in either of seven modes: extracting the luminance signal, extracting the chrominance signal, extracting the voltage of unweighted interference fluctuations in the chrominance signal, extracting the voltage of background noise, extracting and weighting the fluctuations noise in the luminance signal, and extracting the integral fluctuation noise in the luminance signal. The bank can be bypassed instead of being manually disconnected. Figures 3; references 5: 4 Russian, 1 International.

USSR

UDC 621.397.611 VIDEOMAGNITOFON:621.397.132

THE 'ELEKTRONIKA-551 VIDEO' COLOR VIDEO TAPE RECORDER

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 11, Nov 77 pp 54-59

ALEKSANDROV, I. M., BESSUDNOV, R. P., KOVTSOV, V. P. and KOROLEV, YU. V.

[Abstract] The article describes the "Elektronika-551 Video" tape deck for recording and playback of TV colorcasts. The base model for the new system is the "Elektronika L1-08" video tape deck. Details are given on the tape transport mechanism, the electronic part of the system, the video channel, the automatic control system, the audio channel, the power supply and commutation system and the construction of the unit. An experimental run of these tape decks has confirmed the correctness of the decisions made in designing the system. Program duration is doubled by using the half-frame method of recording the color image in accordance with the requirements of the IEC for color image reproduction quality. The introduction of FM signal processing and additional corrections in the color record-playback channel reduces crosstalk distortions between brightness and chrominance signals, as well as the moire level in the chrominance signal caused by a reduction in the chrominance signal recording current as compared with IEC recommendations. The use of special IC's with an increased degree of integration considerably reduces the volume of the electronic part of the tape deck. The use of DC disk motors improves the tape transport design and increases precision in automatic control of the video heads and tape speed. The system uses standardized interchangeable parts and components. Figures 8; references 6: 5 Russian, 1 Western.

USSR

UDC 621.397.611

A DEMODULATOR FOR TV-RADIO STATIONS OF THE I-V VHF BANDS

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 25-30 manuscript received
28 Jun 77

KOZLOVSKIY, M. M., POGREBNOY, L. V. and ALTUKHOV, B. V.

[Abstract] A transistorized demodulator has been built for automatically checking the performance of television transmitters. Its characteristics meet the All-Union State Standard 20532-75 as well as the IRCC recommendations, such as those pertaining to sideband suppression and distortion compensation. It operates in the video channel as well as in the audio channel. This demodulator can be used in any of the I-V VHF bands. No test transmitters or test modulators are needed for checking and tuning it. Figures 6; references 5: 3 Russian, 2 International.

EAST GERMANY

THERMOVISION

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 9, May 77 pp 312-313

BERGMANN, HEINZ, graduate engineer

[Abstract] The author gives a brief review of thermovision, meaning the display of thermal radiation in the form of an image, using infrared television technology. The process is also known as thermography and thermometry. In a sense, the human eye, which can perceive incandescence, is a primitive thermovision device. Modern thermovision devices can sense temperatures from as low as 0°C upward. The electro-optical image converter, operating on the basis of electronoptical amplification and display of photoelectrons, is a more sophisticated device. Its range begins at approximately 400°C. From approximately 300°C upward, infrared-sensitive television camera tubes with lead oxide or sulfide coating may be used. Solid-state detectors represent the most modern devices, which can sense heat from 0°C upward. The display may be black-and-white heat patterns, isotherm image, and superimposed isotherms (digital superimposition of the isotherm temperatures is also possible). The most advanced units available presently cover the -20°C to 900°C range, with expansion possibility to 2000°C by means of special infrared filters. Thermovision has many industrial, medical, and other uses. Figure 1; table 1; references 5 (German).

EAST GERMANY

OPTOELECTRONIC RADIATION BARRIERS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 18-24

REGEL, WILFRIED, Television Electronics State Enterprise

[Abstract] Optoelectronic radiation barriers in general, and optoelectronic radiation barriers made by VEB WF [Television Electronics State Enterprise] in particular, are reviewed in terms of performance, design, construction, and applications. All optoelectronic radiation barriers feature a transmitter such as the VQ 110 luminescence diode and a receiver such as the SP 201 phototransistor, both made by VEB WF. Detailed data are presented about the sensitivity of the SP 201 for radiation of all wavelengths and at low collector currents, as well as its dynamic behavior. The radiation flow in the VQ 110 is explained. This is followed by a review of the basic equations concerning the lenses used, and a description of radiation barriers with and without additional lenses. These data are necessary in design calculations for the optoelectronic radiation barriers in various end uses. The parameters of the barriers are established on the basis of measurements, which are afflicted with

errors, some being typical for measurements on this kind of product (such as irregularities in the beam configuration). The most important parameters include the focal width of the transmitter lens and the receiver lens, the aperture angle of the transmitter lens, the transmission frequency, and the transmission characteristics of the receiver amplifier. Methods for measurement are described, and examples of circuits (for a barrier operated at distances of 6 and 10 cm, respectively) are given. Figures 26.

USSR

UDC 621.356.820

EFFECT OF THE FADEOUT DISTRIBUTION ON THE NOISE IMMUNITY OF OPTICAL COMMUNICATION LINES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 111-114
manuscript received 14 Jul 77

BUKHINNIK, A. YU., KUSHNER, V. F. and SHCHELKUNOV, K. N.

[Abstract] The noise immunity of a digital optical communication line in a turbulent atmosphere is evaluated, when the receiver algorithm consists of counting the number of photons within a time period equal to the length of a binary message and comparing this count with the threshold. The probability density of the average number of photons in a message is assumed to correspond either to a log normal distribution or to a Rice fluctuation of the amplitude. The average number of photons in a message necessary to ensure a probability not higher than a certain error is thus found to depend on the fadeout distribution and, in most cases, on the character of amplitude fluctuations at the receiver. Figure 1; references 9: 6 Russian, 3 Western.

USSR

UDC 621.391.8

NOISE IMMUNITY OF THE RECEPTION OF OPTICAL SIGNALS WITH UNKNOWN PHASE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 123-125
manuscript received 22 Feb 77

BORISOV, E. V. and KISELEV, A. K.

[Abstract] Where coherent reception is not feasible because of atmospheric turbulence, an optical communication line is considered with discrete frequency modulation of the subcarrier and consequent intensity modulation of the optical carrier. Detection is then based on the difference of frequencies, with the phase angle regarded as a random quantity. The noise immunity of such a receiver is evaluated here, assuming a nonstationary Poisson flux of photoelectrons at the photodetector output. The error probability is found in this case to depend not only on the signal-to-noise ratio but also on the absolute intensity level of the signal radiation. Figures 2; references 5: 4 Russian, 1 Western.

PROTOTYPE OF A DEVICE FOR FIBER-OPTICS COMMUNICATION WITH A THIN-FILM MODULATOR

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 214-216
manuscript received 19 Jul 77

BELOV, A. V., BELYALETDINOV, I. F., DIANOV, YE. M., ZOLOTOV, YE. M.,
PROKHOROV, A. M. and SHCHERBAKOV, YE. A., Physics Institute imeni P. N. Lebedev,
Academy of Sciences USSR, Moscow

[Abstract] This research demonstrates the feasibility of effective utilization of a thin-film electro-optical modulator in a fiber-optics communication system, in particular for transmitting a television image by means of a laser light source. Radiation on a wavelength of $0.63 \mu\text{m}$ from a single-mode He-Ne laser was coupled into the thin-film modulator by a rutile prism with a spherical base with efficiency of 50%. Focusing was by a lens system. Special steps to improve efficiency could bring the radiation input efficiency up to 80 percent. The Bragg type modulator was based on a lithium niobate diffuse waveguide. Optical losses in the waveguide and in the extraction process were of the order of 1 dB. The deflected beam leaving the modulator was passed through a diaphragm and coupled into a low-loss glass fiber. Losses in the fiber were about 8 dB/km. The emission was coupled into this light guide with an efficiency of about 60 percent. The end of the fiber was held flush against an avalanche photodiode, and the diode signal was sent to a television receiver. A television image of good quality was produced with laser powers of 0.1-5 mW for an entire working day. Figure 1; references 6: 5 Russian, 1 Western.

HUNGARY

FIBER-OPTICAL SYSTEMS IN ELECTRONICS. PART 1

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 17 No 2, Feb 78 pp 38-44

SZALAY, MIKLOS, dr, engineering and economic consultant, Central Research Institute of Physics

[Abstract] This review of the state of the art discusses the use of fiber-optical systems in electronics in general, and in data-transmission and communications in particular. Part 1 discusses light sources, optical light conductor fibers, and detectors. At present the most often used light sources are light-emitting diodes and solid-state laser diodes. Point sources (such as Fairchild FLV 100 and Hewlett-Packard 5082-4420) or narrow-beam sources (such as FLV 104) are used in fiber-optical systems. The light-conducting fibers are made of glass (lead, lead-borosilicate, germanium dioxide, quartz, or borosilicate types) coated with a sheath with higher refraction index. The required parameters (transmission spectrum, attenuation, propagation speed, dispersion or optical scatter, and juncture losses) may be adjusted by composition and manufacturing method. Multiple-channel fiber bundles may be made by various methods. Two kinds of detectors are used in fiber-optical systems: avalanche diodes and PIN diodes; both may be used in high-speed pulse-transmission systems. Figures 8; tables 6.

EAST GERMANY/SOVIET UNION

COMMUNICATION SYSTEMS USING LIGHT CONDUCTORS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 11, 1977 pp 448-451 manuscript received 27 Jul 77

ZHABOTINSKI, M. E., KAZENELENBAUM, B. S., GRIGORYANTS, V. V., GULAEV, YU. V., INOSEMTSHEV, V. P., ISAKOV, V. N., POTAPOV, V. T., SOKOLOV, A. V., SOSNIN, V. P., and FRAZESSON, A. V., Institute of Radio Technology and Electronics, Academy of Sciences of the Soviet Union (IREAN), Moscow

[Abstract] After briefly discussing the typical features of communication systems based on light conductors and the uses of such communication systems, the authors describe (in a paper delivered at the 17 May 1977 Popov conference in Moscow) projects carried out in the Soviet Union in this area. A method was developed for the manufacture of quartz fibers with losses as little as 4 dB/km or less, having a dispersion of 6 ns/km and an aperture of up to 0.22. The method is based on the oxidation of halides from the vapor phase. Thin oxide layers are deposited on the walls of a rotating support tube in the hot zone of a movable heater. The microcapillaries used with these conductors are drawn in a system developed for this purpose. A two-channel measuring system is used to determine very small losses. An amplifier is used to supply the

diode which generates up to 10 nsec pulses at an amplitude of 300 mA. The light-diode modulator may be used in the TTL mode. The receiver is a Si photodiode with a sensitivity of 0.3 A/W and a dark current of 10 nA. A basic system for transmitting digital information through light conductors (50 Mbits/sec) was built and tried. The IREAN cooperates with other relevant institutions. Figures 8.

EAST GERMANY

THIRD EUROPEAN CONFERENCE ON LIGHT CONDUCTOR COMMUNICATIONS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 128-129

REHAHN, J. P.

[Abstract] The proceedings of the Third European Conference on Light Conductor Communications, held 14-16 September 1977 in Muenchen, Federal Republic of Germany, are briefly reviewed. Approximately 600 people attended from 20 European and non-European countries. The participants came from industry, universities, and state institutions. The papers were in 15 groups, and covered the technology, measurement, properties, and uses of light conductors, cables made of them, connection techniques, light sources, integrated optical systems, repeaters, distortion elimination, light-conductor communication systems, and actual implementations. The most important papers were very briefly summarized in the following areas: light conductors, cabling and connecting methods, optoelectronic units, repeaters and distortion eliminators, and systems. Experimental systems are under trial in the 2Mb/sec to 400 Mb/sec range; systems of up to 565 Mb/sec are under development.

USSR

COMPARISON OF EFFICIENCY OF LOGIC STRUCTURES FOR TWO OPTICAL RECEIVERS

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR, FIZIKA in Russian Vol 13 No 1, 1978 pp 34-38 manuscript received 22 Apr 77

KAZARYAN, R. A. and OGANESYAN, A. V., Institute of Physics Research, Academy of Sciences of the Armenian SSR

[Abstract] Receivers for atmospheric communication systems are considered which operate in the photon-count mode, within the optical range of signals with pulse-code modulation of the light intensity. The efficiency of a single photodetector is compared to that of a real receiver on the basis of the theoretical and the experimental error probability. The efficiency of a nonoptimal receiver, with fluctuations of the intensity signal, is then compared to that of the optimal receiver by experiment. This experiment has been simulated on a computer with the appropriate logic, calculating the likelihood of signal reception at various signal-to-noise ratios. The results indicate that the optimal receiver does not saturate with larger signals, as does a nonoptimal receiver, and thus tends to yield a lower error probability with higher signal-to-noise ratios. Figures 3; references 8: 3 Russian, 5 Western.

USSR

UDC 62-50

STABILITY OF PULSE SYSTEMS WITH A RANDOM PERIOD

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 38-43 manuscript received 22 Feb 77

MADORSKIY, L. S., Minsk Radiotechnical Institute

[Abstract] The transfer function of unclamped pulse systems with a random discretization period is derived and, on the basis of the characteristic equation for the mathematical expectation, the stability conditions for such a system are established. This method is applied to typical systems with one or with two integrators. The author thanks G. G. Sigalov for helpful discussion. The paper was recommended by the Department of Automatics and Telemechanics of the Minsk Radio Engineering Institute. Figures 3; table 1; references 6: 5 Russian, 1 Western.

USSR

UDC 62-505.15

STATE ESTIMATION AND CONTROL SYNTHESIS APPLIED TO DISCRETE LINEAR SYSTEMS
WITH ADDITIVE AND MULTIPLICATIVE NOISE

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 4, Apr 78 pp 75-84 manuscript
received 2 Feb 77

PAKSHIN, P. V., Moscow

[Abstract] Small errors in the calculation of system coefficients, for optimal control of a linear system with additive Gaussian noise according to a quadratic performance criterion, may lead to instability regardless of the noise intensity. The model for solving this optimal-control problem is, therefore, refined so as to include multiplicative noise which depends on the system state and on the control. The separation theorem still applies, but a nonlinear filter is needed. Here the problem is solved by synthesis of a filter and a regulator, both optimal for the class of linear systems. First the system state is estimated in the continuous-time domain, specifically a discrete system which is considered here. Next the system is expanded to include also a control, and its state is now estimated. Finally, a quadratic performance functional is constructed by proper choice of weighting matrices for a stationary system. The same method is applicable to a nonstationary system within a finite time interval. It still remains to establish the existence, the uniqueness, and the minimality of the solution to the said matrix equations, also to evaluate the convergence of the iterative method of solving them. References 10: 5 Russian, 5 Western.

USSR

UDC 621.384.8:683.04

ESTIMATING A SIGNAL PARAMETER ON THE BASIS OF THE MAXIMUM-LIKELIHOOD CRITERION
IN THE FREQUENCY DOMAIN

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 133-134
manuscript received 1 Mar 77; after revision 6 Jun 77

NOVIKOV, L. V. and RUSINOV, L. A.

[Abstract] When a discrete Fourier transformation is used for spectral analysis of quasi-deterministic periodic signals of finite duration, then it becomes necessary to determine a parameter (the frequency) of the harmonic components more precisely than the quantization step along the frequency axis would allow. With the signal envelope known, the problem can be solved by the maximum-likelihood method. Accordingly, the dispersion of the frequency estimate is calculated as a function of the frequency deviation and referred to the dispersion of the optimum estimate--for various numbers of participating channels. Figures 2; references 2 (Russian).

USSR

UDC 621.391

NOISE IMMUNITY OF FIXING IN TIME PULSES WHICH HAVE PASSED THROUGH AN AMPLITUDE DETECTOR MIXED WITH FLUCTUATION NOISE AND CLUTTER INTERFERENCE

Kiev UZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 22-26
manuscript received 29 Sep 77

OZERSKIY, YU. P.

[Abstract] Amplitude detection of a useful signal mixed with fluctuation noise and clutter interference is analyzed. Both linear and square-law detection are considered and the dispersion of the low-frequency voltage component at the detector output is calculated from the correlation function of the process. The error of fixing the time of a signal pulse, either by its leading edge or by its peak, is found to be affected by single clutter signals as well as by multiple clutter signals. Figure 1; references 2 (Russian).

USSR

UDC 621.391

TWO-CHANNEL METHOD OF PROCESSING INTERVAL CODES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 37-41
manuscript received 29 Sep 77

KUKLEV, L. P.

[Abstract] Two-channel reception differs from plain coincidence reception by the use of a second channel for analog summation of code pulses with a threshold difference between signal and noise in the mixture. The overall noise immunity of such a decoder is increased, with a slightly higher probability of suppressing the dominant peak, by a reduction to almost zero of the false-alarm probability in the side peaks. Therefore, such a two-channel processing of n-pulse interval codes which serve as synchronizing signals in data transmission systems is preferable. Figures 3; references 3 (Russian).

USSR

UDC 621.391.2

DETECTION OF A FLUCTUATING SIGNAL SUBMERGED IN NONSTATIONARY NORMAL NOISE BY THE METHOD OF BILATERAL CONTRAST

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 27-32
manuscript received 24 Jun 77

BELETSKIY, YU. S. and BELOUSOV, A. A.

[Abstract] Detection of a fluctuating signal submerged in a nonstationary noise by similarity methods, such as the method based on bilateral contrast within the spectrum, is considered here in the case of a normal noise of an intensity which arbitrarily varies with time. With a random process at the input, this detector compares the envelopes of the signals which appear at fixed instants of time simultaneously across the outputs of three linear matching filters, a central and two lateral ones. The fluctuating input signal is here assumed to be quasi-harmonic with a Rayleigh distribution of random amplitudes and phases. On this basis, the detection process is analyzed for noise immunity. According to calculations, this method of detection ensures a stable false-alarm probability unaffected by the time dependence of the noise dispersion. The mean probability of correct detection at a low signal-to-noise ratio can be higher in the case of a nonstationary noise than in the case of a stationary noise of the same mean intensity. Figure 1; references 7 (Russian).

USSR

UDC 621.391.2

SELECTION OF A PERIODICALLY-PHASE-KEYED SIGNAL AND FILTER COMBINATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 60-67 manuscript received 18 May 77

IPATOV, V. P.

[Abstract] The realizability and the characteristics of filters for suppressing all side lobes of a periodically-phase-keyed signal along the delay axis in the time-frequency plane are evaluated on the basis of the pulse response of such a filter, i.e., its response to a single elementary radio pulse and to a cyclic shift of a sequence. The frequency characteristic of its transfer ratio is calculated in terms of discrete Fourier transforms, and the loss caused by mismatch as well as the resulting level of side lobes in the case of an unmatched filter are estimated. By minimizing both, it is possible to arrive at the optimum signal-filter combination. Most suitable would be a PPK signal with a uniform discrete Fourier transform. Only one with a 4×4 matrix of the linear cyclic-shift operator satisfies this requirement. So-called Singer codes, with a single-level periodic autocorrelation function, are also found very suitable for this purpose. Figure 1; references 12: 10 Russian, 2 Western.

USSR

UDC 621.391.2

NONPARAMETRIC BINARY NEYMAN-PEARSON DETECTOR

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 78-83
manuscript received 21 Jan 77; after revision 28 Mar 77

AKIMOV, P. S., YEFREMOV, V. S. and KUBASOV, A. N.

[Abstract] A nonparametric Neyman-Pearson detector with binary rank quantization is considered and its algorithm is constructed on the basis of the likelihood ratio for independent observations. Its performance, in terms of the detection probability depending on the signal-to-noise ratio, is evaluated in the case of a Rice or Rayleigh mixture of respectively a nonfluctuating or fast fluctuating signal with noise as well as in the case of a signal mixed with noise and a random pulse interference. Figures 4; references 7: 6 Russian, 1 Western.

USSR

UDC 621.391.2

SEQUENTIAL BINARY RANK-DETECTION PROCEDURE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 84-88
manuscript received 16 Nov 76

AKIMOV, P. S., YEFREMOV, V. S. and KUBASOV, A. N.

[Abstract] A sequential detection procedure is considered which involves binary quantization of the rank. The performance of a multichannel detector of this kind is analyzed in terms of the likelihood ratio, which can be easily calculated here. Although some useful information is lost during binary quantization, in the case of an a priori indeterminacy there is a simpler solution to the problem of adaptive detection. As the quality indicators of such a detector serve the mean number of observations and the probability of accepting the hypothesis H_0 in the presence of a signal at an arbitrary value of the alternative-distribution parameter (signal-to-noise ratio), both characteristics naturally depending on the rank quantization threshold. Figures 4; references 4: 3 Russian, 1 Western.

USSR

UDC 621.391.2

OPTIMIZATION OF THE PARAMETERS OF A LINEARLY FREQUENCY MODULATED SIGNAL WITH FREQUENCY AND DELAY-TIME DISPERSION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 105-110
manuscript received 28 Jan 77

RUBTSOV, M. I.

[Abstract] Transmission of linearly frequency modulated [LChM] pulse signals is considered in a channel with a Doppler frequency shift and a delay-time dispersion. The conditions for maximizing the signal-to-noise ratio are established, assuming the presence of additive white noise as well as single and independent signal scattering by each of many partial scatterers. Such a channel is conveniently characterized by parameters of an ellipse in the time-frequency plane. Attaining the global maximum of the signal-to-noise ratio requires that not only both the signal envelope and the filter response but also the law of intrapulse modulation be matched to the channel characteristics. The magnitude of this global maximum is determined solely by the scattering area of the channel in the "delay time--Doppler frequency shift" plane. In some cases the signal-to-noise ratio is found to be higher with than without intrapulse modulation. Figures 3; references 4: 2 Russian, 2 Western.

USSR

UDC 621.391.2

THEORY OF STAGGERED RECEPTION OF SIGNALS IN CHANNELS WITH FADEOUT AND WITH STOCHASTIC MUTUAL INTERFERENCE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 115-118
manuscript received 7 Jul 76; after revision 24 Jan 77

SHLYAKHOV, I. M.

[Abstract] Transmission of messages over independent parallel channels is considered and a decision rule for signal identification is established on the basis of the least preferable a priori signal and interference distributions, with both the useful signal and the mutual interference given in terms of their respective correlation functions. The characteristics of such channels are established and algorithms of optimal reception under various conditions are constructed. The problem of estimating both the signal and the mutual interference in any one channel reduces to a problem of linear filtration. References 7: 3 Russian, 4 Western.

USSR

UDC 621.391.8

NOISE IMMUNITY OF PHASE-TELEGRAPHY DEMODULATORS

Kiev IZV VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 125-127
manuscript received 14 Jul 77

CHURKIN, YE. I. and CHAN VAN MIN

[Abstract] A first-order modified phase-to-amplitude converter and a phase-to-amplitude converter with a proportionally integrating low-pass filter are considered for use in phase telegraphy. An analysis of their noise immunity indicates that both are much more advantageous than a univibrator. The probability of reverse action in the demodulator must still be further examined. Figures 2; references 7 (Russian).

USSR

UDC 621.391.13

RECEPTION ON THE WHOLE IN SYSTEMS WITH REINTERROGATION

Kiev IZV VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 119-121
manuscript received 29 Sep 77

GOLOVIN, A. D. and GOLOVIN, D. B.

[Abstract] A method is proposed of accepting the decision about an input signal only when its a posteriori probability exceeds the a posteriori probability of any other signal within the sample by a certain factor or more, the transmission being otherwise repeated. A comparative error analysis indicates the advantage of this method over the method of maximum a posteriori probability. The correctness of the formulas for the probability of distortion at the correlator and the probability of interrogation has been verified by a mathematical simulation of the detection process on an M-222 computer. Figures 2; references 2 (Russian).

USSR

UDC 621.391.26:519.234

EFFICIENCY OF RANK ALGORITHMS IN SIGNAL DETECTION ON THE BASIS OF QUANTIZED OBSERVATIONS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 74-77
manuscript received 17 Jan 77

BONDARENKO, V. N., KOLOMENSKIY, YU. A. and UL'YANITSKIY, YU. D.

[Abstract] The asymptotic relative efficiency of two rank algorithms in detection of a constant signal is evaluated, when observations have been quantized with respect to the signal amplitude. The efficiency of a Wilcoxon detector with the ranks in implicit form only is found, at various noise distributions, to increase only slightly with the number of quantization levels. A detector of the Mann-Whitney kind is not rigorously nonparametric with respect to the hypothesis $H_2: w(u) = w(x)$, where the distribution of readings $w(u)$ and the distribution of the "adaptive" noise sample $w(x)$ are identical but otherwise arbitrary. Figure 1; table 1; references 2: 1 Russian, 1 Western.

USSR

UDC 621.391.828

ABATEMENT OF MULTIPLICATIVE NOISE BY PHASE CONVERSION OF SIGNALS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 14-21
manuscript received 29 Sep 77

SUSLONOV, S. A.

[Abstract] Signal fading in radio communication, when the fadeout correlation interval is much shorter than the signal duration, can be abated by phase conversion of the signal, i.e., by introduction of large phase shifts into the signal spectrum with the aid of a phase-nonminimal circuit. The process is analyzed here generally for a system consisting of a transmission channel with phase predistortion of the input signal, with multiplicative noise, and with compensation of the phase predistortion in the output signal. The effectiveness of this method is demonstrated by calculations and test data. Figures 2; table 1; references 10: 8 Russian, 2 Western.

USSR

UDC 621.395.5

REDUCING THE POWER OF A DATA SIGNAL IN VOICE-FREQUENCY CHANNELS

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 44-48 manuscript received 16 Jun 75

GAVRILENKO, V. S., CHERNETSKIY, G. A. and CHINENKOV, L. A.

[Abstract] The increasing demand for discrete data transmission is met by multiplexing of voice-frequency channels. With the limited number of such channels suitable for this purpose, it becomes important to consider the feasibility of reducing the power of transmitted data signals. Accordingly, the quality of data transmission over systems with a resolving feedback and an error detecting code is evaluated here. The results of this analysis and of an experimental evaluation indicate that data transmission over thus equipped voice-frequency channels is feasible at a signal power of 3-6 microw at the reference level, with the transmission rate dropping not more than 10 percent below the maximum in an error-free situation. Figures 2; references 5 (Russian).

USSR

UDC 621.376.9

CONCERNING USE OF THE METHOD OF TEST STEPS IN INERTIALESS SOLUTION FEEDBACK

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 71-72 manuscript received 5 Mar 77

KOSOBOKOV, V. I. and KHVOROSTENKO, N. P.

[Abstract] In many instances inertialess solution feedback makes it possible to improve the reliability of pronouncement of a solution concerning a transmitted message by inclusion of the preceding solution in the a posteriori statistics V. The present short communication considers the possibility of using the method of test steps for increasing the noise immunity of inertialess solution feedback. It is concluded that the method of test steps not only decreases the probability of errors and distortions but also considerably decreases the grouping of errors in time. References 3 (Russian).

USSR

UDC 621.376.23

DEMODULATION OF AN FM SIGNAL IN A TT-12 VOICE-FREQUENCY TELEGRAPH DETECTOR

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 39-43 manuscript received 15 Apr 75

VAKULENKO, N. I.

[Abstract] The zonal TT-12 voice-frequency telegraph equipment includes a special frequency detector with a very stable discrete-circuit modulation converter. The latter consists of a clearing-pulse shaper, a clearing-pulse commutator, two identical frequency dividers, and a phase discriminator. A rectangular FM input signal is converted to a PDM sequence whose low-frequency part proceeds through a low-pass active filter to the threshold device. The performance of this demodulator is calculated here, including its detector characteristic and inherent noise level. Figures 3; references 4 (Russian).

USSR

UDC 519.7:62-50

OPTIMAL CONVERSION OF DISCRETE SIGNALS ON THE BASIS OF NONLINEAR MEASUREMENTS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 5-9 manuscript received 25 Apr 77

CHURAKOV, YE. P. and KRASIN, V. P.

[Abstract] An optimal rms estimation of a signal appearing together with Gaussian noise is considered on the basis of nonlinear measurements, i.e., measurements which depend nonlinearly on that signal. Increasing the computer memory for signals recorded simultaneously by several instruments makes it difficult to implement the "sliding window" algorithm for an a posteriori sample. Instead, the complex problem is broken down into lower-dimensionality problems coupled to one another and the estimates are based on instantaneous measurements only. The method is illustrated on several examples and its accuracy is tested in accordance with the Rao-Kramer inequality. The paper was recommended by the Department of Automatics and Telemechanics of the Ryazan Radio Engineering Institute. Figures 4; references 3: 2 Russian, 1 Western.

USSR

UDC 621.394.662.2

DOUBLE INDEPENDENT SYNCHRONIZATION IN DISCRETE DATA TRANSMISSION SYSTEMS

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 49-51 manuscript received
23 Jul 75

YUSHKOV, N. F.

[Abstract] For a repetitive exchange of messages, interrogation and confirmation signals, over a discrete data transmission channel it is worthwhile to ensure that the phase of control, pulses at the sender and the phase of control pulses at the receiver remain independent. This is achieved by double independent synchronization. The synchronizing pulse sequence is transmitted once in each direction, only after the communication link has been established. Here the reliability of this method is evaluated in terms of mean time to reach synchronization, duration of synchronism, and probability of false synchronization. Figures 4; references 5: 3 Russian, 2 Western.

USSR

UDC 621.394.763

REFINEMENT OF THE LOAD PARAMETERS FOR BETTER PLANNING OF A SUBSCRIBER'S TELEGRAPH NETWORK

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 33-39 manuscript received
14 Apr 77

TUMANOVSKIY, YE. I., TARNOPOL'SKIY, I. L., SAMOLYUBOVER, E. L., ORESHKINA, K. N. and PARIKOZHKA, I. A.

[Abstract] Quadrennial studies of the trends in telegraph communication have yielded, through a statistical analysis, sufficiently precise data for better planning of a subscriber's network. The load parameters on which such a planning must be based include volume indicators (installed and used capacity, number of subscribers and of channels), traffic growth indicators, average length of messages, specific bilateral subscriber load, and hourly load distribution with reference to the time zones. The last countrywide survey was taken in 1975, and the results should be useful in the forthcoming effort of optimizing the telegraph communication system. Figures 7; tables 5; references 4 (Russian).

USSR

UDC 621.395.721.1

REMOTE INSPECTION OF "AMT" AND AMT-69 PAY TELEPHONES

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 56-60 manuscript received 15 Jun 77

GUBRENKO, I. M. and IOFFE, I. Z.

[Abstract] Circuit and layout modifications in AMT and AMT-69 pay telephones as well as in the appropriate instrument panels are proposed which will facilitate a changeover to remote inspection of such telephones, without line-men, and thus improve the service with a lower operating cost. Figures 7.

USSR

UDC 621.396

SEQUENTIAL DETECTION OF PULSE-TIME MODULATED SIGNALS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 46-54 manuscript received 29 Sep 77

SHERSTNEV, YE. A.

[Abstract] Detection of pulse-time modulated telemetry signals takes into account the fact that such a signal can appear with equal probability at either of two positions, the unshifted and a shifted, within a repetition period. A detector based on this principle consists of a threshold device, a strobe generator, and a resolver. Here a detector with a resolver operating by a sequential algorithm is described. A reversible counter performs the sequential search, this search being optimal with the lower threshold equal to unity; the upper threshold depends on the maximum allowable error probability. A logic table for such a counter has been set up, according to which the noise position is analyzed in terms of a random walk of particles between two absorbing walls and the signal position is analyzed for the case of a binary signal. The mean search time and the probability of reaching the upper threshold are calculated for each position, with lowering of the threshold found to shorten further the search time. Figures 5; table 1; references 5: 3 Russia, 2 Western.

USSR

UDC 621.396

ESTIMATION OF THE TRANSIENT TIME IN A TRACKING RADIOMETER ON THE BASIS OF THE SOLUTION TO THE KOLMOGOROV EQUATION

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 55-59 manuscript received 29 Sep 77

FEDOSOVA, A. I.

[Abstract] Pickup of a signal submerged in noise by a tracking radiometer consisting of a discriminator and a smoothing filter with one integrator in the feedback loop is treated here as a Markov process, with the probability of a tracking error $P(x,t)$ satisfying the second Kolmogorov equation. The transient performance of such a radiometer is analyzed on the basis of the solution to this partial differential equation for the case of a discriminator characteristic $D(x) = D_0 \text{sig } x (-\gamma^2 x \leq \gamma)$ and a fluctuation characteristic $F(x) = F_0$ independent of the mismatch, with $\int P(x,t) dx = 1$. The solution yields the time constant of the radiometer regulation, and the maximum time constant serves as the lower estimate of the transient period. The statistical characteristics of such estimates depend on the signal-to-noise ratio and on the initial mismatch. Figure 1; references 4 (Russian).

USSR

UDC 621.396.4:621.397

FOLLOW-UP CORRECTION OF DISTORTIONS OF PHASE-FREQUENCY CHARACTERISTICS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 64-67 manuscript received 10 Oct 76

RADIKAYNEN, YA. M.

[Abstract] In the case of the television channel of radio-relay lines, follow-up automatic correction of arbitrary distortions of a discrete-type phase frequency characteristic (PFC) is accomplished by an analogous follow-up automatic resonance correction of random distortions of the amplitude-frequency characteristic (AFC). The combined operation of both correctors makes it possible to equalize the distortions of the AFC and PFC in the case of distortions of networks of minimum-phase and nonminimum-phase types. Follow-up correction can eliminate distortions in proportion to their continuous occurrence in the time of the television transmission. Distortions of the AFC (including those introduced by the PFC corrector) and distortions of the PFC, resulting from misalignment of minimum-phase networks, are eliminated by an AFC corrector. The present short communication shows it is possible to eliminate distortions of the PFC channel () resulting from misalignment of nonminimum-phase networks by the proposed corrector which creates its PFC () so that () + () = 0. A functional diagram is presented of a follow-up PFC corrector, based on the use of a series of packets of test signals, transmitted according to length during intervals of "inversion." Figures 3; references 3 (Russian).

USSR

UDC 621.396.23

OPTIMUM DISTRIBUTION OF AVAILABLE POWER IN BROAD-BAND COMMUNICATION SYSTEMS WITH COMPOSITE SIGNALS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 128-130
manuscript received 26 Jan 77

POSTYUSHEKOV, V. P. and KHAZOV, A. M.

[Abstract] The problem of optimally allocating the available transmitter power to components of composite signals in a broad-band communication system is approached here from the standpoint of reception quality under conditions of non-uniform noise intensity. Minimization of the error probability is demonstrated in a subchannel with Rayleigh fading and optimal noncoherent reception of orthogonal (in the amplified sense) signals. The algorithm of power allocation is constructed on this basis and the optimum power distribution found to differ from a uniform one, especially when the error probability must be very low. Figures 2; table 1; references 4: 3 Russian, 1 Western.

USSR

UDC 621.396.62

INCREASE OF THE FREQUENCY SELECTIVITY OF RECEIVING CHANNELS OF RADIO PULSE DETECTOR

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 89-94
manuscript received 25 Aug 77

LEBEDEVA, O. M. [deceased] and PRIYMAK, I. A.

[Abstract] A compensating device for discriminators in radio pulse detectors is described which consists of two differently tuned resonance circuits and a phase detector with a low-pass filter at the output. Connection of such a device behind the i-f stage eliminates the need for composite filters when a precisely square amplitude-frequency characteristic is required. It also simplifies the bandwidth regulation and keeps the transfer ratio constant over a wide range of bandwidths. The resulting improvement in the signal-to-noise ratio at the detector output depends on the bandwidth. It diminishes as the bandwidth is increased. Figures 3; references 4 (Russian).

USSR

UDC 621.396.62:621.396.8

NOISE IMMUNITY OF THE RECEPTION OF FREQUENCY-KEYED AND PHASE-KEYED SIGNALS WITH MUTUAL AND FLUCTUATING INTERFERENCE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 95-100 manuscript received 11 Jul 77

LEDOVSKIKH, V. I., TOKAREV, B. V. and BUTENKO, V. V.

[Abstract] The noise immunity of digital transmission in the presence of mutual interference between several systems operating simultaneously in the same frequency channel and the effect of noise on the error probability due to interference are evaluated here for two important practical cases: first noncoherent reception of a frequency-keyed signal with frequency-keyed interference and a normal "white" noise, then reception of a phase-keyed signal with harmonic interference and fluctuation noise. Transmission with phase-keyed signals is found to be more noise immune than transmission with frequency-keyed signals under all conditions. Figures 5; references 4 (Russian).

USSR

UDC 621.396.69.001.5

SYNTHESIS OF MUTATORS ON THE BASIS OF CONTROLLED SOURCES

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 18-21 manuscript received after completion 27 Sep 76

VLADIMIROV, V. L.

[Abstract] According to some works in the literature, a mutator is an active linear quadripole intended for conversion of a nonlinear component of a network of one type into a nonlinear component of another type. However, it is also possible to expand the generally accepted term "mutator" to converters of the resistances and conductances of the linear components of a network. In native literature mutators have been called "active impedance converters." The present paper gives a procedure for calculating variations of the A-matrix of active impedance converters-mutators and presents their principal properties. Each of the matrix-components shown corresponds to a source of current, controlled by voltage (ITUN) or current (ITUT), or a source of voltage, controlled by current (INUT) or voltage (INUN). Structural schemes are shown where an inverter is realized on the basis of two ITUN or two INUT and a converter by a combination of ITUT with INUN. Figures 2; table 1; references 7 (Russian).

USSR

UDC 621.396.621

A METHOD OF SHAPING A TWOFOLD-(RELATIVE)PHASE-MODULATION SIGNAL

Moscow ELEKTROSVYAZ' in Russian No 1, Jan 78 pp 52-55 manuscript received
21 Jul 76

GRIGOR'YEV, V. G., KURITSYN, S. A. and NECHAYEV, V. M.

[Abstract] Twofold modulation of the relative phase is used in various countries as a technique suitable for data transmission at a rate of 2400 bits/s. The echo modulation method of shaping the signal spectrum has the disadvantage of a nonrigid relation between modulation rate and carrier frequency. Another method of shaping the signal spectrum is by approximation of the signal envelope with a staircase function. A four-step approximation is shown here. The equipment includes a time-base generator containing two frequency halvers and several AND circuits, two phase manipulators, two amplitude shapers, a shift register, a summator, and a low-pass filter. Each phase manipulator consists of four NAND circuits and one NOR circuit, each amplitude shaper consists of three NOR circuits and three resistors. Figures 6; references 6: 2 Russian, 1 German, 3 Western.

USSR

UDC 621.396.666

INVESTIGATION OF NONLINEAR PROPERTIES OF CONTROLLABLE ATTENUATORS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 84-91 manuscript
received 1 Jun 76

IVANOVA, V. G., ALEKSEYEV, G. P. and BERESTNEV, P. D.

[Abstract] A method is proposed for determining the parameters of the series-connected nonlinearity of two inertialess quadripoles, which extends to an n-stage connection of quadripoles. In so doing, the methods of calculation reduce to the series separation of the two last stages and the reduction of them to one equivalent quadripole. A comparative evaluation is made of various L-shaped sections of controllable attenuators. Figures 6; tables 2; references 2 (Russian).

DYNAMIC CHARACTERISTICS OF AN AUTOMATIC-FREQUENCY-CONTROL SYSTEM IN THE PRESENCE OF NOISE

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 101-104
manuscript received 20 Jun 77

KHODAKOVSKIY, V. A.

[Abstract] The dynamic characteristics of an automatic-frequency-control system, namely its locking band and holding band, become in the presence of noise random quantities which depend on the system parameters as well as on the signal-to-noise ratio. For illustration, an AFC system with a simple low-pass RC filter and a simple i-f bandpass filter is considered here without and with noise. The calculations indicate that noise narrows the effective locking and holding bands, which can be attributed to the peculiarity of a frequency detector in which its output voltage is proportional to the "center of gravity" of the signal spectrum. This "center of gravity" is always lower, equivalent to a lower slope of the discrimination curve, when a harmonic signal appears together with noise. At the same time, the frequency dispersion of the tunable heterodyne increases with higher noise intensity and with shorter time constant of the low-pass filter. Figures 4; references 2 (Russian).

CZECHOSLOVAKIA

TELECOMMUNICATION SATELLITES

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 9, Sep 77 pp 347-350

LOM, TOMAS

[Abstract] Satellites represent a vast, economically very important telecommunication sphere. The system of satellites is governed by the INTELSAT international agreement. Introduction of satellites into geostationary orbits is described; the time needed by a satellite to reach its final trajectory is about 600 seconds. Corrections to the position of the units are achieved by rocket jet motors. Solar cells may provide some power for the operation of the satellite. The satellites are designed for multiple access using either frequency division multiple access, time division multiple access, code division multiple access, or space division multiple access. The present series of satellites is the INTELSAT IV. series. At present problems are met in the design of output amplifiers located in the satellite; the permactron types have a limit of five W; therefore improvement in their design represents the most important aspect of the development. Figures 6; table 1; references 3: 2 Czech, 1 Western.

CZECHOSLOVAKIA

THE DIGITAL EQUIPMENT CHAIN IN THE TESLA MKP 32 PCM SYSTEM

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 9, Sep 77 pp 327-331

HAJEK, ANTONIN

[Abstract] The TESLA MKP 32 transmission system is the improved version of the TESLA KPK system; it is designed for use in international and national circuits for the transfer of phone conversations through 30 channels or for transmission of discrete information signals within the region of 300 to 3400 Hz. Part of the system is a digital track for transmission of Pulse Code Modulation (PCM) signals. Transmission rate with two conductors is 2048 bytes/sec. The system is covered by Czechoslovak Patent No 160,896 and USSR Patent No 489,229; applications are filed in Hungary and East Germany. The connections of localization circuits are covered by Czechoslovak Patents No 161,155 and 176,536. The MKP 32 system uses a miniature component base of high reliability incorporating exclusively silicon semiconductors, and digital and analog circuits. The system allows the location of a faulty repeater at a distance, it is provided with an automatic corrector with a correction region for the repeater of 4 to 36 dB, and uses two directional repeaters in two separate cable conducting channels. The repeaters are housed in airtight containers. Operational limits are -40 to + 50°C. Length of line tract cables may be up to 77 km. The expected life is at least 20 years. Figures 10; tables 3; references 14: 12 Czech, 2 Western.

EAST GERMANY

A PROGRAMMABLE METHOD FOR THE DETERMINATION OF THE BIT PAIRS FOR THE MAJORITY RECEPTION OF PSEUDORANDOM SEQUENCES

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 10, 1977 pp 423-425 manuscript received 13 Apr 77

SCHMEISSER, L., Information Technology Section, Dresden Technical University

[Abstract] Among the pseudorandom sequences, which are increasingly often used in communications, the binary maximum sequences capable of being easily realized with feedback-type shift registers are especially important. There are various ways for reducing error possibilities. One such method is the majority-reception technique. This article describes the majority reception method and presents a method for the determination of the required bit pairs. This requires programming in a computer. The method for calculating the bit pairs for majority reception is based on the technique described by L. E. Colley (IEEE TRANSACTIONS EC-16, No 6, 1967, p 357). The method was used in a R 300 computer system for a variety of shift register length and step sizes. From among the 200 bits of the shift register (length $n = 11$ and $l = 200$) there were between 4 and 16 pairs (depending on the choice of the feedback polynomial). If the decoder-shift register has a full sequence period, there is a partner for every bit but one. Figures 4; references 4: 2 German, 2 Western.

HUNGARY

TESTING ASPECTS OF DATA-TRANSMISSION TERMINALS

Budapest BHG ORION TERTA MUSZAKI KOZLEMENYEK in Hungarian Vol 23 No 4, 1977 pp 151-158

GROTTE, ANDRAS, graduate electrical engineer, group leader, Main Development Department, Orion Radio and Electrical Enterprise

[Abstract] The ORION AP-TEST terminal checking simulator is described. It compiles control sequences as the control station of the terminal being tested and transmits them to the terminal. These sequences initiate the execution of various commands, to which the terminal sends responses. The command sequences are built up from data stored in the PROM or on perforated tape. Individually assembled sequences may also be entered. Three major and two minor circuit boards are used in the tester. The VMA board (major) organizes the sequences. In the ROM state it is a phase register. The VMV board (major) stores the received characters and character sequences, controls the receiver interface, and detects reception faults (parity and LRC faults). The VMM board (major) is the modem adaptation unit. The VMJ board (minor) contains the serial number and bits of the read-out character, the reception faults

(parity, LRC, overflow), and the LED displays indicating the status of the transmit and receive sections and the modem interface circuits. The VMP board (minor) has a 256-character, 2x256x4 bit ROM memory. The unit is portable; it may be used to test peripheral devices, terminals, and terminal systems by means of data-traffic simulation. Figures 19; references 4 (Hungarian).

EAST GERMANY

PCM SINGLE-CHANNEL ENCODER FEATURING A MODIFIED DIVISION PRINCIPLE

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 7, Apr 77 pp 213-217

FOERSTER, S., and FRANK, K.-H., graduate engineers, Information Technology Section, Karl-Marx-Stadt Technical University

[Abstract] The encoder described (and illustrated with block and circuit diagrams) has three major units: the analog unit, the timing-pulse generator and control logic, and the output unit. The analog unit consists essentially of two operational amplifiers, which perform the scanning and holding, sign reversing, division by two, sawtooth encoding (linear interpolation) and similar functions in conjunction with the comparator. Sixteen phases (scanning, sign determining, dividing, and linear interpolating phases) are performed in a coding cycle. The realized version has adequate accuracy; it uses an operational amplifier A 109 C and a dual MOS transistor SMY 51 in its scan and hold circuit, with KP 305 B barrier FET transistor for switching. The comparator stage features the comparator unit A 110 C, with a differential amplification stage for increased input impedance of the step and thus better response sensitivity. The digital unit encompasses the control logic with timing-pulse generator and the output unit. Figures 14; references 6: 3 German, 3 Western.

EAST GERMANY

USE OF THE UNIFIED TELEMETRY SYSTEM (ETMS) IN THE INTERKOSMOS COOPERATIVE PROJECT

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 625-626

FISCHER, HANS-JOACHIM, and LIECKFELD, PETER, Electronics Institute, Academy of Sciences of the German Democratic Republic

[Abstract] The Unified Telemetry System has a total of 101 input channels (including 45 single-bit state, 8 nine-bit analog, and 48 ADU-analog channels), a frame length of 64 ten-bit words, odd parity control (one parity bit per word), data-transmission rate of 10,922 bits/sec, 3 words at frame start for frame synchronization, board-time accuracy better than 10^{-5} , measuring error for total memory capacity of 10^7 bits (with two tape memories), memory recording time for the memory of 64 and 256 min (for Type 1 and Type 2, respectively), and playback time of 8 min for both types. The signals are suitable for processing by computer, there are means for software-side error correction, and the devices are ESER [Unified Computer System]-compatible. Practical experience was gathered with the system during the operational time of the Interkosmos 15 satellite at the Neustrelitz ground station. Fast digital evaluation of research satellite data is possible with the system. Figures 3; table 1; references 4: 1 Russian, 1 International, 2 German.

EAST GERMANY

FIELD-TEST RESULTS OF PCM120 TERMINAL SYSTEMS

East Berlin FERNMELDETECHNIK in German Vol 18 No 1, 1978 pp 9-10

BRARDT, G., Chamber of Technology, East Berlin

[Abstract] A field test was carried out with the PCM 120 experimental system in East Berlin. An asynchronous digital multiplex system conforming to CCITT Recommendation G 742 was used as the terminal. It is a secondary multiplex system. The frame synchronization under perturbed secondary tract conditions was satisfactory. The bit error measured at the end of the PCM 120 line was $5 \cdot 10^{-9}$ on the average. Approximately 33 percent of the errors were single errors; the rest, burst errors. The quantization noise did not change when the secondary multiplex system was connected in the line; there was merely some (less than 2 dB) crosstalk and base noise. Six speech subscriber channels from the public system were used in the experimental operation. There was also digital transmission of telegraphy signals (laboratory pattern of a code-transparent telegraphic/data multiplexer unit was connected to the 64 kbit⁻¹ interface of the multiplex). Perfect transmission could be achieved.

The trial confirmed that the multiplex system on LF cables is theoretically feasible. Adequate error conditions and stable operation were realized. Figures 6; references 3 (German).

HUNGARY

CHANNEL-MODEM UNIT OF E2 DESIGN

Budapest BHG ORION TERTA MUSZAKI KOZLEMENYEK in Hungarian Vol 23 No 4, 1977
pp 159-163

VERESS, PETER, graduate electrical engineer, head of the AFO [expansion unknown] Department, TERTA [Telephone Factory]

[Abstract] The new channel-modem unit described fits into the 300- and 960-channel carrier-frequency system of TERTA, which is used in various audio-frequency and frequency-modulated teletype and PCM units. It is of compact design, has many external-circuit connections, and permits the operational measurements of the channels. It features a premodulation system. The basic groups capable of being assembled from the 12 channel units and two common (group and pilot) units may be laid out logically; the channel units are electrically and mechanically independent of each other. But most units within them are interchangeable. The active circuits contain discrete transistors, monolithic integrated circuits, operational amplifiers, modulators, and digital circuits. The channel, display, and pilot-receiver filters are electro-mechanical filters with mechanical resonators; the group filters and the narrow-band filters for carrier-frequency generation are LC filters, equipped with high-quality ferrite-core coils and miniature polystyrene capacitors. The CMB-12 channel modem module can accommodate two 12-channel sub-groups. The unit is reliable, economical, and has favorable electrical parameters. Figures 8.

USSR

THE "OBLAST'-I" COMMUNICATION SYSTEM

Moscow VESTNIK SVYAZI in Russian No 1, Jan 78 pp 28-29

GLUBOKOV, S. V., assistant chief, GUVMTS Main Administration of Intradistrict Interurban Telephone Stations], USSR Ministry of Communication, and SERKOV, YU. M., department chief

[Abstract] The OBLAST'-I system consists of one duplex telephone bay with a 300-channel capacity and provides means for a simplified radio relay link over a range of 250 km between regional and district communication centers. A distinguishing feature of this system is the availability of a direct link between each district center and the regional center, through which links with all other district centers can be established. In the transmitter section i-f signals are frequency modulated and converted to h-f signals. The h-f signals are transmitted unilaterally at a single fixed frequency, within the operating band, the rated transmitter output power being 0.4 W. In the receiver section h-f signals are received unilaterally at a single fixed frequency, within the operating band, and then converted to i-f signals for subsequent amplification and demodulation. The receiver bandwidth is 15 MHz and the noise factor here is 9 dB. The entire bay draws not more than 150 W and weighs 115 kg, its overall dimensions are 2000x320x285 mm³. It is connected to an AMD-2.5 parabolic antenna (gain 45 dB within the 15-65° sector and 65 dB within the 90-180° sector) through a hermetically sealed and fan-cooled EVG-6 elliptic waveguide not more than 55 m long. Figures 3.

USSR

HOW TO INCREASE THE OPERATIONAL STABILITY OF "URAGAN" RADIO-TELEVISION STATIONS

Moscow VESTNIK SVYAZI in Russian No 1, Jan 78 pp 29-30

KUDRYAVTSEV, B. S. and FRIDMAN, E. M., All-Union Radio-Television Transmitter Station imeni Fiftieth Anniversary of the October Revolution

[Abstract] Experience in operating the URAGAN radio-television transmitters has shown that during h-f phasing, when subsystems are assembled, not only the phase but also the amplitude of h-f oscillations at the output of the phasing bridges change. As the amplitude of the input voltage to low-power stages drops below a certain level, oscillations at the transmitter output cease and the equipment fails. A way was found to minimize this dependence of the output voltage on the input voltage, namely by grid limiting through an automatic bias with the optimum leakage resistance, i.e., by using a 6P15P pentode instead of the GU-50 tetrode. Another problem, during operation in the second frequency band, is presented by the coupling network, unwieldy and

difficult to regulate, between the modulator stage (GU-34B tetrode) and the following amplifier stage (GU-40B tetrode). Here a common-grid amplifier circuit would simplify the design of the coupling network and also eliminate the need for a plate ballast in the modulator stage. Other mechanical and electrical design modifications will further improve the transmitter reliability. Figures 5.

USSR

EQUIPMENT FOR RADIO BROADCASTING AND RADIO COMMUNICATION: HIGHER RELIABILITY

Moscow VESTNIK SVYAZI in Russian No 1, Jan 78 pp 25-27

BARANOVSKIY, B. K., assistant chief, Central Design Office

[Abstract] New series manufactured equipment for a more reliable and better quality radio broadcasting and radio communication service includes: the KRA electronic commutator for switching audio channels, a controlled coordinate device with two input transformers and two linear output amplifier; the AORK set for establishing telegraph channels with voice manipulation and for reverse conversion of voice messages to d.c. signals; the UKB compander interlock for interurban audio broadcasting, with a mixer in the transmitter and with a mixer as well as a rejection filter in the receiver; and the ShAU-10, 11,12 broadband amplifiers for the antenna-feeder channel. The KRA commutator can connect any output to any input, can simultaneously connect several outputs to one input, and can prevent a simultaneous connection of one output to several inputs. It is equipped with appurtenances for preparing and checking out a program for subsequent hookup, for spot checking a program in progress and measuring the acoustics at any terminal, and for providing a telephone link to subscribers as well as a service link. Both the KRA and the AORK are novel and no analogous equipment is currently manufactured. The UKB compander interlock is provided with instrumentation for measuring the overall attenuation, the amplitude-frequency characteristics, the nonlinear distortion, the crosstalk attenuation, and the integral as well as the psophometric noise levels. All this equipment is built with the most advanced components, according to the latest method of manufacture and circuit design. Figures 5.

USSR

UDC 656.25:621.316.9.621.395.44

PROTECTABILITY OF HIGH-FREQUENCY CHANNELS AGAINST EXTERNAL ELECTROMAGNETIC INTERFERENCE

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 3, Mar 78 pp 28-30

MOSHCHUK, E. A., chief of the engineering department, signalization and communication service for the Odessa-Kishinev railroad

[Abstract] Electromagnetic interference in h-f channels of railroad communication lines comes from radio broadcasting stations, from the coding equipment of signalization centralization and interlocking systems, and from radio telegraph equipment in the form of continuous-tracking pulses. It can also come from local automation and remote-control equipment as well as from faulty elements of h-v transmission lines. Procedures have been developed for the detection and the location of interference sources by personnel at checking and clearing stations. Poor contacts in unattended repeater terminals are particularly critical. The most effective protection against electromagnetic interference are good contacts, especially in power supply equipment, grounding of the cable shell along the entire trunk length, and shielding of conductor connections as well as of input and matching transformers in the stations. Figures 2.

USSR

UDC 656.25:621.315.2.001.2

DESIGN OF COMMUNICATION CABLE TRUNKS FOR RAILROAD TRANSPORTATION

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 2, Feb 78 pp 15-16

TYURIN, V. L., professor, LIIZhT [Leningrad Institute of Railroad Transportation Engineers imeni Academician V. N. Obrastsov], and GLUSHKO, V. P., graduate student

[Abstract] One major consideration in the design of communication cable trunks for railroad transportation is the distribution of unattended repeater stations with necessarily unequal distances between them and the resulting higher noise level. It is suggested that not the actual number of repeater segments but the number of average-length repeater segments which would make up the trunk line be regarded as the criterion. In matching the characteristics of multiplexing equipment with those of the cable trunk, one ought to consider: 1) Not only the psophometric level of inherent noise but nonlinear noise as well; 2) Predistortion of transmission levels at all trunks so as to meet the noise specifications; 3) Not one but at least two frequencies (upper and lower) of the line spectrum; 4) The possibility of small gain variations; and 5) The reception level at unattended repeater stations at the lowest as well as at the highest operating temperature. An algorithm for the design calculations and an appropriate computer program have been written in FORTRAN.

USSR

UDC 656.25:621.316.9:621.315.2

LIGHTNING RESISTANCE OF COMMUNICATION CABLE TRUNKS IN THE BAYKAL-AMUR LINE

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 2, Feb 78 pp 19-21

LYUBIMOV, K. A., candidate in technical sciences, director of the laboratory, TSNIIMPS [Central Scientific-Research Institute, Ministry of Railroads, USSR, RUMYANTSEVA, G. I., junior research worker, and POPOV, B. V., candidate in technical sciences, senior instructor, Kuybyshev Electrotechnical Institute of Communication

[Abstract] The vulnerability to lightning strokes of communication cable trunks running through permafrost, frost clefts, and chasms depends on the cable diameter, on its shell and sheath materials, as well as on the method of cable laying and grounding. A cable has been developed for railroad communication along the Baykal-Amur line which consists of grade MKPmASHp quads with monolithic polyethylene insulation. An experimental study of its behavior and a reliability analysis, based on electrical and mechanical strength, indicate that this cable exceeds standard specifications and is superior to cables with cordyl-styroflex or porous polyethylene insulation in lead sheath which was recommended in 1971 by the Novosibirsk Division of "Giprosvyaz'" [State Institute for Surveying and Planning of Communication Installations]. Figures 3; tables 2.

USSR

UDC 656.25:621.315.2.657.3.001.8

ESTIMATING THE COST OF RAILROAD COMMUNICATION CABLE TRUNKS

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 3, Mar 78 pp 18-20

VERBITSKAYA, M. F., director of the estimates group of "Giprotranssignalsvyaz'" [State Planning and Surveying Institute for the Planning of Signalization, Centralization, Communication and Radio in Railroad Transportation]

[Abstract] Calculations are shown pertaining to cost estimates for railroad communication cable trunks. They are based on wholesale prices of cable and on the cost of delivery, by truck or freight train, which includes crating as well as loading and unloading. Typical data are given for grade MKPAB cable manufactured at the "Azovkabel'" Plant A and delivered to 19 construction zones within the Soviet Union. Documentation and standard calculation sheets for this purpose are available. Tables 3.

USSR

UDC 656.254.16.071.84

SOME WAYS TO IMPROVE THE PERFORMANCE OF RAILROAD RADIO COMMUNICATION ALONG THE TRANSBAYKAL LINE

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 3, Mar 78 pp 20-23

PAVLYUKOV, R. D., candidate in technical sciences, KUZNETSOV, YU. A. and ZAGUMENOV, G. G., engineers

[Abstract] When a communication line is 50-60 m away from the railroad tracks, then the quality of railroad radio communication begins to deteriorate and, as the distance increases further, dead zones begin to appear. Additional difficulties in ensuring continuity of the radio link are caused by trestles which form shields around antennas installed on locomotives. Attempts to solve these problems have been made by installing partly horizontal and partly inclined waveguides inside trestles at about the height of the roof of a locomotive, to simulate a passive radio relay consisting of an inductive loop and a radiator respectively, as well as by installing special directional antennas and antenna-feeder channels in the stations. The radiation pattern and the performance of a dipole antenna and of an inverted-L antenna are analyzed here, with the length of a dead zone shown to decrease in both cases with increasing distance from the station. Engineers A. V. Pashkov and A. Yu. Tetter participated in these experiments. Figures 8.

Components and Circuit Elements Including
Waveguides and Cavity Resonators

USSR

UDC 537.212.001.24:621.319.4

THE ELECTRIC FIELD AT THE EDGE OF A PULSE CAPACITOR WITH CONSIDERATION OF
FINITE DISPLACEMENT OF THE PLATES

Minsk IZV. VUZ: ENERGETIKA in Russian No 9, Sep 77 pp 31-38 manuscript
received 17 Aug 76

TITOV, M. N., engineer, and BAGALYE, YU. V. [deceased], candidate in technical sciences, docent, Planning and Design Office of Electrohydraulics, Academy of Sciences UkrSSR

[Abstract] The electric field on the edge of a pulse capacitor section is analyzed and calculated with consideration of finite displacement of the plates in order to determine the effect that this displacement has on the average value of the initial field strength E_{in} of the low-intensity partial discharges that arise at the sharp edges, and on the intensity of these discharges. It is assumed that the constant spacing between plates is d and the relative displacement of the plates is nd . The problem is solved by the method of conformal mappings on the "Mir-2" digital computer, and the field patterns and equipotential lines are given for different n . The value of E_{in} is calculated as a function of the parameter n and the thickness of the dielectric d . It is found that for sections with covered foil (n ranging from 0 to 10) the value of E_{in} is only 1% higher than for a section with projecting foil ($n = 100$). A perceptible increase of E_{in} (by 9%) and reduction in the volume of insulation (by 29 percent) can be attained by reducing the parameter n to 2. This will require winding machines that can make sections with plate displacement of no more than 0.2 mm for foil about 100 mm wide. Recommendations on reduction of n are summarized in a table that should be of practical use in designing high-voltage components with insulation of capacitor type such as 220 kV cable shoes with insulation about 5 mm thick. Figures 4; table 1; references 7: 6 Russian, 1 Western.

USSR

UDC [621.319.4:537.212].001.24

ELECTRIC FIELD AT THE EDGE OF A CAPACITOR PLATE WITH A NONLINEAR INTERFACE

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 72-74 manuscript received 28 Sep 77

NABOKA, B. G., Kharkov

[Abstract] Exact analytical expressions for the electric field intensity at the edge of a capacitor plate are derived on the basis of conformal mapping and inversion of the mathematical model. This method, when applied to a curvi-linear plate-dielectric interface as actually found in practice or to such an interface of an arbitrary shape, simplifies the calculations. Its validity is based on the duality principle, which involves the components of electric induction and of electric field intensity in electrostatics. Figures 3; references 8: 7 Russian, 1 Western.

EAST GERMANY/HUNGARY

A LOCKING RELAY FOR ELECTRONIC CIRCUITS

East Berlin FERNMELDETECHNIK in German Vol 18 No 1, 1978 pp 31-32

STEFFENS, O., Budapest, Hungary

[Abstract] A new locking relay, called LR, was developed. The set of contact springs may contain up to 12 pairs which, in 2 groups and each with its own actuating card, are stacked in such a manner that each pair of contact-spring groups can be actuated alone. The design, construction, operation, performance, and applications of the relay are described and illustrated with photographs, drawings, and diagrams. The operation takes place in three steps: (1) This is the starting position; the marker pin is to the left. The force of the locking spring is higher than the reset force of the corresponding spring group. (2) The relay and the marker-magnet systems are simultaneously energized by a current pulse. The locking spring is pressed back by the draw of the relay anchor. The contact springs may return to their rest position (working contacts open, rest contacts close). The interlock of the marking pin between locking spring and actuation card is lifted. (3) The end of the excitation pulse begins. As the anchor resets, the locking spring advances and, with the marker pin, moves the right actuating card so that the right-side contact spring group switches. The relays performed satisfactorily in service; they are small and light in weight. Figures 3; no references.

HUNGARY

DIMENSIONAL ACCURACY OF MASTER PATTERN FILMS OF PRINTED CIRCUIT BOARDS

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 17 No 2, Feb 78 pp 55-58

TOTH, ENDRE, associate professor, Department of Electronic Technology, BME [Budapest Technical University]

[Abstract] The author discusses in general the effect of various manufacturing processes on the dimensional accuracy of master pattern films for printed circuit boards, and presents examples to illustrate the effects of film defects on the quality of the pattern films. One influencing factor is the temperature expansion coefficient of the film material. Polyester substrate is best in this respect. Another factor is the dimensional change caused by fluctuations in atmospheric humidity. Further changes in dimensions may take place as a result of film-thickness fluctuations; however, this is seldom encountered. Some improvement may be obtained by regulating the temperature at the factory and pretreating the factory air. However, heat effects are encountered when the film substrate is coated with the photoresist layer. Thus, the coating equipment must also be carefully controlled during operation. Finally, the placement of the film during the preparation of the pattern also

affects the dimensional accuracy. Various methods have been proposed to eliminate this source of inaccuracy. It must be realized that additional problems may be introduced by the fact that any dimensional change in the film is directional. This may be remedied only by measures in film substrate production. Figures 5; tables 2.

EAST GERMANY

DESIGN CONCEPTS, REALIZATION AND VARIANT COMPARISON OF ACTIVE RC FILTERS OF LOW NOISE AND HARMONIC DISTORTION FACTOR

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 10, 1977 pp 428-432 manuscript received 21 Jan 77

SEIDEL, V., Chamber of Technology, Broadcast and Communication Technology State Enterprise, Communications Factory, Leipzig

[Abstract] The present stage of development of electronic devices is characterized by the increasing degree of integration of the circuits and component units. The high packing densities associated with this development can be achieved only at extremely low power consumption. In this article, the author uses the example of a low-pass filter to investigate the extent to which active RC filters are suitable for the transmission of channel bundles in carrier-frequency engineering. The main difficulty is in maintaining a satisfactory signal-to-noise ratio and extremely low non-linear distortion level. The low-pass filter has a limit frequency of 108 kHz; it suppresses carrier residues and fault sideband in primary-group conversion. The theoretical and experimental study of typical circuits informs the reader about the advantages and disadvantages of the various methods used for the realization of active filters. On the basis of references in the literature, a review is made of noise analysis and distortion factor assessment of active filters; signal-to-noise ratio, impedance level, and power; realization with impedance converters and state equations; cascade design of 2nd-order filter units; and various versions. Figures 10; table 1; references 22: 17 German, 5 Western.

EAST GERMANY

SCANNING FILTER WITH BRANCHED STRUCTURE USING TIMED INTEGRATORS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 27-28, 41

UNGER, HORST and NEUMANN, EGBERT, Physics and Electronics Section, Ernst Moritz Arndt University, Griefswald

[Abstract] This article reviews the theory, design, construction, performance, and applications of a recursive analog scanning filter with timed integrators with a branched structure, featuring operational-amplifier circuitry. The prototypes examined correspond to a 6th-order Tschebishev filter T 06 50 and to a 5th-order Cauer filter C 05 25 31, respectively. The construction of the filters features timed integrators, scanning hold units, and summatoms combined in an operational amplifier circuit. There are actually two operational amplifiers (Type A 109) to reduce drift of the offset voltages. BC 177 transistors are used as short-circuiting switches in inverted operation. The measurements on the prototypes were carried out at a sampling frequency of 16 kHz, using a level-measuring station MU-211 made by VEB RFT [Radio and Television Engineering State Enterprise] in Leipzig, at a bandwidth of approximately 150 Hz. Both branched structures used were found to be stable. In general, the measurements confirmed the theoretically forecast low coefficient sensitivity of the branched structures with timed integrators; they showed in addition that these structures have low noise and low harmonic distortion factors. Figures 4; tables 2.

USSR

UDC 621.372.54

POLYNOMIAL FILTERS WITH PERMANENT EFFECTIVE INPUT RESISTANCE

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 94-98 manuscript received after completion 11 Jul 77

KOSYREV, V. B.

[Abstract] The paper analyzes the principles of construction of iterative filters with a permanent effective input resistance (constant at all frequencies) and intended for operation as output oscillatory systems of radio transmitting devices. Parallel connection of a low-frequency filter and a high-frequency filter, and the special features of designing filters for transmitters are discussed. Calculated relations for designing such filters are presented. The author thanks E. V. Zelyakh for valuable advice. Figures 4; table 1; references 17: 15 Russian, 2 Western.

USSR

UDC 621.396.669.8

BASIC NOISE OF A DIGITAL FILTER WITH A SPECIFIED FREQUENCY CHARACTERISTIC

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 20 No 12, 1977 pp 26-30 manuscript received 4 Feb 77

STEPASHKIN, A. I. and EMIKH, L. A.

[Abstract] In the case of construction of digital filters with specific frequency properties, the controlling factor affecting the choice of capacity of the operating units is the permissible magnitude of the basic noise presented to the output of the filter. The appearance of such noise, caused by quantization with respect to the level of the discrete readouts of a signal and by rounding off of the results of intermediate calculations, is connected as a rule with fulfillment of the operation of multiplication. The present paper solves the problem of finding the dispersion of the basic noise of a digital filter with a fixed point in the case of limitation of the capacity for representation of discrete, equally spaced in time, readouts of the signal x_v ($v = 0, 1, 2, \dots$) and the capacity of the intermediate results of calculation. On the basis of an evaluation of the quantization noise of a nonrecursive filter, which is synthesized in a frequency range, a method is proposed for choosing the length of its registers. The paper was recommended by the Department of Automatics and Telemechanics of the Ryazan Radio Engineering Institute. References 5 (Russian).

USSR

UDC 621.372.632

TRANSISTORIZED MICROWAVE BAND FREQUENCY DIVIDER

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 105-106 manuscript received after completion 15 Apr 77

ABAKUMOV, V. F. and DEM'YANCHENKO, A. G.

[Abstract] Until recently harmonic frequency dividers used in the microwave band were made for the most part on a basis of tunnel diodes. However, such dividers require a stable feed and have a low level of output power which reduces their reliability and noise immunity. Transistor devices are free from these shortcomings. The present paper describes one of the possible circuits of a transistorized frequency divider for the microwave band and the special features of its construction and adjustment. Figures 4; reference 1 (Russian).

USSR

UDC 621.372.632:621.382.3

PLANNING OF TRANSISTORIZED FREQUENCY MULTIPLIER ON DIGITAL COMPUTER

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 35-44 manuscript received 1 Mar 77

BRUYEVICH, A. N.

[Abstract] Methods shown in the literature for calculating frequency multipliers based on transistors have two significant shortcomings: the effect of the collector voltage on the currents of the collector and base is not considered in a broad sense, or is considered approximately; and the effect of operating conditions on the parameters of a piecewise linear model of a transistor is not considered. Such a situation accounts for the fact that in frequency multipliers, the frequency of the voltages at the collector and base are different. Consequently, for calculation of a frequency multiplier it is necessary to perform a harmonic analysis of the current through a nonlinear inertial element (transistor) which occurs under the action of a biharmonic effect. Simplifications found in the literature signify a transition to harmonic stimulation. In the present paper it is shown that there is no need for a similar simplification because the system of precise (in the limits of a piecewise linear approximation) equations which describe the state of the same transistor and the external networks, it is possible with a suitable choice of unknowns to reduce to a system of linear equations and to one or two transcendental, into which solutions of a linear system (on a digital computer) enter as parameters. Figures 4; references 7 (Russian).

CALCULATION OF HARMONIC DISTORTION FACTOR OF TRANSISTORIZED FREQUENCY MULTIPLIERS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 98-101 manuscript received 21 Jun 77

SOLOSHEK, L. K.

[Abstract] During investigation of high-frequency transistorized frequency multipliers of low and medium power (to 0.1 W) a difference was discovered, especially with large angles of cut-off θ , between the value of the amplitude of the harmonics (calculated by conventional methods, with the use of a linearly-broken approximation) of the input current-voltage characteristics of a transistor, and the actual value. For a better agreement of engineering calculations of frequency multipliers with experimental data, it is advisable to improve the approximating functions of the input characteristics of microwave transistors and the conventional method. An experimental check of the static current-voltage characteristics of contemporary microwave transistors of low and medium power, which have very small resistance losses in the base region, showed that the input characteristics, in practically all the range of operating currents, deviates considerably from the linearly-broken approximation and corresponds well with exponential dependency of the form

$$i_e = I_e \exp \left[(u_{e.b} - E_e) \frac{1}{u_T} \right]$$

where i_e is the active component of the current through the emitter p-n junction, $u_{e.b}$ is the effective voltage at the emitter base terminal; $u_T \approx 26$ mV, the potential temperature (for silicon transistors some deviation from this magnitude is possible); I_e is the concrete value of the current in the limits of an exponential approximation; E_e is the corresponding I_e value of the voltage at the volt-ampere characteristics. Figures 2; tables 2; references 3 (Russian).

USSR

UDC 621.372.8

PULSE CHARACTERISTICS OF ELECTROMAGNETIC SHIELDS

Moscow ELEKTRICHESTVO in Russian No 11, Nov 77 pp 90-92

LYUBOMUDROV, A. A., dr in technical sciences, Moscow

[Abstract] Methods of the theory of electric fields are applied to a solution of the problem of shielding in the case of electromagnetic pulses. The approach makes it comparatively easy to derive the pulse characteristics of an electromagnetic shield with a complicated geometric shape. The shielding process is considered as passage of a signal through a quadripole equivalent to the shield casing with consideration of shape. A comparison of pulse characteristics and evaluation of the pulse fields inside sealed casings shows that a quasi-steady electric field is attenuated by the shield much more strongly than a magnetic field. In many cases the external electric field that penetrates the shield may be much weaker than the electric field that is induced in the shield by the penetrating magnetic field. An expression is found for the pulse characteristic of the shield with respect to this induced electric field. A comparison of experimental and theoretical pulse shapes showed good agreement. Figures 2; table 1.

USSR

UDC 621.372.8:621.315.61+666.221.3

THIN-FILM LIGHT GUIDES MADE OF HEAVY CROWN GLASS

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 134-135
manuscript received 19 Apr 77

KISELEV, V. K. and RED'KO, V. P., Mogilev Affiliate of the Institute of Physics, Academy of Sciences BSSR

[Abstract] A report on thin-film light guides made from heavy crown glass by the method of rf-sputtering. The specimens were made in a triode type facility in an argon atmosphere with 20 percent oxygen. Five grades of crown glass were studied: TK8, 14, 16, 20 and 21. Heavy crown glasses have the highest content of barium oxide of all optical glasses with index of refraction ranging from 1.56 to 1.66 depending on barium oxide content. Measurements showed that the index of refraction of the films was higher in all cases than that of the sputtered targets. This is attributed to preferential sputtering of BaO from the target when it is bombarded with gas ions in the rf discharge. Grades TK16 and TK21 produced the best light guides with attenuation of less than 1 dB/cm. Figures 2; references 7: 2 Russian, 5 Western.

USSR

UDC 621.372.8.09

ASYMMETRIC GRATINGS ON THE SURFACE OF GLASS WAVEGUIDES

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 218-220
manuscript received 26 Jul 77

ALEKSEYEV, V. V., BATYGOV, S. KH., ZLENKO, A. A., SYCHUGOV, V. A. and SHIPULO, G. P., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

[Abstract] Gratings with asymmetric profile of the lines in the glass were produced by ionic etching of the corrugations into the glass through a photoresist using Freon as the gas etchant. The asymmetric profile of the corrugations resulted from placement of the substrate at an angle to the flow of etchant. Waveguides were made by diffusion of Ag^+ ions in the glass substrate enabling propagation of 3-5 TE and TM modes. Experimental observations showed redistribution of the power emitted from the waveguide. The coefficient of redistribution of the radiation energy into the adjacent media on a wavelength of $0.51 \mu m$ reaches a value of the order of 10. The authors thank N. M. Bystrova for assistance with the work. Figures 2; references 6 (Western).

USSR

UDC 621.372.821

ELECTRODYNAMICS OF INTERFERENCE IN NON-RESONANT WAVEGUIDE-SLOT ARRAYS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 48-54 manuscript received 15 Mar 77

YERSHOV, L. I., KREMENETSKIY, S. D. and LOS', V. F.

[Abstract] The electrodynamic characteristics calculated by known methods of waveguide-slot arrays, with a comparatively small number (up to 30) of slots in each waveguide, substantially differ in many cases from experimental data. As shown in the literature, this fact explains the so-called exterior and internal interference. Rigorous methods for taking account of these phenomena are very time-consuming and make it possible on contemporary electronic computers to analyze a system with only a very small number of slots. Approximate methods only take into account the interaction with respect to the fundamental wave, which for calculation of directional diagrams with the levels of side lobes below $(15 \div 20)$ db is, as practice shows, inadequate. In connection with this, the pressing problem arises of an investigation of the electrodynamic factors which affect the directional pattern of a waveguide-slot array with low levels of side lobes. The following pertain to it: the exterior interference, the interior interference with respect to higher types of waves, the nonresonanceness of the slots, and the finite thickness of the waveguide walls. The nonresonanceness of the slots is primarily caused by an insufficiently adequate procedure for completion of the length of the slots during practical realization of the specified aperture distribution in the array. The present paper is concerned with development of approximate methods of calculation of the factors mentioned, making it possible accurately to analyze

the characteristics of a real waveguide-slot array. Discussion of the material is conducted using as an example a waveguide-slot array widely used in practice, with slots cut in the wide wall of the waveguide. The proposed procedure for evaluation of the electrodynamic effect of interference makes it possible accurately to calculate a directional pattern up to a level of 30 db. This effect is fundamentally necessary to take into account during development of a waveguide-slot array with a small number of radiators and a low level of side lobes of a pattern. The relations obtained in the paper make it possible to develop a method for synthesis of real waveguide-slot arrays, taking account of the effect of interference. Figures 6; references 7: 6 Russian, 1 Western.

USSR

UDC 621.372.828

DESIGN OF HIGH-Q ASYMMETRIC STRIPLINE WAVEGUIDES

Minsk VESTSI AKADEMII NAVUK BELARUSKAY SSR, SERIYA FIZIKA-TEKHNICHNYKH NAVUK in Russian No 1, 1978 pp 112-116 manuscript received 22 Mar 77

LUKASHEV, V. M., Institute of Electronics, Academy of Sciences of the Belorussian SSR

[Abstract] High-Q asymmetric stripline waveguides are used in IC microwave devices operating at centimeter and millimeter wavelengths. A design analysis is given which has already been applied to microstripline waveguides with multilayer dielectrics. Assuming a fundamental TEM-mode in homogeneous isotropic layers, the effects of boundary conditions in intricate configurations are taken into account by appropriate Laplace transformations in complex planes. Here a stripline waveguide is treated as a three-layer medium and, on this basis its geometric proportions and characteristic impedance are calculated for suspended and for inverted structures. Numerical data have been obtained on a computer, according to a special program for such a design. The author thanks V. B. Kartazhov for the special calculations by the variational method, against which the results of this study could be checked. Figures 4; table 1; references 8: 5 Russian, 3 Western.

USSR

UDC 621.372.826:621.315.61

PHASE CHARACTERISTICS OF A PLANAR DIELECTRIC WAVEGUIDE NEAR METALLIC OBJECTS

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 37-40 manuscript received 9 Nov 76; final version 4 Apr 77

GUDZENKO, A. I., SOTIN, V. YE., and TISHCHENKO, A. A., Moscow

[Abstract] The effect of near metallic objects on the phase lead along a waveguide is evaluated by a simple method involving the dispersion equation. This equation is derived here and solved for the simple case of a single two-dimensional TE-mode propagating through a three-layer lossless waveguide, the carrier layer between two dielectric layers and a metallic surface nearby. On this basis, the phase characteristic are calculated with appropriate simplifying approximations. First a flat metallic surface is considered, then a metallic object in the shape of a parabolic cylinder. The results indicate that the effect of metallic objects near the carrier layer in a waveguide, at distances comparable with the wavelength of optical modes, must be taken into account. Figures 4; references 4: 2 Russian, 1 German, 1 Western.

USSR

UDC 621.373.826:621.396

PLANAR WAVEGUIDES BASED ON EPITAXIAL LAYERS OF GaAsP AND GaN FOR PURPOSES OF INTEGRATED OPTICS

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 135-138 manuscript received 19 Apr 77

ANDREYEV, V. M., BYKOVSKIY, YU. A., VIGDOROVICH, YE. N., MAKOVKIN, A. V., OPLESNIN, V. L., PLAVICH, L. F., SMIRNOV, V. L. and SHMAL'KO, A. V., Moscow Engineering Physics Institute

[Abstract] An investigation is made of planar waveguides based on epitaxial layers of A^{III}B^V compounds suitable for use not only in the infrared range, but in the visible region of the spectrum as well. The materials were epitaxial layers of GaAs_{1-x}P_x and GaN. The epitaxial layers were grown from the gas phase and had a perfect single-crystal structure. The losses in these optical waveguides were determined for different wavelengths, and the possibilities for using them in integrated optical systems are considered. The lowest losses were shown by waveguide layers of the GaAs_{0.15}P_{0.85} and GaAs_{0.1}P_{0.3} type, having losses of 0.5 and 1 dB/cm respectively for the TE₀ mode ($\lambda = 1.15 \mu\text{m}$). These low losses combined with high electrico-optical, acoustico-optical and luminescent parameters should make these waveguides suitable for integrated-optics directional couplers, switches, modulators, light guides and lasers with distributed feedback for the visible and near-infrared range. Figures 2; table 1; references 9: 7 Russian, 2 Western.

USSR

UDC 621.373.826:621.396

ELECTRO-OPTICAL PHASE MODULATION OF RADIATION IN THIN-FILM WAVEGUIDES BASED ON EPITAXIAL LAYERS OF GaAsP

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 146-147 manuscript received 13 Jun 77

BYKOVSKIY, YU. A., VIGDOROVICH, YE. N., SMIRNOV, V. L., OPLESNIN, V. L., PLAVICH, L. F. and SHMAL'KO, A. V., Moscow Engineering Physics Institute

[Abstract] An investigation is made of electro-optical phase modulation of laser radiation in thin-film waveguides based on single-crystal epitaxial layers of $\text{GaAs}_{1-x}\text{P}_x$. Epitaxial layers of GaAsP, 3-5 μm thick, were grown from the gas phase on low-resistance substrates of n-gallium phosphide. The resultant films were single-crystal in structure. The lowest losses were shown by thin-film waveguides based on $\text{GaAs}_{0.15}\text{P}_{0.85}$ suitable for operation in the visible and near-infrared. Losses for the TE_0 mode in the waveguide on $\lambda = 1.15 \mu\text{m}$ were 0.5-1 dB, and on $\lambda = 0.6328 \mu\text{m}$ 1.5-2 dB/cm. Radiation on these wavelengths was modulated at frequencies up to 5 MHz with controlling voltages of 13 and 7 V per radian of phase shift on the longer and shorter wavelengths respectively. It is demonstrated that single-crystal epitaxial layers of GaAsP are suitable for development of a variety of electro-optically controlled integrated-optics elements and devices. Figures 2; references 8: 3 Russian, 5 Western.

USSR

UDC 621.396.674

PATTERN-FORMING CIRCUITS ON A BASE OF MULTI-WAVE WAVEGUIDES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 2, 1978 pp 42-47 manuscript received 20 Mar 77

MAKSIMOV, V. M.

[Abstract] The paper demonstrates the possibility of constructing pattern-forming circuits (DOS) for a multibeam multichannel antenna on the base of an ordinary multiwave guide. It is shown that, irrespective of the dependence on the form of the cross section of such a waveguide, its length is determined by the solution of a system of inequalities derived in the work and provides the required phase relations between the propagated waves. Expressions are obtained which make it possible to determine the elements of the scattering matrix of a device for excitation of waves for symmetrical and nonsymmetrical DOS on a basis of multiwave guides. These expressions in conjunction with known methods of synthesis of a scattering matrix of reactive multipliers can serve as a base for practical realization of a DOS on a basis of multiwave guides. Figures 2; references 8: 5 Russian, 3 Western.

USSR

UDC 621.396(088.)8

SELF-FILTERING OPTICAL WAVEGUIDES OF RING TYPE

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 138-142
manuscript received 5 May 77

BELANOV, A. S. and DIANOV, YE. M., Physics Institute imeni P. N. Lebedev,
Academy of Sciences USSR, Moscow

[Abstract] An analysis is made of the waveguide characteristics of a structure of ring type comprised of a central core made of a material with high dielectric losses (loss tangent of 10^{-6} - 10^{-5}) surrounded by a guiding shell of maximum optical density with a third external shell over the entire waveguide. In this type of structure, the luminous section is in the form of an annulus. The high-loss material in the center filters out higher modes, resulting in operation close to single-mode transmission. These waveguides have large transverse dimensions and good dispersion characteristics, which facilitates excitation and joining, enables transmission of wide-band signals, and makes it easier to achieve the necessary tolerances. Figures 4; references 5: 4 Russian, 1 Western.

USSR

UDC 621.396

DEVICE WITH MULTIEXTREMAL CHARACTERISTICS BASED ON NONLINEAR MAGNETIC ELEMENTS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 10-13 manuscript received after revision 30 May 77

GLUZMAN, P. L., MOROZOV, M. P. and YUDIN, V. V.

[Abstract] Construction of devices for realization of multiextremal functions is difficult. Meanwhile development of new types of synthesizers of multiextremal functions would open wide prospects for planning certain devices for radio engineering and computing technology. Problems of the construction of devices with nonmonotonic multiextremal characteristics based on nonlinear magnetic elements are practically not discussed in the literature, although previous papers by P. L. Gluzman and his various coauthors have shown that their reliability and broad functional capabilities are very promising. The present paper considers the special features of construction and the principles of operation of a device with multiextremal characteristics based on the new nonlinear magnetic elements. These elements were developed by the authors and called "inductrons." An experimental investigation was made of the amplitude-harmonic element for five inductrons. The values of the output voltage of these inductrons were obtained as well as relations for determining the number of stable states. Figures 2; references 5 (Russian).

USSR

UDC 681.3.05+681.2+621.31

INFORMATIONAL EFFICIENCY OF ANALOG-TO-DIGITAL CONVERTERS IN THE CASE OF INCOMPLETE DATA ON THE PROBABILISTIC CHARACTERISTICS OF THEIR ERRORS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 44-48
manuscript received 12 Dec 76

MOISEYEV, V. S.

[Abstract] The informational efficiency of analog-to-digital converters in the case of incomplete a priori data on the probability distribution of errors is analyzed, with the conditional maximum information loss serving as the criterion. The latter is defined as the maximum possible rate of information loss over all degrees of freedom in the data available. The estimation is made on the basis of entropy calculations for the various hypotheses with regard to the error distribution and for various numbers of error components (two or more). The paper was recommended by the Department of Computing Technology of the Leningrad Institute of Precision Mechanics and Optics. Table 1; references 7: 6 Russian, 1 Western.

USSR

UDC 681.325.3

CHECKING THE DYNAMICS OF ANALOG-TO-DIGITAL CONVERTERS BY THE METHOD OF ERROR ACCUMULATION

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 28-31 manuscript received 20 Jul 76; final version 1 Mar 77

ALEKSANDRIN, V. I. and CHUBAROV, M. A., Gorkiy

[Abstract] It becomes necessary to check the dynamics of encoders during their design, manufacture, and operation. A rather universal method not requiring a fast storage device seems feasible, if an encoder is regarded as an element with time delay and as such connected into a closed loop with negative feedback. On the basis of the fundamental dimensionless equations for the system, the relation between the dynamic quantizing characteristic and the envelope of oscillations in response to a step signal is analyzed here. The analog memory at the input contributes the largest dynamic error, because of undercharging of the capacitor during read-in and its discharging during storage. A comparison of theoretical results with actual oscillograms confirms the validity of this method, which has also been established experimentally. Figures 4; references 3 (Russian).

EAST GERMANY

HIGH-SPEED 11-BIT DIGITAL-TO-ANALOG CONVERTER FOR DUAL-COMPLEMENT CODE

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 pp 93-95

DIEBEN, ANNEROSE, HEYMEL, GERHARD and UNGER, HORST, Physics-Electronics Section, Ernst Moritz Arndt University, Greifswald

[Abstract] A converter with recurrent network is described. To achieve high conversion rates, the recurrent network is low-ohmic. The converter features a switched constant-current source with a high-speed diode switch. The switching diode used is a SAY 16 type having a block recovery time of less than 4 nsec. In this design, the rate is determined almost entirely by the speed of the digital switching circuits employed. The digital words are offered in series, in the form of a dual-complement code. To achieve the desired constancy of the currents, Darlington stages with low base-current losses are used; they are temperature-compensated with diodes. A prototype was built. It uses metal resistors deposited by vapor coating. It was statically and dynamically tested. The results of the tests indicated that a coding error of less than 1 LSB (about 1 mV) may be achieved over a short period. The long-term error is approximately ± 3 mV. Long-time constancy may be improved further by using reference elements with temperature stabilization instead of zener diodes. High accuracy is obtained with conversion rates of a few MHz. Figures 5; references 5: 4 German, 1 Western.

USSR

UDC 621.317.725:550.837.08

A MODIFICATION OF AN INTEGRATING ANALOG-TO-DIGITAL CONVERTER FOR MARITIME SEISMOLOGICAL PROSPECTING

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 32-36 manuscript received 9 Feb 76; final version 24 Mar 77

ZHELUDKOV, N. I. and MEYER, V. V., Ryazan

[Abstract] A modification of a differential-integrating encoder with digital autocorrection of errors is shown which has a four times higher transmitting capacity, up to $6 \cdot 10^3$ bits/s, than its earlier version. Nonlinear distortion has been reduced by elimination of the second-harmonic component, and is now less than 0.02 percent. Voltage-to-time conversion is effected here also in two cycles, each including a two-step integration, but the input appears in the first cycle as the sum and in the second cycle as the difference of a reference current and a signal current. The device consists of a differential integrator, a parallel-crossing array of analog switches, an equalizing amplifier, a servo-feedback switch, a gate, a reversible counter, a logic circuit, and an iterative trigger. The dynamic error of these integrating encoders with short coding cycles is affected most by dielectric absorption within the infrared range. The performance of the new modification is analyzed here. It has been designed specially for a 24-channel sonar system with which studies of sediments on the bottom of sea shelves are made, operating at frequencies up to 45 Hz. Figures 2; references 8: 6 Russian, 2 Western.

EAST GERMANY

OPTIMIZATION OF A SYSTEM FOR THE IDENTIFICATION OF IRREGULARLY DISTRIBUTED
HYDROACOUSTIC SCATTERERS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 92-95
manuscript received 20 Jan 77

MUELLER, ERIKA, Chamber of Technology, Rostock

[Abstract] The studies reported are based on the probability-density distribution function of the momentary values of the echo signals consisting of incoherent pulses which are superimposed. The goal was to optimize a system for the parameter estimation of hydroacoustic Poisson-distributed scatterers, especially the optimum estimation of the local space density and scatter coefficient. The optimum estimation based on the momentary echo values has an asymptotic accuracy limit. Various receiver structures are proposed for the practical implementation of the adaptive procedures involved. They include adaptive receiver with parameter estimation, recursive receiver based on the Robbins-Morro principle, and others. The results reported contribute to the theory of optimum decision rules, and have practical significance. By selecting an optimum localization signal duration and by establishing a lower error threshold, and also considering the asymptotic accuracy limit, the user of the estimation method may determine the most favorable application range. Figures 11; references 5: 2 German, 3 Western.

USSR

UDC 531.78:084.2

NONCONTACT TORQUE SENSOR

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, Mar 78 pp 39-40

ODINETS, S. S. and SILICH, S. S., engineers

[Abstract] A description is given of a noncontact torque sensor which utilizes the principle of converting increases in the resistance of sensing elements of strain gauges into frequency. The increase in frequency is proportional to the torque and is independent of the r.p.m. of the shaft. The sensor is designed as a cylinder around whose generatrix is wound a transmitting antenna potted in epoxy. The body of the sensor has cutaways to accommodate circuit components and a battery power supply. The sensor is pressed onto a sleeve, which is then fitted onto the shaft. The total weight with batteries is 0.7 kg, with the outside diameter measuring 150 mm and the inside 70 mm; its height is 40 mm. The sensor consists of a strain-sensitive resistance bridge, an unbalanced signal amplifier, a controlled oscillator, a power amplifier, a transmitting antenna, a voltage stabilizer and a battery power supply. Signals from the resistance bridge are converted into frequency by means of a controlled frequency pulse generator made up of three transistors. A type 1UT401A operational amplifier is employed, to whose input is connected the measuring branch of the resistance bridge. Two types 7D-01 batteries are used to power the circuit. The signal transmitted by the sensor's antenna is picked up by the receiving antenna of a measuring unit and is amplified. A freq-meter, magneto-electric oscillograph, or a magnetometer with frequency modulation can be employed to process the signal from the output of the amplifier. The receiving antenna is installed at a maximum distance of 0.5 m from the sensor. Maximum accuracy in studying dynamic processes is achieved when employing a magnetometer. Nonlinear distortion is 0.5 percent. Type 2PKB strain gages are employed. The device can be used in the 0 to 40°C temperature range. A block diagram, circuit diagram, and photograph of the detector are shown. Figures 3; references 2 (Russian).

AN ANALYSIS OF THE PROCESSES IN A SYSTEM CONSISTING OF A MECHANICAL WAVEGUIDE AND AN ACCELERATION TRANSDUCER FOR THE CASE OF SHOCK ACCELERATION

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 1, Jan 78 pp 60-62

NEMSADZE, SH. A. and DOLABERIDZE, G. E.

[Abstract] Test stands for the determination of the dynamic characteristics of piezoelectric, high frequency, shock acceleration instrumentation transducers contain an exciter, a waveguide and the acceleration transducer being tested. The problem of calculating the dynamic response of the measurement transducer, the parameters of the model adopted, which employs concentrated masses and stiffness factors, and analyzing the influence of the waveguide properties on the results of measuring the resonant frequency and attenuation of the transducer, is solved in two stages. In the first, equations are derived for the shock acceleration occurring in a waveguide with the action of a mechanical exciter. In the second step of analyzing the transient process in the waveguide and acceleration transducer system, the model used assumes that the internal and external waveguide resistance to motion is zero and that the acceleration transducer is a nonconservative oscillatory system with one degree of freedom. Expressions are derived for the contact force acting on the transducer, the relative deformation of the transducer, and the response of the transducer to the shock acceleration, where these permit the determination of the main metrological characteristics of transducers: the resonant frequency and attenuation factor of the oscillating system. Experimental studies conducted at the Georgian Polytechnical Institute imeni V. I. Lenin show that mechanical exciters with a cylindrical striker in the waveguide can produce shock accelerations with a unipolar waveform having a duration of 50-100 microseconds and an amplitude of 10^5 m/s². Mechanical exciters with a ball striker make it possible to excite bipolar waveform accelerations with a duration of 15-40 microseconds and an amplitude on the order of 10^4 m/s², while in units with a pulsed magnet exciter, it is possible to produce a bipolar waveform acceleration with a duration of 10 microseconds and an amplitude of $5 \cdot 10^3$ m/s² in the waveguide. Figures 3; references 5 (Russian).

USSR

UDC 533.608.536.531

ESTIMATING THE ERROR OF TEMPERATURE COMPENSATION FOR ONE CLASS OF THERMO-ANEMOMETERS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 110-116 manuscript received 18 Jan 77

POVKH, I. L. and YEREMIN, G. P.

[Abstract] A hot-wire thermoanemometer is analyzed in terms of a linear model representing it as a system with quasi-constant parameters and with temperature fluctuations in the form of time harmonics at the input. The transfer function involves conversion of temperature fluctuations to changes in the transducer resistance and to an output voltage. The thermal compensation and its error are calculated, with thermal inertia accounted for by a higher thermal capacity of the hot transducer wire and by a velocity gradient due to a finite distance between the transducer wires. The upper cutoff frequencies of temperature fluctuations at several benchmark stream velocities (1, 10 and 100 m/s) are thus determined for several wire radii (1, 0.5, and 0.1 mm). Temperature compensation of a thin wire is found to be effective over a wide frequency range, but above the cutoff frequency it not only ceases to be effective but also introduces an additional error by increasing the amplitude of the output signal. A close agreement is found between theoretical and experimental data on temperature compensation of tungsten wire in air streams. This paper was recommended by the Department of Physical Hydrodynamics of the Donetsk State University. Figures 3; table 1; reference 1 (Russian).

USSR

UDC 536.629.7

A THERMOELECTRIC BATTERY TRANSDUCER FOR MEASURING THE NONSTEADY-STATE COMPONENT OF A HEAT FLOW

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 1, Jan 78 pp 71-73

GAVINSKIY, YU. V., VOROZHTSOV, B. I., and NEMIROV, YU. V.

[Abstract] Traditional thermoelectric battery transducers for heat flows take the form of a system of series connected differential thermocouples, where the thermal electrodes are arranged parallel to the direction of the heat flow passing through the transducer. The output signal of the device is proportional to the temperature drop across the thickness of the wall and its thermal resistance. A variant of this design is proposed to eliminate the constant signal component for the study of nonsteady-state heat flows. The new transducer is a thermoelectric battery consisting of series connected thermocouples which are installed in a heat sensitive wall so that the hot junctions are located at the front surface and the cold junctions at a parallel rear wall surface, while supplemental junctions are positioned at a set spacing from the front and rear surfaces. The operation of the device is based on the fact that

in a steady-state mode, the temperature heads relative to the supplemental junctions, located between the front and rear surfaces, are equal, and the thermal e.m.f.'s generated cancel out each other. The spacing between the supplemental thermojunctions and the heat sensitive surfaces is determined by taking into account the thermal equilibrium of the device and the boundary conditions for the heat exchange during the measurement process. The transducers are fabricated by winding a spiral of enameled constantan wire on a strip of insulation material, such as triacetatecellulose, and then mechanically removing the surface layer of the winding to a depth specified by a given design equation. The blank is then immersed in a galvanic bath, where the bare sections of the wire are copper plated. The result is alternating bimetal and constantan thermoelectrodes, at the junction points of which a thermal e.m.f. is produced. The copper plated sections are coated with an insulating layer of BF-2 glue. The base is then cut up into sections of the specified dimensions. The layer transducers fabricated in this fashion, with dimensions of $10 \times 10 \times 3 \text{ mm}^3$, contain about 1,200 individual sensitive elements, or almost 4,800 thermocouples. These devices produce a thermal e.m.f. sufficient for recording heat flows with densities of up to 10 W/m^2 using the KSP-4 automatic potentiometer without supplemental amplification of the signal. Figures 3; references 2 (Russian).

USSR

UDC 621.311.25:621.039.002.5-26.002.56

LOW-FREQUENCY VIBROMETER FOR CHECKING EQUIPMENT OF THE IN-PILE LOOP IN A NUCLEAR ELECTRIC POWER PLANT

Moscow ELEKTRICHESKIYE STANTSII in Russian No 9, Sep 77 pp 16-17

KRASYUK, V. YA., IVANOV, YU. S., and ISLAMOV, S. S., engineers, Khar'kov Division of VTI [All-Union "Order of the Red Banner of Labor" Scientific Research Institute of Heat Engineering imeni F. E. Dzerzhinskiy]

[Abstract] The paper describes a low-frequency vibrometer for checking vibrations of technological equipment of the in-pile loop in a nuclear electric power plant. The proposed instrument uses the series-produced I001 vibration sensor after a minimum of modification to compensate for pendulum drift. The device contains a system for automated balancing of the pendulums in the sensing elements that enables parallel recording of vibration data simultaneously over nine channels. The electrical circuit is simplified and additional measurement errors are avoided by eliminating intermediate signal conversions to get vibration velocity and displacement data. Vibrations of 2-200 Hz can be measured in velocity ranges of 0-5, 0-50 and 0-100 mm/s and displacement ranges of 0-50, 0-100, 0-500 and 0-1000 μm . The electronic module can operate at temperatures from -10 to $+45^\circ\text{C}$, and the working range for the sensor is $5-70^\circ\text{C}$. The sensor measures $135 \times 70 \times 75 \text{ mm}$ and weighs 1.5 kg; the electronic module measures $410 \times 220 \times 280 \text{ mm}$ and weighs 5.2 kg. Figures 4; references 5: 4 Russian, 1 Western.

ONE-THIRD-OCTAVE SPECTRUM ANALYZER, MODEL F4327

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, Mar 78 pp 44-45

MASLAKOV, G. N. and TIMONIN, YU. A., candidates in technical sciences, and NASTYUSHENOK, S. S., NEVMERZHITSKIY, N. I., ORLOV, V. N. and TIKHANOV, G.N., engineers

[Abstract] A description is given of a one-third-octave spectrum analyzer, model F4327, developed and put into production by the All-Union Scientific Research Institute of Electronic Measuring Instruments (VNIIEP) and the Zhitomir Elektroizmeritel' Plant imeni the 50th Anniversary of the USSR. It is designed for systematic one-third-octave spectrum analysis of electrical signals in the audio-frequency band (20 to 20,000 Hz) and makes it possible to measure r.m.s., mean rectified and maximal values of voltage in the broad frequency band and in one-third-octave bands. The analyzer is in the form of a portable laboratory instrument, measures 480 X 480 X 278 mm, and weighs 20 kg maximum. Its power requirement is 25 VA, and it is powered from 220 VAC, 50 Hz. The instrument owes its selective characteristics to a selection block containing 31 band filters with one-third-octave passbands. The transfer functions of these filters are described by Butterworth polynomials of the sixth order and are implemented by series connection of three RC active band components, each of which is built on the basis of an amplifier with a double T-type RC bridge circuit in a common negative feedback loop. Enhanced stability of the frequency characteristics of the filters is achieved because of the highly stable RC components of the double-T bridge circuit. The signal supplied to the analyzer's input is normalized by an input unit, is amplified by a preamplifier, and enters the inputs of the selection block's filters and an overload indicator. The signal enters from the output of the preamplifier or one of the filters, depending on whether the mode selector switch is set at "broadband" or "narrowband," into an intermediate attenuator, which makes it possible to reduce signal attenuation by 10 or 20 dB, when required. The signal is then amplified by a final amplifier and sent to the external "instrument output" jack and to a measuring circuit containing r.m.s., mean rectified, and maximum value converters with two integration time constants. Measurement results are read off a needle indicator. A block diagram, circuit diagram, and photograph of the analyzer are shown. Figures 4; references 6 (Russian).

USSR

UDC 621.317.536.53:621.398

RADIOTELEMETRIC SYSTEM FOR CLOSED METALLURGICAL SHOPS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 pp 28-29

LEUS, I. A., engineer, and MUGARAB-SAMEDI, K. G., candidate in technical sciences

[Abstract] A radiotelemetrical system is described which assures a precision of measurement of $+15^{\circ}$ C in the range of measurement of temperatures of the surface of ingots of $400--1000^{\circ}$ C with a signal-to-noise ratio of 40 db, and after finishing can be used for measurements of temperature and a different zone. In addition, it can be used as a radiotelephone channel of communication between a crane operator and a dispatcher. Tests of the telemetric system at the Azerbaydzhanskiy Pipe Rolling Plant confirmed the stable and reliable operation of the equipment. References 2 (Russian).

USSR

UDC 621.317:772.2

REDUCING THE LOW-FREQUENCY ERROR OF DIGITAL PHASE METERS

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 82-83 manuscript received 13 Jan 77; final version 7 Apr 77

CHEPURNYKH, S. V. and CHMYKH, M. K., Krasnoyarsk

[Abstract] A method is proposed for increasing the accuracy of digital phase meters at low frequencies, without significantly adding to the complexity of the instrument. Its gist is a weighted discrete signal processing, by a sequential lowering of the quantization frequency. The measurement time, which begins at the start of the trigger with synchronization of the phase (difference)-to-time converter and ends with the overflow of the timing divider, remains constant. A performance analysis indicates that, at a typical low frequency of 25 Hz, the error of a phase reading taken for 1 s is thus reduced from 3.5° to 0.01° . Figures 2; references 4 (Russian).

USSR

UDC 621.317:621.35

ANALYSIS OF INFRALOW FREQUENCY SIGNALS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 20 No 12, 1977 pp 5-7
manuscript received 22 Feb 77

KONOVALOV, A. A. and NEGIBIN, O. A.

[Abstract] In the case of experimental investigations connected with checking the parameters of slowly changing processes, one of the complex problems is measurement of the integral values for long intervals of observation, as well as determination of their distribution law. An analysis of the technical potentialities of existing means showed the advisability of using electrochemical converters of information during solution of similar problems. The present paper considers a device for determination of integral values of infralow frequency signals, developed on the basis of an electrochemical discrete hydrogen integrator. A block diagram of the analyzer, a description of the principles of operation, and the results of tests of the device are presented. The analyzer described in the paper can find use in systems for inspection of the environmental parameters during work with gas analyzers in medical research and various other fields of measuring technology. The paper was recommended by the Leningrad Institute of Aviation Instrument Making. Figures 2; references 2 (Russian).

USSR

UDC 621.317.4

A DEVICE FOR MEASURING THE COMPONENTS OF THE SPECIFIC MAGNETIC IMPEDANCE

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 35-38
manuscript received 9 Nov 76

MASLOV, YU. N.

[Abstract] A device has been built for measuring both components of the specific magnetic impedance, real (reluctivity) and imaginary, which consists of two appropriate meters, a magnetizer, a trigger, an adjustable capacitor, and an indicator of the minimum magnetizing current. This device is used with ring specimens around which magnetizing turns have been wound. Both its sensitivity and accuracy satisfy standard requirements. The paper was recommended by the Department of Electrical Engineering and Electric Radiomeasuring of the Vladimir Polytechnical Institute. Figures 2; references 4 (Russian).

USSR

UDC 621.317.73

CONVERTERS OF PARAMETERS OF COMPLEX RESISTANCES FOR DIGITAL INSTRUMENTS AND SYSTEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 pp 19-21

BAKHMUTSKIY, V. F., candidate in technical sciences, NIKOLAYCHUK, O. L. and STEPKIN, V. I., engineers

[Abstract] The principal characteristics of existing methods of measuring the parameters of complex resistances (PKS) are classified. The problem of creating converters of PKS in a different way is solved. The converters assure coupling with ordinary (nonspecialized) analog-to-digital converters of two-cycle integration and a follow-up regime of conversion. Compromises satisfy requirements as regards to precision, fast operation and noise immunity of instruments, and in addition parametric unification with d-c output signals is assured. The block diagrams are discussed of PKS converters which are used in the composition of a F4801/1 digital multimeters with a basic F4801 voltmeter. Also discussed are the block diagrams and principal specifications of a F-48011 converter of capacitor parameters, and the F48012 converter of inductance coil parameters. Figures 2; references 12: 9 Russian, 3 Western.

USSR

UDC 621.317.73

MEASURING TRANSDUCERS OF COMPLEX RESISTANCE INTO VOLTAGE USING THE POSSIBILITY OF POLARIZATION OF OBJECT UNDER STUDY

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 pp 24-25

NOVITSKIY, S. P., candidate in technical sciences, and BURENKOV, I. I., engineer

[Abstract] The paper considers methods of constructing measuring transducers of complex resistance into voltage in the frequency range from zero to 200 kHz with values of the modulus of complex resistance in the interval $0.1-10^7$ ohms. These transducers also make it possible to maintain a specified measuring regime of the object under study with respect to direct current. Such transducers are widely used during construction of devices intended for study of the properties of electrical engineering and radio engineering elements, and biological and electrochemical objects. Measuring transducers of complex resistance into voltage constructed with passive and active elements are considered as well as their principal errors. Measuring transducers of complex resistance into voltage, based on operational amplifiers in which such errors are decreased to a considerable extent, form the basis of the broad-band (20 Hz--200kHz) measurers of the complex resistances of electrochemical systems with polarization of the operating electrode with a specified potential. The principal characteristics of this measurer are presented. Figures 4; references 8 (Russian).

USSR

UDC 621.317.73

CONVERTER OF CAPACITANCE AND CONDUCTIVITY OPERATING IN A CONTINUOUS FREQUENCY RANGE

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 pp 21-23

AGAMALOV, YU. R., candidate in technical sciences, KNELLER, V. YU., dr in technical sciences, and KURCHAVOV, V. I., engineer

[Abstract] The paper describes a converter--one of the first automatic devices which make it possible to solve the most often encountered problem of measurement of reactive C_x and active G_x components of capacitance objects in a parallel two-element equivalent circuit in the frequency range 50 GHz--20 kHz, to the mode of which a multielement RC-two-terminal network can be brought. A block diagram of the device and a graph of the transformation of signals are presented. In addition, circuit diagrams of the following are shown: 1) Circuit diagram of transformation unit; 2) Phase shifter, stabilized with respect to amplitude; 3) Controlled voltage divide; and 4) Phase sensitive rectifier. The principal characteristics of the converter are presented. Figures 6.

EAST GERMANY

PREVIEW OF THE 1978 SPRING FAIR IN LEIPZIG

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 p 90

ECKERT, K.

[Abstract] Some East-German metrological instruments scheduled for display at the 1978 spring fair in Leipzig are briefly previewed on the basis of information received from their respective manufacturers. They are the following: (1) The 00 031 oscillation measuring instrument from Otto Schoen Test Electronics RFT State Enterprise in Dresden (a small, lightweight, and line-independent instrument to measure oscillation acceleration and oscillation velocity); (2) The 83 012 fault localizer made by the same company (to measure and test faults in energy cables up to 50 kV); (3) The G-2001.500 counter from the Erfurt Radio Factory Branch State Enterprise, part of Microelectronics Combine State Enterprise (digital measurement of frequency, period duration, time interval, rpm, and absolute values of electric oscillations and pulses, and also use as frequency divider and stopwatch); and (4) The Type 1203 a.c. voltage regulator from Statron State Enterprise (a supply of stabilized voltage for measuring stations, laboratory equipment, or office equipment, having an output range of 2000 VA, operating on the basis of the principle of phase section control. An autotransformer reduces the input voltage to the level required for control). Figure 1; tables 2.

EAST GERMANY

MEASUREMENT OF THE S PARAMETER OF MICROWAVE TRANSISTORS IN STRIP CONDUCTOR HOUSING DESIGN

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 116-119 manuscript received 25 Aug 77

BENEDIX, A., INTET Section, Area: Microwave Engineering, Ilmenau Technical University

[Abstract] The S parameter (quadrupole parameter) is measured basically with a vector voltmeter in the 500 to 1500 MHz frequency range. The test setup is a modification of that described in Hewlett-Packard Application Note 117-2, January 1971. The hold setup consists of a substrate (Al_2O_3) in stripline design, 50-ohm stripline interfaces to coaxial cable, ground contact, ground plate, transistor, replaceable insert, Teflon rods, helical springs, and screws to adjust the spring tension. The transistors need not be soldered in for measurement. The basic measuring instrument is a Type PLV-1642 vector voltmeter made by Miki in Hungary. It has a measuring range of up to 1 GHz; measurements of up to 1.5 GHz can be made by making use of upper-wave harmonics determinations. The experimental system is described and illustrated with diagrams, photographs, drawings, and circuit diagrams. Some results, and their applications, are presented. Figures 12; references 8: 5 German, 3 Western.

EAST GERMANY

PRESENTING MEASURING INSTRUMENTS. S-3204.000 CONTROL SYSTEM. PART 1.

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 9, May 77 pp 293-294

DIETZSCH, UDO, and ECKERT, KLAUS, graduate engineers

[Abstract] The S-3204-000 control system is a third-generation member of the product line for basic devices serving measurement and display of the measured values; Assortment 1 (brief designation: ESDM 31). All signals (information signals, remote control signals, control signals, command signals, report signals, static signals) are compatible with Standard Interface 1.2 (SI 1.2) and Interface IMS-1, Category II. The control system is used for remote control of measuring chains and data-acquisition systems. Remote control is accomplished by output of remote-control data and control signals. The system types and versions of this control system permit control to be performed by a computer; however, the system may also be used as the center. The system may be used in part- or full-automated measuring stations in combination with products of the ESDM 31 line. The system is described and illustrated with a photograph, block diagram, and charts. Seven system types, which may be used for two combination types (listed), are available. Figures 2; table 1.

EAST GERMANY

SI-1 INFRARED FOURIER SPECTROMETER IN THE METEOR 25 SATELLITE

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 627-630

KEMPE, V., OERTEL, D., PUDER, J., ROSELER, A., SAKATOV, D. P., and STUEMUND, H., Electronics Institute, Academy of Sciences of the German Democratic Republic

[Abstract] The task of the Type SI-1 Fourier spectrometer launched on Meteor 25 was (1) to collect experience in space use for the development of other devices of this size and complexity, (2) to evaluate various methods for indirect probing of the earth atmosphere by different means, and (3) to assess the usefulness of a continuously measured spectrum in cosmic measurements. The cosmic experiments with Fourier spectrometers are carried out jointly by the Academy of Sciences of the German Democratic Republic, the Meteorological Service of the German Democratic Republic, and the Hydrometeorological Service of the Soviet Union. This article describes the design, construction, and operation of the dual-beam Michelson interferometer; its performance characteristics such as the signal-to-noise ratio; the reconstruction of the absolute spectra from the interferograms transmitted to earth; the control and guidance of the optical and mechanical system; the synchronization of the Michelson mirror movement; the scanning of the interferogram; and the monitoring of the

device condition during space flight. The design and construction features employed in the instrument may be spun off in various fields of microelectronics for civilian use. Figures 5; references 4: 1 Russian, 1 German, 2 Western.

EAST GERMANY

BOLOMETER AMPLIFIER WITH POWER SUPPLY

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 630-631

KABEL, WERNER, Electronics Institute, Academy of Sciences of the German Democratic Republic

[Abstract] The bolometer of the Fourier spectrometer developed for use in satellites is a Kortum-type black-layer bolometer, having a resistance of approximately 60 ohm, requiring a power supply of approximately 0.6 V. The a.c. voltage emitted under use conditions is in the 20 to 100 Hz frequency range. The bolometer has only thermal noise. It is connected to the supply voltage through a series resistor which is approximately 10 times higher than the bolometer resistance, while the a.c. voltage is tapped off through a capacitor. To make full use of the bolometer's sensitivity, the amplifier and supply-voltage feed must be designed in such a manner that no noise is superimposed over the signal except the natural noise of the bolometer, which is approximately 10 nV. Barrier-layer field-effect transistors are used in the input stage. A circuit diagram is presented of the bolometer amplifier and power supply which meets the use requirements. Means for stabilizing the operating voltage are described. Figures 4; references 4: 2 German, 1 Russian, 1 Western.

EAST GERMANY

20 MHz BROADBAND OSCILLOGRAPH

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 665-670

STRECKENBACH, GERT-ROLF

[Abstract] Detailed description is given of a 20 MHz broadband oscillograph for do-it-yourself assembly. Although the instrument is expensive, it has outstanding performance characteristics. Individuals usually have no access to comparable instruments on the market. The unit has an input voltage

divider to permit the sensitivity of the Y input to be adjusted in four steps in a frequency-independent manner. A sawtooth voltage is generated, which is amplified in the X amplifier for horizontal deflection. Part of the output voltage of the vertical amplifier is fed to the pulse amplifier. There, the square pulses for triggering are generated. Switchover to internal and external horizontal deflection is possible. The power supply unit supplies all required operating voltages. The control units are independent of each other. All voltages except the afteracceleration and filament heater voltages are electronically controlled. There are means for overload protection. The X amplifier, the input voltage divider, the Y preamplifier, the Y output amplifier, the sawtooth generator, the pulse amplifier, and the power supply unit are described in detail and illustrated with circuit, wiring, and block diagrams. The performance data are presented in tabular form. Figures 14; tables 2; references 5 (German).

EAST GERMANY

TESTING INSTRUMENT FOR SELECTED CIRCUITS IN THE D10 SERIES

East Berlin FERNMELDETECHNIK in German Vol 18 No 1, 1978 pp 33-34

GERSTENBERG, HILDBURG, and WALTER, U., Information Technology Section, Dresden Technical University

[Abstract] The theory, design, construction, operation, performance, and applications of a circuit tester, especially suitable for integrated-circuit testing, is described and illustrated with block diagrams and a photograph. It may be used for fault recognition (interruptions between connecting pin and solid-state device chip and constant level at the output of a gate independently of the input occupancy); for testing combinatory circuits D 100, D 103, D 110, D 120, D 130, D 140, D 150 and D 160 (the testing is based on the required-actual comparison principle); and the testing of circuits with memory function (D 172 and D 174, for example). The instrument is adapted to the unified ESEG system; it uses 10 two-level circuit boards of the 170 mm by 95 mm size, and 31- and 58-pole plug connectors. The function groups are realized on individual circuit boards. A total of 154 integrated circuits comprise the D10 series. The test instrument is grouped in three configurational stages: (1) Circuit boards for the testing of combinatory circuits; (2) intermediate stage, with amplifiers for the control variables and expanded display; (3) Configuration incorporating the circuit boards for testing circuits with memory function. The instrument may be expanded further. Figures 4; table 1; references 4 (German).

HUNGARY/WEST GERMANY

COST INCREASES IN MEASURING INSTRUMENTS RESULTING FROM ELECTRONICS

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 17 No 2, Feb 78 pp 33-37

UNTERBERGER, RICHARD, professor, Dr, Technical University, Munich, Federal Republic of Germany

[Abstract] The author demonstrates on the basis of an example that measuring instruments may become more expensive by up to 100 percent without an improvement in their metrological performance (characterized by use range and accuracy) if our goal is only to make reading simpler, make measurement faster, and reduce the number of operators. The example concerns an instrument designed to measure the gear angle of a geared rack (measuring range: 250 mm; scale unit: 1 μ m; maximum rise: 15 mm) by mechanical and electronic means, respectively. As a result of inclusion of electronic units and electronic displays, the instrument cost increases 1.7- to 2-fold. This provides merely the reduction of the reading time to 1/10 of the original value (giving us a wage saving of 0.10 DM per rack spindle over four years). However, this improvement may be worth the increased cost in some instances, for example in rack spindle manufacturing operations where the quick availability of the results may permit earlier intervention in the manufacturing process, so that wastage may be reduced. The semi-automated approach, also discussed briefly, combined the disadvantages of the purely mechanical and electronic approaches; thus, it is not recommended. Figures 7; table 1.

Microelectronics, Integrated and Logic Circuits;
General Circuit Theory and Information

EAST GERMANY

ELEVENTH COLLOQUIUM ON MICROELECTRONICS AT THE INFORMATION ENGINEERING SECTION
OF DRESDEN TECHNICAL UNIVERSITY

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1977 p 4

LUNZE, K., Information Engineering Section, Dresden Technical University

[Abstract] The themes discussed at the colloquium concern the physical principles of the processes taking place in crystalline and amorphous semiconductors; technological methods, structure, and function of special solid-state devices; problems of switch and switching-circuit development; logic simulation; network analysis; function, modeling, and design of integrated bipolar circuits and integrated analog circuits; communication-engineering and system-theoretical problems; light conductors; deterministic and stochastic systems; and so forth. The Information Engineering Section of Dresden Technical University sponsors these colloquia because the University feels obliged to promote research and development in the field of microelectronics, and specifically to contribute to the utilization of the results of research and development in industry. This issue of NACHRICHTENTECHNIK ELEKTRONIK contains the texts of some of the lectures presented at the colloquium.

EAST GERMANY

SOME ASPECTS OF NANO-ELECTRONICS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1978 pp 5-6
manuscript received 14 Oct 77

HARTMANN, W., Dresden

[Abstract] In his paper delivered at the 11th colloquium on microelectronics held in 1977 at the Information Engineering Section of Dresden Technical University, the author discussed some aspects of nanoelectronics, more specifically the scientifically based technologies needed for its realization. The main goal was to decrease the size of the structural elements and at the same time to increase the reliability of the integrated systems which became increasingly complex and more integrated. Going into the range of the submicron size range means not merely downscaling; new qualitative and quantitative approaches are necessary. In properly designed nanoelectronic systems, studies of the spatial distribution of all parameters must be included in the functional relationships. The theoretical analysis of nanoelectronic components is a must. At the present time, this can be accomplished only by assuming a defect-free monocrystalline silicon semiconductor. But this is inadequate for nanoelectronics; we must include the consideration of the dynamic defect structure of the host lattice and its statistical fluctuations. The Si/SiO₂ system should be given consideration for nanoelectronic developments.

EAST GERMANY

ADVANCEMENTS IN BIPOLAR DIGITAL CIRCUIT TECHNOLOGY

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 23-24, Dec 1977
pp 760-765

ALBRECHT, WOLFGANG, Dr of engineering, and GROSS, WERNER, Dr of technical sciences, Information Engineering Section, Dresden Technical University

[Abstract] Recent advancements in bipolar digital circuit technology are reviewed, and a comparison is made of the parameters and application areas of the LSI techniques. Emphasis is on problems related to the emitter-coupled logic (ECL) and the integrated injection logic (I²L) because it was in these fields that major advancements emerged, which contributed to the large-scale integration and circuits of the highest quality and demands in terms of processing speed (especially for the ECL). MUR [ultra-rapid module] and NTL [non-threshold logic] circuits are not covered because they provide no stable digital conditions. The following subjects are covered: (1) Developments in ECL technology (E²CL and E²L circuits; ECL circuits with opposite-running reference voltage and feedback ECL circuits; complex multi-level ECL tree structures); (2) Developments in I²L technology (I²L base getters in the standard technology, new I²L technologies [Schottky components, ion implantation, component insulation, dual diffusion, current hogging injection logic (CHIL), substrate feed logic (SFL), vertical injection logic (VIL), Schottky I²L, isoplanar I²L, Schottky transistor logic (STL), I²L with self-adjusting dual-diffused injector (S²L), and high-speed I²L (HSI²L)]). The bipolar alternatives described open up new possibilities for the realization of low-consumption circuits with great packing density in the medium speed range ($t_v \sim 20$ -200 nanoseconds) by means of integrated injection logic, as well as complex high-speed circuits ($t_v \sim 1$ nanosecond). They also have the potential of being further expanded. We may expect I²L circuits to emerge which realize a $P_v \cdot t_v \sim 0.01$ -0.06 pJ with currents of up to 10 μ A, and switching times of a few nanoseconds. Figures 19; tables 3; references 30: 7 German, 4 Russian, 19 Western.

EAST GERMANY

ELECTRONIC PARAMETERS OF MOS TRANSISTORS WITH SMALL DIMENSIONS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1977 pp 6-8
manuscript received 14 Oct 77

DIENER, K.-H., and MOESCHWITZER, A. KDT, Dresden

[Abstract] In their paper delivered at the 11th colloquium on microelectronics held in 1977 at the Information Engineering Section of Dresden Technical University, the authors discussed the electronic parameters of MOS transistors with small dimensions, specifically with channel lengths of 2 μm or less. Downscaling involves changes in many structural, process, and operating parameters. The gate-insulator thickness, the channel width, the substrate doping, doping of deep ion implantation, operating voltage and current, power, and oxide capacity are particularly affected. Some of these parameters have absolute minimum limits established on the basis of physical considerations. Problems encountered include increased risk of punch-through, higher body effect, reduced threshold voltage, and even the risk of sign reversal. The relevant parameters for various sizes and the minimum limits are summarized in a table. An example is presented in order to illustrate the considerations involved in downscaling. It concerns an inverter consisting of a basic transistor and a load transistor. Figures 3; table 1; references 6: 2 German, 4 Western.

EAST GERMANY

A DESIGN-ORIENTED CIRCUIT MODEL FOR THE MOS ENRICHMENT TRANSISTOR SATISFYING COMPUTER REQUIREMENTS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1978 pp 10-11
manuscript received 14 Oct 77

KRAUSS, M., Dresden

[Abstract] In his paper delivered at the 11th colloquium on microelectronics held in 1977 at the Information Engineering Section of Dresden Technical University, the author discussed a modeling method falling between physical and formal description methods: The model theorem is based on the simplest physically supported theory for the active zone of the MOSFET [metal oxide semiconductor field effect transistor]. A formal description of the output characteristic lines, which is realistic enough, is used for the constriction range. The resistors included in the layout are included in the model later, so that transition from the "internal" to the "external" transistor is accomplished. The article describes a first-order model, a second-order model, and a model with equivalent resistors. The expressions used in the modeling process are derived, and the various models are evaluated in terms of their application ranges. Figures 2; references 3: 1 German, 2 Western.

EAST GERMANY

CIRCUIT TECHNOLOGY FOR INTEGRATED TRANSISTOR ARRAYS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1978 pp 29-30
manuscript received 14 Oct 77

BOEHME, R., "Otto Schoen" Radio, Television, and Measurement Electronics State
Enterprise, Dresden

[Abstract] In his paper delivered at the 11th colloquium on microelectronics held in 1977 at the Information Engineering Section of Dresden Technical University, the author discussed some new circuits developed at the "Otto Schoen" enterprise, for the control of amplifiers and filters, and for voltage-to-current conversion. The circuits described and illustrated may be used for forming powers, roots, and effective values; for controlling amplifiers; for converting voltages into current values by simple means; and so forth. On the basis of measurements carried out on the real-time analyzer 01012, the narrow-band analyzer 11163, and the display 01022 it is evident that circuits may be realized with integrated transistor arrays which have accuracies in the 1-3 percent range for the set value at the control range of 1:1000, under production conditions. Even better values were achieved in the laboratory. All devices operate in the 20-200 Hz range. Very high current levels cannot be handled. Figures 4; references 9: 8 German, 1 Western.

EAST GERMANY

UTILIZATION POSSIBILITIES OF ORGANIC THIN LAYERS IN ELECTRONICS AND COMMUNICATION

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 1, 1978 pp 36-38
manuscript received 14 Oct 77

HAMANN, C., Karl-Marx-Stadt

[Abstract] In his paper delivered at the 11th colloquium on microelectronics held in 1977 at the Information Engineering Section of Dresden Technical University, the author briefly reviewed the literature dealing with utilization possibilities of organic thin layers in electronics and communication in general, and with (1) methods of manufacturing organic thin layers, (2) properties of organic thin layers, (3) dielectric thin layers, (4) passivation layers, and (5) application in optics and holography in particular. The specific features of organic thin layers are (1) average mean path length in the order of magnitude of the wavelength of electromagnetic radiation, with specific penetration depth; (2) increased influence of surface characteristics; (3) often extreme stresses by high field strengths, power densities, and mechanical stresses; and (4) damagability by chemical exposures. References 44: 16 German, 1 Japanese, 27 Western.

HUNGARY

UDC 621.3.049.77:681.3

THE FUTURE OF MICROELECTRONICS

Budapest HIRADASTECHNIKA in Hungarian Vol 29 No 2, Feb 78 pp 33-38 manuscript received 14 Nov 77

MATRAI, GEZA, dr, United Incandescent Lamp and Electrical Works Corporation, Gyongyos

[Abstract] In order to give an answer to the question about the future of microelectronics, we must review the incredible growth of this field during the last 30 years. The author presents a brief review of this period, which started with the discovery of the transistor in 1948, and outlines his view of the future of microelectronics, the expected technological developments, and specifically changes expected to take place in the field of microcomputers. In the field of technological developments, changes are expected in power consumption, operating speed, gate and memory density, and costs, all contributing to better, faster, more compact, and less expensive microelectronic devices. The rate of development is almost exponential. In the field of microcomputers, major improvements are expected in the performance characteristics of memories, central processor units, input/output devices, and software. Much of the data used in the article originated from the papers presented and opinions expressed at the World Electronics Conference (WELC) of 1977, held in Moscow. Of course, developments which cannot be visualized today may also take place. Figures 10; table 1.

CZECHOSLOVAKIA

NEW DEVELOPMENTS IN INTEGRATED CIRCUITS

Prague AUTOMATIZACE in Czech Vol 20 No 5, May 77 pp 142-143

HYAN, TOMAS J., engineer

[Abstract] The article describes the development of the so-called TV games. The unit connected to a TV screen consists of the main part which incorporates control elements for affecting the movements of a ball or another object shown on the screen. The controls may be arranged for two or more players; power supply may be from a battery or from the grid, connection to the TV is by a coaxial cable. Ten to 20 integrated TTL type circuits are needed; some manufacturers use multipurpose integrated LSI circuits which can incorporate all the requirements for one or two TV games. Two types of LSI circuits are made; in one, the unit is connected to the TV receiver by a cable, in the other the LSI circuits are built into the TV unit. The firms Grundig and Blaupunkt are marketing TV receivers of the latter type, e.g., the GRUNDIG Super Color 8200 TS unit. The popularity of the TV games is expected to become very extensive. The first manufacturer of the LSI circuits is General Instruments Ltd. with their AY-3-8500 unit for 60 cycles. The National

Semiconductors Corporation offers the integrated circuit MM 57100 N suitable for such games as table tennis, lawn tennis, etc. The circuit is designed to keep score for the game, generate several kind of sounds, select eight rebound angles, start the ball from the side of the player who won the last point, etc.; the functions are performed automatically. The European firm offers an integrated circuit ITT 2030 which simulates the following games: volley-ball, table tennis, soccer and steeple chase. It is designed to be incorporated into TV receivers. Among the manufacturers developing new games are: Cardinal Industries Inc., Bally Manufacturing Corp., Intel and Midway Manufacturing Corp. The Intel 8080 microprocessors allow programming of up to 40 different games. LSI integrated circuits were developed originally for space research and military duties; they are useful now for consumer applications. Figure 1; references 5: 1 Czech, 4 Western.

CZECHOSLOVAKIA

NEW TRENDS IN THE MANUFACTURE OF HYBRID INTEGRATED CIRCUITS

Prague SDELOVACI TECHNIKA in Czech Vol 25 No 9, Sep 77 pp 335-336

HIRSL, JINDRICH, engineer

[Abstract] The article presents a review of the Symposium on Hybrid Integrated Circuits (HIC) which was held in Paris in the spring of 1976. Combination of a larger number of monolithic integrated circuits and of other elements on large area substrates and their interconnecting by the Hybrid Integrated Circuits (HIC) technique produces functional entities which frequently represent the basic part of the entire apparatus. At the Symposium a Japanese firm presented a circuit for a color television set assembled on a ceramic substrate 50 x 50 mm with 40 connections. The firm Sharp presented a calculator on a substrate, and Hewlett Packard a table calculator for programming HP9825 A. The high output HIC systems can also be used for photocamers as in the TL ELECTRO X camera of the Japanese firm YASHICA. This camera is provided with a monolithic integrated circuit, one transistor, 11 thick layer resistances and a thermistor. HIC are competing with monolithic integrated circuits; cost reduction will be achieved by the use of thin layer circuits attached to polyimide foils. HIC can be used for filtration and very high outputs, which cannot be obtained by the use of the monolithic technique. References 2 (Western).

EAST GERMANY

SERVICE PROBLEMS WITH CONSUMER ELECTRONIC PRODUCTS CONTAINING INTEGRATED CIRCUITS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 9, May 77 pp 285-287

KLEIN, WOLFGANG, Radio and Television Industry Sales State Enterprise

[Abstract] Integrated circuits are increasingly used in consumer electronic products such as radio receivers, television receivers, and other devices. Surveys indicate that the failure rate decreases considerably as a result of using integrated circuits (for example by 11.1 percent in devices with an output power of 1 W, and by 72.6 percent in devices with an output power of 0.5 W). Defects may be caused by defective integrated circuits and by improper connection of the integrated circuits. Troubleshooting of devices containing integrated circuits is somewhat different from devices of conventional circuitry. Usually the technician does not, and cannot, carry all instruments needed for troubleshooting. The main thing therefore is to determine whether the defect lies in the circuit or elsewhere. If the defect is traced to the integrated circuit, it is replaced. Mechanical stresses must not bear on the installed integrated circuit. Removal of the failed integrated circuit and installation of a replacement is a difficult procedure because of the many connections involved. References 2 (German).

EAST GERMANY

DYNAMIC LOADING SYSTEM FOR RELIABILITY TESTING OF MSI CIRCUITS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 632-635

BENEDIX, ROLF, and GROSSE, DIETER, Microelectronics Institute, Dresden

[Abstract] The loading system described features parallel control with TTL pulses and an RC loading of the outputs. Testing is performed at the maximum permissible temperature (up to 70°C, depending on type) with occasional periods of 125°C; the output loading is according to the corresponding maximum output load factor; signal voltage is 5.25 V, which is the upper limit of the operating range. The loading system is made up of loading circuit boards, heat cabinet with circuit board module, power supply unit, protection against excessive voltage and current, and monitoring unit. The system is used for the evaluation of MSI circuits developed at the Microelectronics Institute (formerly called Molecular Electronics Experimental Station) in Dresden. Testing is usually carried out for 2,500 hours (sometimes for up to 20,000 hours) of series-manufactured products, experimental products, and development models. The failure rates are established at a statistical certainty

of 60 percent; they are usually in the $2-4 \cdot 10^{-5} \text{hr}^{-1}$ order of magnitude. The static and dynamic loading principles and techniques are comparatively evaluated. Figures 9; references 7: 1 Western, 6 German.

EAST GERMANY

COMPARISONS FOR THE PARAMETER-DEPENDENCE OF THE TRANSMISSION ACCURACY OF SOME PHASE-SENSITIVE RECTIFIERS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 119-122 manuscript received 6 Jan 77

GREINER, H., Chamber of Technology, Jena

[Abstract] This article carries out a simplified analysis of the effect of the tolerance-afflicted switching resistances of operational amplifiers on the transmission accuracy of specific phase-sensitive rectifier circuits. The results of the analysis permit the proper selection of a version for a given requirement. Some of the circuits described are novel. The circuit synthesis of phase-sensitive rectifiers according to the direct-control method and the parameter-dependence of the transmission accuracy are discussed in detail. Addition and difference signal circuits are presented. The addition circuits are particularly effective for the function amalgamation of the output summator with an effective active smoothing filter since the input signals are fed either all to an inverting or a non-inverting input. This is an advantage over the difference signal circuits. Those approaches using an inverting output summator are preferable to approaches using a non-inverting one. From the special characteristics of the various circuits, described and illustrated, the most suitable for a given task may be chosen. Figures 4; table 1; references 9: 1 Western, 8 German.

CONCERNING TOPOLOGICAL TRANSFORM OF OSCILLATOR CIRCUITS

Moscow RADIOTEKHNIKA in Russian Vol 33 No 3, Mar 78 pp 68-70 manuscript received 9 Dec 76

VOLGIN, L. I.

[Abstract] The known topological transform of closed circuits, based on inversion of a three-pole amplifier, is invariant relative to frequency generation. In this case the invariance is maintained with the conditions that the feedback circuit is reversible, i.e., its elements of the [Y]-matrix y_{12} and y_{21} are equal. The present short communication considers a topological transform of oscillator circuits based on the reversal of a three-pole amplifier, free from the limitations noted above. The distinctive feature of the proposed method of topological transform of oscillator circuits is the possibility of replacement of the type of active three-pole without a change of a circuit, exterior with respect to an active three-pole circuit (only the points of connection of the input and output of the three-pole to the exterior circuit are changed). Figures 4; references 8: 7 Russian, 1 Foreign (?Czech).

EAST GERMANY

CONSTRUCTION AND EXPERIMENTAL EVALUATION OF A YIG TUNABLE MICROWAVE TRANSISTOR OSCILLATOR

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 10, 1977 pp 414-417 manuscript received 29 Dec 76

BENEDIX, A., INTET Section; Area: Microwave Engineering, Ilmenau Technical University

[Abstract] The construction and evaluation results of a complete YIG [yttrium-iron spheres] tunable microwave transistor oscillator in the S band are described. A tuning range of 680 MHz and a maximum output of 2.1 mW are achieved with the transistor used (KT 371 A) and a YG sphere having the diameter of 0.71 mm and a $M_S = 530.3$ A/cm). YIG's are used in filters and tunable oscillators; their major parameters are saturation magnetization, resonance line width, anisotropy field constant, Curie temperature. The saturation magnetization (M_S) and the resonance line width are the most important ones. The HF properties of a single-crystal YIG are best described by a selective parallel oscillation circuit. The YIG tunable microwave transistor oscillators were built by means of the 50Ω microstrip technique. They were evaluated with a measuring setup designed for this purpose. The initial findings indicate that it is possible to maximize the tuning range at the expense of output. The coupling design affects performance significantly. Figures 13; table 1.

USSR

UDC 621.384.4/.5.083

AN INVESTIGATION OF THE LINEARITY OF PHOTODETECTORS IN THE PULSED MODE

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 1, Jan 78 pp 33-35

KOTYUK, A. F., TIKHOMIROV, S. V., KHATYREV, N. P., CHERNOYARSKIY, A. A., and YAKOVLEV, V. A.

[Abstract] Two methods are employed in order to determine the light response of the FEU-28, 7ELU-F7 and LFD-2 series produced photodetectors: in the first, the source radiation was focused on the surface of a diffuse reflector, and the relative change in the level of the optical power falling on the receiving area of the photodetector was computed from the inverse square law; the second procedure employed "light addition," where one light beam was constant and the flux of the other could be varied continuously. The light sources were semiconductor injection radiators; and the photodetector output signal amplitude was measured either with the V4-7 digital voltmeter or a stroboscopic oscilloscope with the F7-9 digital output unit. The stability of the pulse output power of the laser radiation during the measurements was controlled, and the power level delivered to the photodetectors under study was held constant with a 23ELU-F13 converter operating in a known linear response mode, while the width and repetition rate of the pulses were varied. The results indicate that the conversion nonlinearity in a dynamic range of approximately 40 dB with respect to voltage (with an output signal amplitude of from $5 \cdot 10^{-2}$ volts up to the linearity limit when the load was 50 ohms) can reach approximately 5 - 10 percent. The incident power level fell in a range of 10^{-6} - 10^{-3} watts for photomultipliers and 10^{-3} - 10^{-1} watts for photodiodes. The conversion nonlinearity depends not only on the operational modes and parameters of the acting pulses, but also on the individual properties of the specific device. Of the photodetectors studied, only individual devices provided a conversion linearity within the limits of one order of magnitude which did not exceed an error of 2 percent. The light sources used delivered wavelengths of from 0.84 to 1.06 micrometers, maximum radiation powers from $3 \cdot 10^{-3}$ to 5 watts, and repetition rates of up to 10^4 Hz. The linearity of the devices is presented in graphical form as a function of their output voltage. Figures 4; tables 2; references 4 (Russian).

EAST GERMANY

APPLICATIONS OF PHOTOMULTIPLIERS. PART I

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 19-20, Oct 77 pp 635-639

KULLMANN, JOACHIM, graduate engineer, and HARTIG, HORST, engineer, Television Electronics Factory State Enterprise, East Berlin

[Abstract] The present state of development of photomultipliers is reviewed and their application areas discussed. The photomultipliers manufactured at Television Electronics Factory State Enterprise have a photocathode, the electron-optical input system, the secondary-electron multiplier, and the anode in an evacuated glass vessel. They make primary use of the photoemission and the secondary emission, while the thermal emission and the field emission are regarded as interfering components. Data are presented about these products, specifically about cathode sensitivity, anode sensitivity, dark current, bright current, pulse rise time, nuclear spectrometric resolving power, energy equivalent of the dark pulses, and the like. The various cathodes (SbCs, SbCs-quartz, SbCs-V, AgCsO, SbKNaCs, and SbKNaCs-quartz) and their spectral curves are described. The intended uses of the various products are evident from the type code (it specifies the use, number of dynodes, photocathode layout, radiation entry window material, and cathode type). Figures 15.

USSR

UDC 532.783

A CONTROLLABLE TRANSPARENCY WITH MATRIX ADDRESSING

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 131-133
manuscript received 16 Mar 77

VOLKOV, V. V., PLOTNIKOVA, N. I., PLOTNIKOV, YU. I., RAKOV, A. V. and SMIRNOV,
YU. P.

[Abstract] An investigation is made of the characteristics of controllable transparencies with matrix addressing having an information capacity of 1 kbit. Modulation of the incident emission is based on the effect of dynamic scattering with storage in a liquid-crystal mixture of methoxy-benzylidene-butylaniline+ethoxybenzylidene-butylaniline + 10 percent cholesteryl deconate. The working section measures $0.25 \times 0.25 \times 0.02$ mm and the spacing is 0.5 mm. Measurements are made of data recording, storage and erasure times, the coefficient of modulation, controlling powers and the distribution of intensity of transmitted light over the area of the transparency. The working cycle of the transparency is 4 s with 97 percent modulation. It is shown that controllable transparencies with matrix addressing can be used for data recording in holographic storage devices. Figures 5; references 3 (Russian).

USSR

UDC 535.317.2

TRANSFORMATION OF MIRROR-PRISM SYSTEMS WITH THE AID OF BIQUATERNIONS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 82-86
manuscript received 2 Mar 76

GREYM, I. A. and SHEFTEL', M. B.

[Abstract] The design of mirror-prism systems is reduced to calculating the biquaternion which represents the performance operator of such a system. Here the design of a system of three or more mirrors is simplified by an equivalent transformation to a simpler canonical form of the biquaternions for its individual elements. This method is illustrated first on a system consisting of one mirror and a rhombus formed by two mirrors, then to a system consisting of such a rhombus and an angle mirror as well as to a system consisting of two angle mirrors with intersecting edges. The paper was recommended by the Department of Devices for Precision Mechanics and Optics of the North-West Polytechnic Institute. Figures 3; references 3 (Russian).

USSR

UDC 535.317.2

NONLINEAR ABERRATIONS IN OPTICAL SYSTEMS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 86-90 manuscript received 6 May 76

AL'TSHULER, G. B.

[Abstract] Nonlinear aberrations in optical systems result from a field dependence of the refractive index. In the case of an isotropic medium without space and time dispersion this refractive index can be represented as the sum of a linear term and a term proportional to the mean-square electric field intensity because of the light wave. Two kinds of nonlinear aberrations are considered: those occurring within the volume of a nonlinear medium and those occurring at the boundary between two media. An analysis and calculation of both kinds indicates that they can be reduced by several means such as: decreasing the thickness of optical components, using optical components with a small refractive nonlinearity coefficient, pairing optical components whose refractive nonlinearity coefficients have opposite signs, and increasing the aperture of the light beam. This paper was recommended by the Department of Quantum Electronics of the Leningrad Institute of Precision Mechanics and Optics. Figures 3; references 4: 2 Russian, 2 Western.

USSR

UDC 621.373:535+535.318

USE OF OPTICAL FIBERS FOR RECORDING FOURIER HOLOGRAMS WITH HIGH INFORMATION DENSITY

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 5 No 1(67), Jan 78 pp 223-225 manuscript received 8 Jan 76, after final revision 16 Sep 77

BYKOVSKIY, YU. A., MAKOVKIN, A. V., KUL'CHIN, YU. N., SMIRNOV, V. L. and SHMAL'KO, A. V., Moscow Engineering Physics Institute

[Abstract] An investigation is made of conditions of recording and reconstructing holograms with high information density by means of radiation that has traveled through an optical fiber. Experiments were done with an optical fiber in the channel of the reference beam from a helium-neon laser. With a 250 μm fiber, the distance between maxima of intensity of the reference wave in the plane of the hologram was of the order of 3 μm , which is somewhat closer than the minimum required for reliable reconstruction. Calculations showed that the amount of information that can be recorded and read out is in the range of 10^4 bits per mm^2 . The signal-to-noise ratio in the reconstructed image is at least 10.

USSR

UDC 621.373.8:536.242

TEMPERATURE FIELD OF THE ACTIVE ELEMENT OF A SOLID-STATE LASER OPERATING IN THE PERIODIC MODE WITHOUT FORCED COOLING

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 97-101 manuscript received 16 Nov 76

BALASHOV, I. F., BEREZIN, B. G., DAVYDOV, S. F., KONDRAT'YEV, V. S., and KHANKOV, S. I.

[Abstract] A laser is considered which consists of a tubular pumping lamp and a cylindrical active element, both inside a cylindrical reflector (quartz tube with silver coating on the outside). The temperature field of the active elements is calculated on the assumptions that: 1) Heat generation in the lamp and in the active element is uniform in space and continuous in time; 2) Heat generation in the active element does not affect the thermal operating conditions in the lamp; 3) The active element can be regarded as being coaxial with the reflector for the calculation of the heat transfer coefficients; 4) The thermophysical properties are isotropic and independent of the temperature; 5) The mode of heating and cooling is regular of the first kind; and 6) The effects of the two thermal fluxes on the active element are mutually independent so that the temperature field of the active element can be represented as the sum of two fields. The results of calculations are found to be sufficiently accurate, agreeing closely with available experimental data. This paper was recommended by the Department of Thermal Physics of the Leningrad Institute of Precision Mechanics and Optics. Figures 3; references 8 (Russian).

USSR

UDC 621.373.8:536.242

TEMPERATURE FIELD OF A PLATE EXPOSED TO LASER RADIATION PULSES OF FINITE DURATION

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 102-106 manuscript received 7 Jan 77

GUREVICH, YE. B., KRASYUKOV, V. P., TARKHOV, G. N., and CHEBOTAREVSKIY, YU. V.

[Abstract] The temperature field of a nonmetallic plate during drilling of small holes in it with a laser beam is calculated, taking into account the duration of the laser pulses. The fundamental equation of heat conduction is solved in dimensionless cylindrical coordinates, on the assumption of linear internal heat sources and constant thermophysical properties. The boundary conditions correspond to a thermally insulated bottom surface and to a top surface initially at ambient temperature. On the basis of these calculations, it is possible to select the optimum pulse width and pulse repetition rate

for laser machining of various nonmetallic materials. This paper was recommended by the Department of Theoretical Mechanics of the Saratov Polytechnic Institute. Figures 1; references 6 (Russian).

USSR

UDC 621.374

PASSAGE OF NARROW GAUSSIAN PULSES THROUGH A RESONANTLY AMPLIFYING MEDIUM,
PART 2: AMPLIFICATION OF DIVERGENT BEAMS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 91-96 manuscript received 14 Dec 76

SHARLAY, S. F., SEREBRYAKOV, V. A., SMUROVA, N. A., and RYNKEVICH, N. P.

[Abstract] Divergent beams are now widely used in modern multistage laser systems for forming high-power pulses, with both the amplification and the self-focusing of such beams being largely dependent on the angular as well as the transverse radiation pattern. Here the amplification of divergent beams is calculated on the basis of equations describing the special case of a spherical wave whose front moves along the z-axis. Both the absence of diffraction (sharp beam boundary) and the presence of some diffraction (blurry beam boundary) are considered, and for each case the amplification factor is calculated as a function of the pulse amplitude (photons/cm²·s). The amplification factor is found to peak at certain divergence angles. This paper was recommended by the Department of Quantum Electronics of the Leningrad Institute of Precision Mechanics and Optics. Figures 5; table 1; references 2 (Russian).

USSR

ULTRASOUND CONTROLS A LASER BEAM

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 4, Apr 78 p 55

SHCHERBAK, YU., junior research worker, Institute of Electronics, Academy of Sciences Belorussian SSR

[Abstract] A deflector is an important component of a laser system for such applications as television, data recording, and high-speed data retrieval. Its function is to guide the light beam to specific points in space. An optoacoustic deflector appears most promising. Here the laser beam passing through a cell excites ultrasonic waves and the resulting compression-rarefaction cycles produce a diffraction grating with a spatial period equal to the length of elastic waves. The direction of the laser beam can thus be rapidly varied by varying the ultrasound frequency. Such an optoacoustic deflector

performs best in combination with the optical system invented jointly by this author and V. A. Pilipovich (corresponding member, Academy of Sciences Belorussian SSR). The beam cross section is shaped by a set of prisms transforming it from a circular one to an elliptical one of desired dimensions, while increasing its area in the plane of deflection proportionally to the number of prisms. The beam is then deflected, usually by a small angle, into such an optoacoustic cell. Upon subsequently returning through a set of reverse prisms, it acquires its original dimensions at a larger deflection angle. The distinguishing feature of this device is that the optoacoustic cell and the two sets of prisms for expansion and compression of the light beam are all contained between two extra prisms which turn the beam through 180°. With the light propagating along a spiral trajectory and passing twice through each pair of prisms, only half the number of prisms is needed here and the overall size of the optical system becomes much smaller. An optoacoustic cell 1.5x 30x30 mm³ large with prisms of grade TF5 glass expands an incident light beam 29 times, in the plane of the cell, while deflecting it at the exit by a 29 times larger angle.

USSR

UDC 62-501.72

METHODS OF NOISE IMMUNITY IDENTIFICATION

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 4, Apr 78 pp 56-68 manuscript received 12 May 77

SHUBLADZE, A. M., Moscow

[Abstract] The problem of identifying the parameters of a linear dynamic object and its normal performance, on the basis of a noisy input and output signal, is solved without a resulting biased estimator. The noise and the signal are assumed to be, in a definite sense, independent of one another. The behavior of such an object is described by a linear differential equation. One algorithm is constructed for the case of an acting high-frequency stationary useful signal and another one for the general case. The two algorithms are based on respective theorems regarding a reduction to a nonstationary nonhomogeneous linear system. Proofs of these theorems are also given. References 5: 4 Russian, 1 Western.

USSR

UDC 621.391

PROBABILITY OF SEARCH COMPLETION WITHIN A GIVEN TIME

Kiev IZV. VIZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 42-45 manuscript received 2 Sep 77

VORONOV, YE. V. and GOLUBEV, G. K.

[Abstract] A method of estimating the probability of search completion within a given time, rather than estimating the mean search time, is developed on the basis of the generatrix of the search time distribution. The form of this generating function is often easier to determine than the search time distribution itself, as demonstrated in the case of a function $\phi(s) = Q(s)/P(s)$ where the degree of polynomial $P(s)$ is higher than that of polynomial $Q(s)$. The method is also extended to any generating function analytically continuable into the $|s| > 1$ domain. A simple search apparatus and the corresponding algorithm used in a typical radar system serves as an example of its application. The advantage of this method becomes evident on the basis of calculated signal and noise detection probabilities.

USSR

UDC 621.391

SYNTHESIS OF OPTIMAL COMPOUND LINEAR FREQUENCY SEQUENCES

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 68-73
manuscript received 11 Jul 77

KOSHEVOY, V. M.

[Abstract] A compound linear frequency sequence is one where the base sequence, with a frequency linearly varying from pulse to pulse, repeats itself after a definite number of positions with an initial frequency which varies according to the code of the outer subsequence, this code also being linear. The parameters of such sequences are calculated here which will yield an indeterminacy function of optimum characteristics with respect to high resolution of distance and velocity measurements in radar, namely one with the maximum zone free of side peaks and the minimum largest side lobe around the center peak. References 4: 2 Russian, 2 Western.

USSR

UDC 621.391.272:629.7.054.07

GENERALIZED KALMAN FILTER WITH MULTIPLE LINEARIZATION AND ITS USE FOR NAVIGATION IN GEOPHYSICAL FIELDS

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 4, Apr 78 pp 50-55 manuscript received 19 Jan 77

DMITRIYEV, S. P. and SHIMELEVICH, L. I., Leningrad

[Abstract] The problem of signal filtration on the basis of nonlinear measurements with additive noise is solved by means of a suboptimal algorithm with a Kalman filter. In the case of a strongly nonlinear relation between the measurement vector and state vector, the difficulty caused by an intricate multimodal relation within an a posteriori zone of indeterminacy is overcome by multiple linearization. Such a filter is now applied to the navigation, in accordance with the theory of statistical filtering. A typical example is navigation of a vehicle over geophysical fields. Figures 2; references 14: 9 Russian, 5 Western.

USSR

UDC 621.396.96

SYNTHESIS OF MULTICHANNEL RADAR SYSTEMS FOR MEASURING THE COORDINATE OF OBJECTS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 5-13 manuscript received 29 Jun 77

LUKOSHKIN, A. P. and PODDUBNYI, S. S.

[Abstract] The problem of tracking a target by its angular coordinates, distance, and velocity is solved here by the method of nonlinear filtration of Markov processes. The variation of target coordinates with time is justifiably assumed to be such a stationary Gaussian process and the coordinates themselves to be nonlinearly coded in the pulse signal appearing at the receiver input. It is also assumed, for simplicity, that the target is a point object and that signals reflected by it do not fluctuate. Furthermore, the dimensions of the receiver antenna and the spectral width of the probing pulse signal are assumed to be such that there is a negligible time delay of the signal over the aperture of the receiver antenna. On this basis, a radar system is synthesized with a complex, a phasal, or an amplitudinal radiation pattern of the receiver antenna. Figures 2; references 8: 4 Russian, 4 Western.

USSR

UDC 621.396.963:391

COMPARATIVE EVALUATION OF THE EFFICIENCY OF MOVING-TARGET-SELECTION SYSTEMS WITH DIFFERENT REJECTION FILTERS AND COHERENT ACCUMULATORS

Kiev IZV. VUZ: RADIOELEKTRONIKA in Russian Vol 21 No 4, Apr 78 pp 121-123 manuscript received 16 Feb 77

AVDEYEV, V. V. and DROZDOV, YU. L.

[Abstract] Optimal processing of coherent radio pulses submerged in correlational noise consists of noise rejection by a clearing filter and subsequent accumulation of the useful signal. The efficiency of moving-target-selection systems with various combinations of rejection filters and coherent accumulators is evaluated here on the basis of the receiver detection characteristics in the case of slow signal fluctuations and a random signal phase. As filters are considered a single interperiod compensator, a double interperiod compensator, and a recursive second-order Chebyshev filter. As coherent accumulators are considered a balanced one and an exponentially weighted one. All combinations are found to be suboptimal, with the combination of a Chebyshev filter and exponentially weighted accumulator being most preferable. Figures 3; references 5 (Russian).

EAST GERMANY

ENERGY SPECTRUM AND RESOLVING POWER OF LOCALIZATION SIGNALS

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 27 No 10, 1977 pp 407-410 manuscript received 13 Jan 77

ZECHA, M., Chamber of Technology, Technical Electronics Section, Rostock University

[Abstract] The possibility of using the energy spectrum in the search for objective criteria for the assessment of the performance of localization systems is investigated. The localization channel may be regarded as a system in which the running time of the signal and the target function of the pulse reaction are combined. The resolution question is this: How accurately can the pulse reaction of the localization channel be determined with the given localization signals? The logarithmic energy spectrum of the total signal is made up of the logarithmic energy spectrum of the transmission signal and a periodic component of the circular frequency. To assess the resolving power we must find out the number of oscillations within the bandwidth used. To resolve the time function it applies that two reflection signals may be distinguished if the periodicities in the spectrum differ by at least one oscillation. The secondary maxima must be suppressed. These considerations apply to the classic localization signals, frequency-modulated localization signals, and signals utilizing the Doppler effect. Correlation analysis of localization signals in the time range is an optimum method for signal-to-noise ratio. Figures 6; references 5: 2 German, 3 Western.

USSR

PARASITIC AMPLITUDE MODULATION IN ZhR-3 AND ZhR-3M RECEIVERS

Moscow AVTOMATIKA TELEMEXHANIKA I SVYAZ' in Russian No 2, Feb 78 pp 40-41

ZHUK, V. I., senior electromechanic, Yasinovatsk range of the Donets railroad

[Abstract] Parasitic amplitude modulation in ZhR-3M and ZhR-3 radio receiver stations can be so large as to prevent triggering of the noise suppressor. The carrier is also amplitude modulated when the frequency characteristic of the i-f amplifier is far from optimal. It must be precisely symmetric relative to the center frequency and must approach the optimum shape, if the noise suppressor is to operate normally. A procedure has been developed for checking a receiver and clearing faults caused by parasitic amplitude modulation so that the reliability of railroad radio communication can be increased. Figures 2.

EAST GERMANY

THE TESLA 2108 B-1 SPIDER AM AUTOMOBILE SUPER RECEIVER. PART 1

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 10, May 77 pp 303-304

ZECH, GERHARD, engineer

[Abstract] This article, the first part of a series, describes the main features of the TESLA 2108 B-1 SPIDER AM automobile superheterodyne receiver and its installation in the vehicle. The receiver can tune medium and short wave stations, and has pushbutton controls. Laymen are discouraged from installing the radio because it is not expected that they can properly perform the adjustments, and they may destroy the integrated circuits (the warranty does not cover damages arising from owner installation). The receiver comes with a loudspeaker (4 ohm, 3 W), a melt fuse (1.25 A), and an interference eliminator. The radio is supplied with $+12\text{ V} \pm 20$ percent (up to 14.4 V), with negative chassis. Wavelength range: 525-1,605 kHz (medium-wave range) and 5.95-6.2 MHz (short-wave range). HF sensitivity: 9 and 8 microwatt at a signal-to-noise ratio of 10 dB. Nine-kHz HF selection circuits of 30 dB: 5 (of which two are tunable). Harmonic distortion factor: 10 percent. Power consumption: up to 90 mA. Dimensions: 180 by 60 by 37 mm; weight: 0.8 kg. Means for connecting a cassette device are provided. Figures 3; table 1.

EAST GERMANY

USE OF DIGITAL DISPLAY COMPONENTS BASED ON LIGHT-EMITTING DIODES

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 9-12

MUELLER, WINFRIED, Television Electronics State Enterprise

[Abstract] The following seven-segment LED [light-emitting diode] digital display units are briefly described; VQB 71 and VQB 73 (both permit the display of all digits, a decimal point, and letters capable of being formed from the seven segments; VQB 73 also permits the display of plus and minus signs); VQB 37 (3 mm digit size with magnifier, especially suitable in pocket calculators); VK 11, VK 12, and VK 15 (featuring a circuit board of their own for ready installation); and VQD30 (featuring capsulated chip and cover for increased mechanical resistance in use). Data are presented about these display units in terms of pass-current diagram (resembling the diagram of silicon diodes), temperature behavior, luminosity (including its dependence on temperature and ambient light level), relationship between luminosity and pass current, series resistor used in conjunction with the unit, and so forth. Some hints about installation are given. Figures 21.

LIGHT EMITTING DIODES WITH A SMOOTHLY VARYING COMPOSITION OF THE WIDE-ZONE EMITTER

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 2, Feb 78
pp 364-371 manuscript received 11 Oct 77

DIAS, P., PORTNOY, YE. L., RAYKH, M. E., and RYVKIN, B. S., Physico-Technical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

[Abstract] Light emitting diodes used in communication systems with fiber optics must deliver the maximum possible radiation intensity within a small solid angle. In the case of a constant-composition emitter the magnitude of the exit angle, typically smaller than 8° , determines the allowable trajectory of light rays and thus the fraction of useful radiation. In the case of a variable-composition $\text{Al}_x\text{Ga}_{1-x}\text{As}$ layer with focusing characteristics, where x decreases with increasing distance from the active p-GaAs layer, the fraction of useful radiation will be much higher. This is demonstrated by performance calculations, in the geometrical-optics approximation, for an ideal focusing emitter layer with the refractive index varying over the thickness and remaining constant over the width. The authors thank V. B. Khalfin for helpful discussions and Zh. I. Alfërov for the supportive interest in this study. Figures 5; references 12: 9 Russian, 1 German, 2 Western.

EAST GERMANY

OPTOELECTRONIC SOLID-STATE COMPONENTS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 23-24, Dec 77 pp 785-786

MUELLER, WINFRIED, engineer, Television Electronics State Enterprise, East Berlin

[Abstract] This article introduces a series of reports describing the optoelectronic solid-state components manufactured by Television Electronics State Enterprise. They include light-emitting diodes, light-emitting displays, photodiodes, phototransistors, and optoelectronic couplers. The article defines the major parameters, the secondary parameters, and the limit parameters; provides information about installation (how to avoid tensile, compressive, bending, and torsional stresses; in what locations to install and not to install; how to solder, unsolder, and resolder; what fluxes to use), and about the cleaning of the components (only certain solvents may be used to remove solder residues). It lists the East-German standards covering optoelectronic solid-state components and tabulates the symbols used for their various parameters. Tables 2; figure 1.

USSR

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ON THE POSSIBILITY OF FORMATION OF NEGATIVE DIFFERENTIAL CONDUCTION IN SEMI-CONDUCTORS AT MICROWAVE FREQUENCIES

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 1, 1978 pp 179-180 manuscript received 13 Mar 77

IVANCHENKO, V. A. and KLIMOV, B. N., Scientific-Research Institute of Mechanics, affiliated with Saratov State University imeni N. G. Chernyshevskiy

[Abstract] In strong microwave fields, the conductivity of semiconductors is determined by the dominant mechanisms of scattering and can both increase and decrease with an increase of a warming field. The present short note considers the possibility of the appearance of a section with negative differential conduction at high frequencies ($\omega^2 \tau^2 \gg 1$) during which, with a direct current and at low ($\omega^2 \tau^2 \ll 1$) frequencies, $d\sigma/dE > 0$. The phenomenon of formation of dynamic negative conduction in high-frequency fields can be used for amplification of electromagnetic waves. The dynamic range of a device which uses this phenomenon must be sufficiently narrow because with large amplitudes of the field $d\sigma/dE$ becomes positive by virtue of the fact other mechanisms participate in dissipation of a pulse. References 5: 4 Russian, 1 Polish.

USSR

UDC 621.315.592

NOISE, LOW-SIGNAL CONDUCTION AND DIFFUSION IN n-TYPE Ge AND Si IN STRONG ELECTRIC FIELDS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 1, 1978 pp 151-155 manuscript received 10 Aug 77

BAREYKIS, V., VIKTORAVICHYUS, V., GAL'DIKAS, A. and MILYUSHITE, R., Institute of Semiconductor Physics, Academy of Sciences, LtSSR, Vil'nyus

[Abstract] Electric fluctuations are ordinarily characterized by the density of fluctuations of the current $\langle \delta J^2 \rangle_{\omega}$. Study of $\langle \delta J^2 \rangle_{\omega}$ in multivalley semiconductors is of interest for two reasons: 1) The phenomenon of the redistribution of carrier current between the valleys causes inter-valley noise, the aspects of which have had little study; and 2) Diffusion processes, because they determine a number of characteristics of microwave devices, and $\langle \delta J^2 \rangle_{\omega}$ characterizes matching of the gradients of current carriers, and for frequencies with which it is possible to disregard inertial processes, $\langle \delta J^2 \rangle_{\omega}$ is proportional to the diffusion coefficient. The present work discusses the results of investigations of $\langle \delta J^2 \rangle_{\omega}$ for n-Ge and n-Si. Because it is impossible in the microwave band to measure directly the spectral density of the

current fluctuations, the authors measured the noise temperature T_n and the small-signal conduction σ_ω (with which $\langle \delta J^2 \rangle_\omega$ is connected by the relationship $\langle \delta J^2 \rangle_\omega = kT_n \sigma_\omega$ where k = Boltzmann constant) of hot electrons in n-Ge and n-Si at a frequency of 10 GHz with a lattice temperature of 85 K. Based on these measurements, the following are found: 1) Dependence of the ratio of the conductivity in the electric field E to the conductivity with $E = 0$, on the magnitude of the electric field for n-Si and n-Ge, and 2) The dependence of the noise temperature T_n on the magnitude of the electric field for n-Si and n-Ge. The experimentally established anisotropy of $\langle \delta J^2 \rangle_\omega$ with reference to the crystallographic axes is explained by the unequal warming up of the electrons in the case of various orientations of E , as well as by the redistribution of current carriers between the valleys and by the contribution of the inter-valley junctions in $\langle \delta J^2 \rangle_\omega$ when the valleys are nonsymmetricaly positioned with respect to E . In the area of the electric fields where warming up of the electrons takes place inertialessly, the diffusion coefficient is determined for hot electrons in n-Ge and n-Si. Figures 3; references 15: 7 Russian, 8 Western.

USSR

UDC 621.315.592

CONCERNING THE THEORY OF ACOUSTOELECTRIC PHENOMENA IN SEMICONDUCTORS IN A VARIABLE ELECTRIC FIELD

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 1, 1978 pp 145-150 manuscript received 7 Apr 77; in final editing 7 Aug 77

BUGAYEV, A. S., GULYAYEV, YU. V., DENISENKO, V. V. and SMBATYAN, ZH. YE., Institute of Radio Engineering and Electronics, Academy of Sciences USSR, Moscow

[Abstract] The effect of an external variable electric field on electronic absorption and amplification of sound [acoustic waves] in semiconductors is considered in a number of works in the literature. In these works, however, the frequency of the variable field is considered sufficiently high (on the order of or more than the frequency of sound ω) and is primarily studied as a nonlinear parametric interaction of the variable field and an acoustic wave. On the other hand, in the case of a very low frequency of the variable field, considerably lower than the "transit frequency"--the inverse time of the path of the sound with respect to the specimen ν_s/L (ν_s = speed of sound, L = length of specimen), it is obvious that everything takes place in the same way as in the case of a constant electric field, but the acoustoelectric effect oscillates with the frequency of the field Ω . In the intermediate region of the frequencies of the variable field

$$2\pi \frac{\nu_s}{L} \ll \Omega \ll \omega,$$

on the one hand, the parametric interaction can be unimportant, and on the other, during the time of its propagation with respect to the specimen, the sound will be subjected to the effect of an electric field with variable intensity, and, generally speaking, polarity. The present paper is devoted to a consideration of the new effects which arise during this. It is shown that in the case where the transit time of the sound with respect to the specimen is equal to an integral multiple of the periods of the external variable electric field, the intensity of the sound at the outlet of a specimen will be constant in time and will be determined by the absorption (amplification) coefficient of sound α , average with respect to the period of the field. Specifically, with these conditions, amplification is possible in a continuous regime with pulses of electrical current. Distinct forms of α are found for the following: 1) Case of pulse connection of drift electric field; 2) Case of use of D. L. White's theory; 3) Case of sinusoidal drift field with fixed bias in a semiconductor with hot electrons; and 4) Case of surface acoustic waves. It is shown that connection of a variable electric field can lead to a significant change of absorption (amplification) of sound and to a shift in the amplification threshold of sound to the side of both large and small values of a constant drift electric field. The possibility is shown of amplification of the surface acoustic waves with the influence of a corresponding specimen phased longitudinally and transversely (perpendicular to surface) of variable electric fields. Numerical data are given. The authors note that a similar effect of amplification of sound waves (both volumetric and surface) in crossed electric fields can also exist in other cases when the transverse electric field changes the amplification factor of a sound with a longitudinal electric field, e.g., in the case of a semiconductor with hot electrons. Figures 3; references 15: 7 Russian, 8 Western.

USSR

UDC 621.382.2

EFFECT OF EXTERNAL PRESSURE AND MAGNETIC FIELD ON ELECTRICAL PROPERTIES OF
KD-301 MAGNETODIODE

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 20 No 12, 1977 pp 73-76
manuscript received 7 Feb 77

UDALOV, V. F., NILOV, A. F. and ROZENFEL'D, F. Z.

[Abstract] The paper describes the results of investigations of the effect of the external mechanical pressure and the magnetic field on the electrical properties of a semiconductor device--the Type KD-301 magnetodiode. The investigations show that external mechanical pressure can effect the conductivity of the magnetodiode, and this makes it possible to use the magnetodiode as a data unit [datchik] for measuring mechanical pressure. The sensitivity of the magnetodiode to small values of pressure increases in the presence of

an external magnetic field. The paper was recommended by the Department of Experimental Physics, Ryazanskiy Radio Engineering Institute. Figures 5; references 2 (Russian).

USSR

UDC 621.382.3

TEMPERATURE DEPENDENCE OF THE CURRENT-VOLTAGE CHARACTERISTICS OF FIELD-EFFECT "LAMBDA" DIODES AND TRANSISTORS

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 69-72 manuscript received 16 Nov 76

D'YAKONOV, V. P. and SEMENOVA, O. V.

[Abstract] The temperature dependence of the current-voltage characteristic of "lambda" devices, diodes and transistors, is analyzed so that their thermal stability can be evaluated. The theoretical part of the analysis is based on the single quadratic-exponential approximation of the current-voltage characteristics applicable to field-effect structure and on numerical calculations with the aid of a "NAIRI-K" digital computer. The experimental part involved plotting of the current-voltage characteristics of several different field-effect devices under thermostatic conditions. The paper was recommended by the Department of Industrial Electronics and Computing Technology of the Smolensic Branch of the Moscow Power Engineering Institute. Figures 4; references 4: 3 Russian, 1 Western.

USSR

UDC 621.382.3

STUDY OF CHARACTERISTICS OF SILICON SIDE MAGNETOTRANSISTORS WITH TWO MEASURING COLLECTORS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 12 No 1, 1978 pp 48-51 manuscript received 20 May 76; in final editing 18 Jan 77

MITNIKOVA, I. M., PERSIYANOV, T. V., REKALOVA, G. I. and SHTYUBNER, G., Leningrad Electrical Engineering Institute imeni V. I. Ul'yanov (Lenin)

[Abstract] This paper is concerned with an investigation of the static magnetoelectric characteristics of a planar two-collector silicon side magnetotransistor [KBM] of strip construction, developed on a basis of the transistors with side injection used in integrated circuits, and representing a

modification of the magnetotransistor. The experimental specimens are made of KEF-10 material with a thickness of the base regions $W_B = 50, 100, 150$ microns and KEF-0.5 with $W_B = 10$ microns, and represents $p^+ - n - p^+$ type magnetotransistors. It is experimentally established that up to an induction of 2T the exterior transverse magnetic field does not affect the injection level of the emitter. Consequently, the magnetic sensitivity of the KBM is determined by a change of the transfer coefficient emitter-collector, i.e., the exterior transverse magnetic field causes a change of the pattern of the emitter current in the base region, and, moreover, can determine the formation of magneto-concentration effects leading to an additional increase or decrease of the collector current as a function of the sign of the field (B^+, B^-). The dependence is investigated of the current and voltage magnetosensitivity of KBM on the thickness of the base region and the magnitude of the induction of the measurable magnetic fields of various polarities. A graph is presented of the dependence of output voltages on the magnitude of the induction of the magnetic field with a balanced connection diagram. The investigations showed that KBM with a voltaic magnetosensitivity comparable to germanium magnetotransistors have a three orders larger spacial resolution (the volume of the magnetosensitivity region amounts to $5 \cdot 10^{-3} \text{ mm}^3$), possess a considerably larger degree and range of linearity of the output signal, considerably better thermostability (by 6 times), and technological effectiveness of manufacture. The KBM can be made in integrated design and serve as functional magnetic transducer elements of monocrystalline integrated circuits. Thus, silicon side magnetotransistors are very promising transducers of magnetic fields. Figures 5; references 6: 3 Russian, 3 Western.

EAST GERMANY

SEMICONDUCTOR INFORMATION TC 10 SYMISTOR (TRIAC)

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 31-32

BOTTKE, E.

[Abstract] The TC 10 Symistor (triac), according to information from the Soviet External-Trade Enterprise ENERGO MASHEKSPORT, is designed for use in 50 Hz a.c. circuits. It may be used at any desired polarity of the primary voltage with positive or negative control signals. The cooling body K10 or K25, originally designed for rectifier diodes and thyristors, made by Rectifier Factory State Enterprise in Stanhsdorf, may be used. A drawing of the Symistor is given, and tabulated data are presented for the electrical/electronic parameters. Diagrams illustrate the relationships between (1) sawtooth voltage and barrier-layer temperature, (2) hold current and barrier-layer temperature, (3) pass-loss power and effective value of the pass current, (4) pass loss power and the effective pass current, (5) transient inner heat resistance and time; (6) control voltage as a function of control current and barrier-layer temperature; (7) relationship between control current, control pulse duration, and barrier-layer temperature; (8) release time as a function of barrier-layer temperature and current amplitude before commutation; (9) release time as a function of main current before commutation; and (10) critical rise velocity of the main voltage as a function of barrier-layer temperature. Figures 11; tables 2.

EAST GERMANY

THE IMPORTANCE AND TECHNOLOGY OF HYBRID COMPONENTS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 23-24, Dec 77 pp 765-769

UHLMANN, RUEDIGER, Dr of engineering, Electronic Technology and Precision Device Section, Dresden Technical University

[Abstract] The advantages of hybrid technology are the following: The user may use the best-suited wiring-substrate technology (thin and thick film, foil); increased reliability, saving of space, area, and weight; better mechanical stability; faster assembly; and lack of interactions among the individual elements. The disadvantages of hybrid technology are the following: higher costs, difficulty of replacement part supply. The main use areas of hybrid technology are in space and military engineering, communications and measuring equipment, automation technology, and very-high frequency equipment.

There are various methods for carrying out the individual manufacturing steps, but there are two special problems: the supply of non-capsulated elements is difficult and much complex texturing is needed; hybrid components must be manufactured centrally. The following manufacturing procedures are involved: thin- and thick-film technology, soft-soldering and adhesive-joining, ultrasonic and thermocompressive bonding, electrical and mechanical testing, hermetic sealing, capsulation, and so forth. The ordering requirements must be negotiated on the basis of the intended use. Figures 5; table 1; references 23: 13 German, 10 Western.

EAST GERMANY

PROPERTIES OF A VO₂ DISPLAY COMPONENT

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 25-26

BUEHLING, DIETER, dr, Institute of Industrial Ceramics, at Ceramics Factory State Enterprise, Hermsdorf

[Abstract] The optical and electrical properties of display components based on vanadium dioxide (VO₂) as the interference layer in general, and the engineering parameters of a seven-segment digital display unit featuring VO₂ in particular, are reviewed. The description is based on examination of laboratory prototypes made at the author's institute. The layer system is made by application of the VO₂ layer to a glass substrate by reactive atomization of a vanadium target, mirroring of the VO₂ layer by vapor-deposition of a mirror layer, etching the segment structure in the mirror and the VO₂ layer, vapor-depositing an insulator layer of SiO_x, vapor-depositing a CrNi resistance layer, and vapor-depositing of the contacts. The principal parameter determining the performance characteristics of the seven-segment display is the thickness of the VO₂ layer; thicknesses between 60 and 70 nm performed best in service. Insofar as electrical properties are concerned, the major parameters are the switching time and the switching power. The prototypes examined had switching-on times of 1.2 sec and switching-off times of 2.3 sec; and a maximum switching power of 7.5 W/cm². The components performed exceptionally well in uses where small digits (less than 10 mm) are required. Because, in addition, the power consumption of the unit is negligible and the color contrast is adjustable over a wide range through the VO₂ layer thickness, the prospects of the component are good. Figures 7; references 5: 3 German, 2 Western.

USSR

UDC 621.3.083.6

DETECTION OF THE DERIVATIVES OF AN INTRICATE CHARACTERISTIC BY DEEP MODULATION OF ITS ARGUMENT

Novosibirsk AVTOMETRIYA in Russian No 6, Nov/Dec 77 pp 41-44 manuscript received 21 Jan 76; final version 7 Apr 77

GALITSKAS, A. A., Vilnyus

[Abstract] For analyzing various intricate characteristics such as optical spectra or current-voltage characteristics of nonlinear electrical systems, it is also often necessary to determine their derivatives which reveal their fine structure. This is done here by the method of deep modulation, according to the $x + \Delta \cos \Omega t$ law, which simultaneously yields derivatives of various orders (including higher ones) even in the presence of noise. The problem reduces to that of determining the reference signals by which modulated input signals have to be multiplied in the measuring instrument of the detector so as to yield at the output of low-pass filters the exact replica of respective derivatives around a given value of the argument. The amplitudes of these reference signals, harmonics of the modulating signal, are easily calculated from a matrix equation. Noise at the input produces a random error at the output, and the dispersion of this error, averaged over the detection time, is also calculated here by application of Parseval's theorem. Figure 1.

ELECTRICAL ENGINEERING
Electrical Engineering Equipment and Machinery

EAST GERMANY

USES OF INTEGRATED VOLTAGE REGULATORS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 pp 85-87

JUNGNICHEL, HORST, graduate engineer, Information Engineering Section, Karl-Marx-Stadt Technical University

[Abstract] The designing of integrated voltage regulators is described. In order to prevent instabilities, the load current must be limited to approximately 15 A. By operating in the "floating" mode, output voltages of more than 37 V may be stabilized; special circuit components are needed to stabilize negative voltage. A resistor or, preferably, a "fold-back" feature is used to limit the output current. Frequency compensation is provided in order to suppress oscillation tendencies. Finally, a resistor is used to offer temperature compensation. These and other features are included in a voltage regulator, which is described and illustrated. It is a 105 mm by 140 mm by 170 mm module, fitting standard racks, and is designed for 5 V and 8 A. The rectifier diode used is a SY 171/02. It may be used with line voltages over the range of 185 to 242 V. Figures 15; tables 2; references 6: 4 German, 2 Czechoslovak.

EAST GERMANY

NUMERICALLY ADJUSTABLE CURRENT SOURCE USING MAA 723

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 2, Feb 78 pp 88-89

GRYGERA, LADISLAV and KRALOVA, MILENA

[Abstract] A stabilized current source with numerical adjustment of the output current and voltage limitation is described and illustrated with block diagrams, circuit diagrams, and a photograph. It uses the MAA 723, and has the following major performance features: adjustment range of output current, 0-299 mA (in 1 mA steps); internal resistance during current stabilization, >1.4 Mohm; voltage limitation, 0-29.9 V (in 100 mV steps); internal resistance during voltage limitation, 10 ohms; interference voltage superimposed, less than 1 mV; dimensions, 233 by 70 by 165 mm. The circuitry is divided in functions such as current and voltage control, and display circuits. In the event that the load resistance becomes so high that the set output voltage is inadequate, the source changes to the voltage mode. Resistors are used to set the output current and voltage limitation values desired. Figures 5; table 1.

USSR

UDC [621.3.048:538.552.2].001.24

DESIGN OF THIN-WALLED SPHERICAL ELECTRICALLY CONDUCTING SHIELDS

Moscow IZVESTIYA AKADEMII NAUK SSR, ENERGETIKA I TRANSPORT in Russian No 1, Jan/Feb 78 pp 60-69 manuscript received 30 Nov 76; after revision 21 Mar 77

APOLLONSKIY, S. M., Leningrad

[Abstract] The problem of an electromagnetic field generated by an electric machine or appliance inside a building is reduced to that of a dipole inside a spherical shielding shell. With the wall thickness assumed to be much smaller than the shield radius, the Maxwell field equations are written in spherical coordinates with appropriate boundary conditions. A solution is obtained first for the case of a uniform resistivity of the shield material and then for the case of a harmonically nonuniform resistivity of the shield material. These theoretical calculations, together with experimental data, reveal that the shielding factor and the reaction coefficient depend not only on the diameter and the electrical properties of the shield but also on the location and the orientation of the dipole. The shielding effectiveness can be improved by dividing the shield into zones of different resistivities. Figures 3; references 8: 7 Russian, 1 Western.

USSR

UDC [621.3.066.6:678.061].001.4

CONTACT CONNECTIONS WITH AN ELECTRICALLY CONDUCTING POLYMER ADHESIVE

Moscow ELEKTROTEKHNIKA in Russian No 2, Feb 78 pp 14-15

DZEKTSER, N. N., candidate in technical sciences; YEFIMOV, B. N., KNIGEL', V. A. and MISHNINA, L. N., engineers

[Abstract] A thermally stable and electrically conducting polymer adhesive has been developed for connecting busbars, to replace soldered and bolted joints. The material consists of an epoxide compound and carbonyl nickel, optimally cured at 80°C for 2 h and then at 120°C for 3 h. The joined conductors should be held under a pressure of 10 MPa for that period of time. The advantages of such an electrical contact are its resistance to moisture and chemically aggressive media as well as its vibration and shock resistance. Aluminum busbars have been connected with this adhesive, the contact resistance being not higher than 3.7 $\mu\Omega$ and its mechanical strength not less than 70 percent the strength of aluminum. The electric field and the current distribution in such a contact have also been established. Figures 3; references 2 (Russian).

USSR

UDC [621.313.3.085.2:538.122].001.24

EFFECT OF THE EQUIVALENT-CIRCUIT PARAMETERS OF A MAGNETIC SUSPENSION WITH A TUNABLE CIRCUIT ON ITS FORCE CHARACTERISTICS

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 78-82 manuscript received 26 May 77

GALKIN, V. I., candidate in technical sciences, VIIEM [? All-Union Scientific Research Institute of Electromechanics]

[Abstract] Because of its simplicity magnetic suspension with a tunable circuit is used in various systems such as integrating gyros and high-speed transportation. Its performance is analyzed here on the basis of an equivalent circuit for a bilateral suspension of a moving armature between two poles of like polarities. The equivalent circuit consists of a capacitor inserted in series with the winding, the winding resistance, the leakage reactance, and the eccentricity-dependent magnetizing reactance because of the reluctance of the air gap. The centering force produced by the two poles depends on the Q-factor of the circuit, which should be larger than two. The magnetizing reactance because of the reluctance of the core iron, and effectively, in parallel with the air-gap magnetizing reactance, decreases the centering force. The resistance because of power losses in the core iron, also in parallel with the air-gap magnetizing reactance, increases the centering force. Figures 4; references 9: 7 Russian, 2 Western.

USSR

UDC 621.313.13-181.4.015.5

EFFECT OF IONIZATION OF THE GASEOUS ATMOSPHERE ON THE ELECTRIC STRENGTH OF MICROMOTORS

Moscow ELEKTROTEKHNIKA in Russian No 2, Feb 78 pp 43-44

GUKOV, V. I., engineer, LEVIN, B. M., engineer, PASHKOVA, V. V., engineer, and ROZHKOVA, V. M., candidate in technical sciences

[Abstract] When micromotors operate within a gap between two electrodes, then lowering the pressure lowers the breakdown voltage and thus the dielectric strength of the insulation. This is accompanied by breakdown of the insulation and glow around the coils. An experimental study of micromotor stators with various grades of insulation, under pressures varying from 0.033 to 3.6 kPa has yielded clues as to the causes of the gradual deterioration of the motor insulation. Namely, the stator can be regarded as a multielectrode system where partial discharges or flashover in the insulation start between two points and progressively ionize the gas at voltages lower than they would be in a simple two-electrode system. Furthermore, the increasing number of discharge gaps intensifies the ionization of the gas within the gap so as to break down the conductor insulation and produce glow around the coils. Tables 3; references 5 (Russian).

USSR

UDC [621.313:62-752:621.376.2].001.24

DIAGNOSIS OF VIBRATION SOURCES IN MACHINES WITH AMPLITUDE MODULATION TAKEN INTO ACCOUNT

Moscow ELEKTROTEKHNIKA in Russian No 2, Feb 78 pp 58-61

AVAKYAN, V. A., candidate in technical sciences

[Abstract] Amplitude modulation of rotating systems results from the interaction of various sources of vibrations with one another and with the rotation of the system elements. The frequency spectrum can thus be very complex, and it is analyzed here for a few practical cases of ball bearings with defective races or with flaws in the races and an outsize ball. All measurable frequencies, including harmonic as well as sum and difference frequencies, are calculated for typical examples. The values are found to agree closely with those obtained experimentally with a vibration analyzer. The results of this study indicate the absolute necessity of taking amplitude modulation into account in the diagnosis of structural and technological defects in rotating machinery. Figures 2; tables 3; references 7: 6 Russian, 1 Western.

USSR

UDC [621.313.322:621.316.722].001.24

STRONG REGULATION OF EXCITATION FOR SYNCHRONOUS GENERATORS IN AUTONOMOUS SYSTEM

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 11-14 manuscript received 4 Jan 77

VILESOV, D. V., doctor in technical sciences, KEBKO, V. D., candidate in technical sciences, PEDAN, E. V., engineer, TOLCHEYEV, V. N., candidate in technical sciences, Leningrad

[Abstract] Strong regulation of an autonomous generator, for the purpose of maintaining stability under sudden load changes, is understood as a fast application of a much higher than nominal voltage across the excitation winding. This is done most effectively through special relays without time delay, so as to ensure both static and dynamic stability. Such a regulation process is analyzed here in terms of voltage transients and recovery characteristics, taking into consideration the periodic component as well as the aperiodic components. An evaluation of experimental data indicates that such a stronger regulation will ensure a smaller voltage dip and a faster recovery. The frequency dip can be appreciable and the effect of strong regulation on the frequency recovery can vary, depending on various other factors. Figures 4; references 3: 2 Russian, 1 Western.

USSR

UDC 621.314.212.027.3.001.4

SLOW TESTING OF HIGH-VOLTAGE POWER TRANSFORMERS FOR PARTIAL FLASHOVERS IN THE INSULATION

Moscow ELEKTRICHESKIYE STANTSII in Russian No 12, Dec 77 pp 70-73

GORBUNTSOV, A. F., engineer, GURIN, V. V., candidate in technical sciences, SOKOLOV, V. V., engineer, PO "Zaporozhtransformator" [? Planning Zaporozh'ye Transformer Plant]

[Abstract] Slow tests reveal the state and the life expectancy of a transformer insulation much better than standard 1-min tests. Delivery-acceptance tests should last 30 min and periodic routine tests should last 60 min so as to reveal partial flashover. Power transformers rated for 150-750 kV should be thus tested at 150 percent of the maximum operating voltage and at a frequency within the 100-400 Hz range. In the case of an unavailable high-frequency test generator, such tests should be performed at 50 Hz according to the procedure shown here. This slow test follows the standard 1-min test (with the voltage built up to a much higher level) either immediately or after the voltage has been reduced all the way to zero. The procedure also includes criteria for transformer acceptance or rejection. Figures 3; tables 2; references 15: 10 Russian, 4 Western, 1 Japanese.

USSR

UDC 621.314.224.8

A MAGNETIC CURRENT TRANSFORMER WITH IMPROVED PROTECTION AGAINST GROUND CURRENTS

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 67-68 manuscript received 7 Sep 76

KAZANSKIY, V. YE., Moscow and MEZHALS, L. V., Riga

[Abstract] A magnetic current transformer has been developed for use with relay protection in 35-220 kV networks. It consists of two solenoids oriented off the vertical by a certain angle, symmetrically on both sides, and joined at a certain point of their geometric center. An analysis on the basis of the physical configuration and the circuit relations indicates that interference, especially because of ground currents, can be minimized by the proper layout dimensions. Figures 3.

USSR

UDC 621.314.241.001.4

TECHNICAL AND ECONOMIC INDICES OF SYSTEMS OF COOLING OF SEMICONDUCTORIZED CONVERTERS WITH p-n STRUCTURES OF LARGE DIAMETER

Moscow ELEKTROTEKHNIKA in Russian No 12, Dec 77 pp 25-29

KHAZEN, M. M., engineer, IVANOV, V. I. and SEMENOV, G. M., candidates in technical sciences

[Abstract] Relationships are established in order to determine the technical and economic effectiveness of using power semiconductor devices (SPP) with p-n structures of large diameter in a converter unit with forced air cooling. It is shown that use of SPP with p-n structures of large diameter make it possible substantially to improve the technical and economic effectiveness of semiconductor converters, during which the optimum diameter of the semiconductor device, all things being equal, is determined by the means of cooling. Figures 6; references 9 (Russian).

USSR

UDC [621.315.55:621.315.612.7]:537.212

ELECTRIC FIELD OF TWO INSULATED CYLINDRICAL CONDUCTORS

Moscow ELEKTRICHESTVO in Russian No 11, Nov 77 pp 85-87 manuscript received 28 Mar 77

LARINA, E. T., candidate in technical sciences, SEMENENKO, M. I., candidate in physical and mathematical sciences, and PESHKOV, I. B., candidate in technical sciences, Moscow

[Abstract] The problem of calculating the electric field of two insulated cylindrical conductors is considered in connection with analysis of the electric field strengths that arise in the insulation of enameled wires during testing. The Cauchy integral is written for the derivative of the potential with respect to the complex variable of the Laplace equation for the region within the annular insulating layer. A Laurent expansion is obtained from the Cauchy integral, and integration then gives the sought representation of the potential by a functional series. The results of calculations by the formulas derived are compared with computer calculations by the net-point method. Nowhere does the discrepancy exceed the accuracy of the computer method. This approach can be generalized to groups of insulated conductors with arbitrary relative location, and also to conductors of different cross-sectional shapes. Figures 2; references 2 (Russian).

USSR

UDC 621.316.542

A NOVEL SYNCHRONIZATION CIRCUIT FOR COMMUTATORS

Minsk IZV. VUZ: ENERGETIKA in Russian No 2, Feb 78 pp 127-131 manuscript received 14 Feb 77

SVECHNIKOV, V. S., engineer, and SOKOLOV, N. M., dr in technical sciences, professor

[Abstract] A novel synchrhonization circuit has been designed which is free of the deficiencies of a peak transformer. It includes anticipators of zero-crossover during switch-on and during switch-off respectively, a d-c amplifier for shaping the synchronization signal, and a summator for adding the latter signal to the switching signal. Preliminary tests indicate that this circuit improves the performance of commutators and live circuit components. It can be very accurately adjusted to diverse commutation cycles. It can also disconnect a network during zero-crossover without subsequent transients. This paper was recommended by the Department of Power Supply of Industrial Enterprises and Municipalities of the Saratov Polytechnic Institute. Figures 3.

USSR

UDC [621.318.2:621.3].001.2

NEW TRENDS IN INVESTIGATION AND DEVELOPMENT OF PERMANENT MAGNETS IN ELECTRICAL ENGINEERING

Moscow ELEKTROTEKHNIKA in Russian No 12, Dec 77 pp 6-11

SERGEYEV, V. V., candidate in technical sciences

[Abstract] Work conducted for some years past as well as new trends in the investigation and development of permanent magnets are reviewed. As an example, a table is shown which outlines the intense work conducted in the Eight and Ninth Five-Year Plan on the investigation of new alloys and the development of technology for their production. In the Tenth Five-Year Plan development continued of new permanent magnets from these materials, as well as study of the procedures for shaping the magnetic properties at individual stages of the technological process and the introduction of permanent magnets in new series of electrical machines and apparatus. Monocrystalline magnets with diametric magnetization are widely used in electrical engineering. In series production preparation of monocrystalline ingots is conducted on "Crystalizer-201" units. In order to increase the technological effectiveness a group of specialists (R. Ya. Larichkina, A. G. Olevnik, V. V. Sergeyev, A. I. Gridnev, A. Bogamazov and F. M. Sal'kovskiy) developed a thermal device for multiposition growth of monocrystals. The new scheme for multiposition growth assured as 90 percent output of suitable (nonparasitic" monocrystals. The production process increased by 3-4 times because of simultaneous growth of several monocrystals in one unit per cycle of the process. A technology was developed for growth of

monocrystalline ingots with a diameter of 10-6 mm, up to 400 mm long. Other native and foreign work is also discussed. Figures 4; tables 2; references 10: 7 Russian, 3 Western.

USSR

UDC 621.318.2.042.4.013.001.24

MAGNETIC FIELD IN THE GAP BETWEEN TAPERED PERMANENT-MAGNET POLES WITH MAGNETICALLY SOFT POLE SHOES

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 74-76 manuscript received 15 Jun 77

GARB, KH. L., Vilnyus

[Abstract] The magnetic field intensity in the gap between two conical permanent-magnet poles is calculated by conformally mapping the axisymmetric field onto a plane. The pole faces are first considered to be parallel so as to produce a gap of uniform width, and then to be clad with pole shoes of a magnetically soft material. Calculations show that the uniformity of the magnetic field in such a gap critically depends on the parallelism of these pole shoes. Figures 3; references 4 (Russian).

USSR

UDC [621.318.3:621.86.062].001.24

PIECEMEAL HANDLING OF STEEL PLATES BY ELECTROMAGNETS

Moscow ELEKTROTEKHNKA in Russian No 12, Dec 77 pp 32-35

ORLOV, A. L., engineer

[Abstract] Problems of piecemeal handling of steel plates of relatively small thickness by electromagnets are of current interest for many branches of industry, particularly in cases where vacuum load-lifters cannot be used for this purpose. The present work is concerned with determination of the maximum pole spacing of multiple magnetic systems, by which pickup of underlying plates in a stack is eliminated. Particular attention is paid to spiral magnetic systems. Figures 2; references 6: 5 Russian, 1 West Germany.

USSR

UDC 621.318.5.627:621.38

ELECTRONIC TIMING RELAY FOR AUTOMATIC FREQUENCY RELIEF AND FREQUENCY RECLOSING RELAYS

Moscow ENERGETIK in Russian No 11, Nov 77 pp 33-34

SUKHORUCHKIN, I. V., and KLIMCHUK, V. S., engineers, REU Stavpolo'energo [? Regional Power Administration of Stavropol'energo]

[Abstract] The TsSRZAI [expansion unknown] Laboratory of Stavropol'energo has developed a timing relay that generates a delay signal in automatic frequency relief and reclosing circuits in substations with both alternating and direct operating current. The relay circuit elements are enclosed in the housing of the series EV timing relay without an increase in size. The maximum possible delay is 50 s. The relay is based on semiconductor devices and sealed electromagnetic relays. A schematic diagram is given and explained. The permissible direct current across the contacts of the RMUG output relay in a circuit with resistive load is 0.1 A and 0.5 A when the voltage across the open contacts is 300 and 30 V, and the corresponding currents in an AC circuit with resistive load are 0.3 A and 1.0 A for voltages of 220 and 115 A. Relay error at mid-scale is no more than 10 percent for ambient temperatures from -40 to +40°C. Figure 1.

USSR

UDC 621.356.001.4

MECHANIZATION AND AUTOMATION OF TESTING OF LEAD-ACID STARTER BATTERIES

Moscow ELEKTROTEKHNIKA in Russian No 12, Dec 77 pp 42-43

BARANOV, A. I., LEZHNEV, P. I., candidates in technical sciences, PERESICHNYY, A. B. and KARPUKHIN, G. P., engineers

[Abstract] The article describes the Type AZRS-StA automatic charge-discharge stand intended for conducting tests of domestic lead-acid starter batteries for capacitance and life expectancy. One of the principal merits of the stand is the possibility of remote control and monitoring of charge-discharge processes. Photographs are presented of a group of AZRS-StA stands with a control desk, and the electronic cabinet. Figures 2.

EAST GERMANY

FLUORESCENCE DISPLAY TUBES (PART 2)

East Berlin NACHRICHTENTECHNIK ELEKTRONIK in German Vol 28 No 3, 1978 pp 123-126 manuscript received 25 Oct 77

HAUSSLER, E., Chamber of Technology, East Berlin

[Abstract] The characteristics of 2nd-generation and 3rd-generation fluorescence display tubes, of the kind used in calculators, digital measuring instruments, elevator displays, and the like, are reviewed briefly. In the 2nd-generation display tubes, the information of the dynamic register, an n-digit binarily coded decimal number, circulates under time shift conditions of the individual positional values, through an addition and subtraction unit. Position shielding is provided. The cathodes consist of several individual filaments. These display tubes are basically vacuum tubes. The 3rd-generation fluorescence display tubes have the segment anodes wired so that they may be connected in the circuit in more and more complex ways. The substrate, usually graphite fabric, is screen printed; the conductor layer is on the inner wall of the display window unit. Proper sealing to ensure perfect vacuum is essential. This work was carried out at Tunsgam in Budapest. Figures 10; references 10: 6 Japanese, 2 German, 2 Western.

General Production Technology

CZECHOSLOVAKIA

EXPECTED DEVELOPMENTS IN ELECTRONICS

Prague AUTOMATIZACE in Czech Vol 21 No 1, Jan 78 pp 21-25

KRECAN, JAROSLAV

[Abstract] Although electronics represents only a small fraction of the GNP of developed nations (5.5 percent in the USA), it decisively effects the progress of the overall industrial production. Direct influence on the life of an individual is still mainly limited to television, but even this has strongly changed the life style of the whole population. Even stronger effects must be expected by the end of this century. Most complex mechanical machinery will be replaced by electronic equipment. In order to study the influence of electronics on the life of a nation the author selected the case of the United States because statistics concerning production and consumption of electronic products are most readily available for this country. Also the largest manufacturers of such equipment are located in the USA. Cost of electronic equipment was drastically reduced by the introduction of mass produced LSI circuits. This led not only to the development of moderately priced computers, but also made possible the production of cheap hand calculators and electronic watches. The following sectors of the electronic industry of the USA are reviewed in Tables in the article; capital costs of the total production and percentage splits into individual products for the period 1975 to 1977, and in some cases, extrapolations until 1980 are shown. Table 1. Federal funds available for electronic equipment; 2. Industrial consumption of electronic apparatus; 3. Computer systems and controls; 4. Computers and calculators; 5. Mass memories; 6. Input apparatus; 7. Output apparatus; 8. Terminals; 9. Controls and administration; 10. Consumer goods; 11. Semiconductor components; 12. Monolithic integrated circuits; 13. Industrial electronics; 14. Large circuits most suitable for integration in the late seventies; 15. Review of US manufacturers. The author expects an ever increasing influence of electronics on every day life. He believes for instance, that newspapers will no longer be printed and all political information will be available to individuals by broadcasting and TV news. Tables 16; references 11: 8 Czech, 3 Western.

EAST GERMANY

DETERMINATION OF CONTACT RELIABILITY FOR NON-LOADED SWITCHING RELAYS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 7, Apr 77 pp 219-222

EGLINSKI, L., dr and PESCHEL, W., Institute of Control Technology

[Abstract] A portable testing unit was developed at the Institute of Control Technology which operates on the basis of the voltage-current method, and establishes the resistance class among seven to which the non-load switching relay belongs. This is performed automatically and the contact transition resistance is measured. A classification of the measured values is used because the permissible upper limit is significantly dependent on the use for which the relay is intended. Reliable operation of the relay requires not only the setting of proper contact resistance values in the "open" and "closed" modes but also conformance to a number of other specifications. It is logical therefore not to evaluate the contact performance on the basis of a single failure criterion. The contact reliability or the probability of exceeding the permissible levels under various resistance threshold values is a more useful measure. Four pairs of contacts can be tested simultaneously in the realized device, which is described in detail and illustrated with block diagram. The first results with the unit are promising. Figures 3; references 8: 7 German, 1 Western.

EAST GERMANY

DATA FEEDBACK AND FAILURE ANALYSIS OF ELECTRONIC COMPONENTS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 27 No 1, Jan 78 pp 7-9

KLEIMON, THOMAS, graduate physicist

[Abstract] Ensurance of active and passive reliability of electronic components is a major goal of the East-German electronics industry. Efforts in the field of active reliability assurance involve development, design, and manufacturing measures; in the field of passive reliability, measures concerning the measurement, recording, and statistical processing of data concerning the performance of the finished product. An important source for evaluation is data feedback, obtained from users of the components or of systems containing the components in test and actual operations. The data obtained in this manner must contain information about the system that failed; the time of the failure; the type and position in the system of the component that failed; the fault parameters including the system failure and the component failure; and the definition of the observation field, meaning the totality of the systems in which the components were watched. The data obtained in this manner are subjected to statistical failure analysis. The ultimate results permit the classification of components into seven reliability categories (they are defined in

article). The uses of the results are illustrated with examples taken from actual production. Experiences with this method indicate that it can contribute significantly to the accomplishment of the goal, which is to produce increasingly reliable electronic components. Figures 4.

HUNGARY

USE OF TIN ELECTROLYTES IN COMMUNICATIONS TECHNOLOGY

Budapest BHG ORION TERTA MUSZAKI KOZLEMENYEK in Hungarian Vol 23 No 4, 1977
pp 176-185

LANBERTUS, ZSOLT, graduate chemical engineer, corrosion consultant, head of BHG [Beloianisz Communications-Technological Factory] Finishing Department; Mrs. CSAKI, LASZLO, chemical technician, Galvanizing Shop of BGH; Mrs. GALDA, BELA, chemical technician, Galvanizing Shop of BHG; and HORVATH, IMRE, graduate electrical engineer, development engineer at BHG

[Abstract] An extensive study was made of various zinc electrolytes and zinc coatings prepared with them for the following performance characteristics: layer-thickness distribution, mechanical coating properties, productivity, environmental wholesomeness, corrosion resistance, and operating costs. The findings are summarized as follows: For good layer-thickness distribution, the electrolyte should contain high concentrations of cyanide and no alkaline cyanide. The most favorable bend-resistance:layer thickness relationship is obtained for an up to 50 micron layer with high cyanide content, for an up to 50 micron layer with no alkaline cyanide content, and for an up to 25 micron layer with high chloride content in the electrolyte. For suspended galvanization, an acidic electrolyte with high chloride concentration is the most productive. In environmental terms, an electrolyte with no alkaline cyanide is the most desirable (such an electrolyte is also the least corrosive). All tin coatings provide the same corrosion resistance, irrespective of the electrolyte used and the method of deposition (provided that all chloride residues are properly removed after the galvanization). Electrolytes containing high cyanide concentration are the most economical to use (increased chloride content and increased absence of alkaline cyanide increase the operating costs). The zinc electrolytes offered on the market may be evaluated on the basis of the findings reported. Figures 12; tables 2.

HUNGARY

HIGH-PERFORMANCE ELECTRON-BEAM EVAPORATION SOURCE FOR THE SOLID-STATE INDUSTRY

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 16 No 10, Oct 77 pp 289-296

BARANY, ISTVAN, staff scientist, and NEMESKERY, GEZA, scientific group leader, Main Department of Target Device Development, Design, and Engineering, Research Institute for the Communications-Technological Industry

[Abstract] This article describes the theory, design, construction, performance, and applications of the GF-1030 electron-beam evaporation source developed at the authors' institute [HIKI] for the solid-state industry on the basis of a scientific-cooperation and research-development agreement with HVD (High-Vacuum Enterprise in Dresden, East Germany). Two device prototypes were produced and examined in East Germany. Some of the findings and experiences obtained there are described. The device consists of the evaporation source (featuring (1) water-cooled cooper housing, (2) permanent magnet and deflector of two pole pieces, (3) electron source of deflector electrode, high-voltage ceramic insulators and cathode coil, (4) oscillating and positioning coils, and U-shaped iron core as the basis for beam positioning and swiveling) and the power supply unit (featuring a high-voltage rectifier and regulator, cathode-heater transformer and its control circuits, and beam oscillating and -positioning units). The various circuits are described in detail and illustrated with diagrams (including the remote-control circuit). The vapor-coating of aluminum with the device is described, and the major results of the measurements are presented. The overall findings were favorable, and it was decided to make additional units and to work on further improvements. Figures 12; tables 2; references 7: 2 Hungarian, 5 Western.

HUNGARY

TUNNEL FURNACES IN MICROELECTRONICS

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 16 No 10, Oct 77 pp 297-303, 320

FABENYI, EDE, graduate mechanical engineer, Main Engineering Department, Research Institute of the Communications-Technological Industry

[Abstract] Three tunnel furnaces, developed at the Research Institute of the Communications-Technological Industry (HIKI), are described and illustrated with photographs, drawings, diagrams, circuit diagrams, and performance charts. (1) The CG-26 is a four-zone furnace designed primarily for the burning-in of palladium-based resistor pastes, which are highly sensitive to the accuracy of the parameters used. (2) The CG-62 is a six-zone furnace, representing an improved version of the CG-26, designed for use with the improved pastes (described in Du Pont Thick Film Seminar Technical Data, 1976). (3) The CG-80

is a four-zone drying and coating furnace, for less critical uses; it is larger in size and thus follow the commands of the control system more sluggishly but is rapid enough for the intended uses. All furnaces were developed, and are being used, for the manufacture of thick-film circuits of advanced design. Figures 20; tables 3; references 9: 4 German, 3 Hungarian, 2 Western.

EAST GERMANY

PREPARATION OF THROUGH-CONTACT CIRCUIT BOARDS FOR DEVELOPMENT NEEDS. PART 1

East Berlin FEINGERAETETECHNIK in German Vol 26 No 12, Dec 77 pp 541-544

SCHUETT, J., graduate engineer, Robotron Center for Research and Engineering State Enterprise, Dresden

[Abstract] The equipment needed to produce development quantities of through-contact circuit boards (but which may be expanded to a production of approximately 20,000 circuit boards per year) is the following: bench drill, numerically controlled circuit-board drilling machine, chemical metallization and pregalvanization system, laminating unit for the solid photoresist, exposure unit, touch-up unit, conductor-path galvanization unit, delaminating unit, spray-etching unit, surface finishing unit for contact pins, contour fabricating unit, and neutralization unit for the effluent water. The patterns of the circuit boards must be provided on polyester film of high dimensional stability, one for each side. This part of the series of articles describes the following processing steps: cutting, drilling, cleaning, metallizing, and pregalvanizing. Various variants are presented in some cases to permit the selection of the best-suited one for the job on hand. The preparation of the original patterns is not described. Table 1; references 5: 4 German, 1 Western.

EAST GERMANY

THE BE2 ADHESIVE-TAPING SYSTEM USED IN A NOVEL AUTOMATED SOLDERING PLANT

East Berlin FEINGERAETETECHNIK in German Vol 26 No 12, Dec 77 pp 539-541

WALTHER, V., dr of engineering, URBAN, H., graduate engineer, and WERNER, V., graduate engineer, Robotron Center for Research and Engineering State Enterprise, Dresden

[Abstract] The entire system consists of a modular rinsing and drying unit following a surge-soldering unit, and diverse other units. One of these latter units is the BE2 adhesive-taping unit. The technological operations start with the non-equipped circuit board with one or more direct plug contact(s). These contacts are protected from contamination by solder and flux by a paper tape glued on them during the subsequent soldering process using water-soluble flux. The equipped circuit boards are then transported to the soldering unit and the rinsing modules where tape residue and flux are removed with circulating water. The process ends by passage through the drying unit. The taping unit, which is described and illustrated in detail, permits circuit boards larger than 50 by 55 mm to be handled. It uses 7.5-20.0 mm wide tape. It has transport, pressure-application, cutting, perforating, tape-moistening, and water-circulation subunits; it may be used in the 5°C-40°C temperature and 10%-80% atmospheric humidity range. Figures 5; table 1; references 3 (German).

EAST GERMANY

CAUSES OF FAILURE IN COATED NOBLE-METAL REST CONTACTS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 26 No 7, Apr 77 pp 227-229

HOEFT, H., professor, Dr of engineering

[Abstract] Substrates consisting of copper, nickel, zinc, aluminum, tin, and/or beryllium are coated with noble metals, with perhaps an intermediate layer between them. Various compositions and combinations were evaluated for performance, durability, and reliability characteristics. The tests indicated that the volume diffusion is insignificant in all, that copper may reach the palladium surface by means of surface diffusion where it may cause electrically perturbing corrosion (CuS and Cu_2S), and that the surface diffusion of copper onto copper replenishes the copper adequately so that no copper depletion takes place and the surface diffusion of copper to palladium is not affected. Hydrolytic surface effects cause increased diffusion under relatively high humidities. Factors affecting performance are, other than composition, properties which directly or indirectly contribute to mechanical abrasive wear, electrical wear, and local diffusion of non-noble components to the surface. Surface characteristics of the various layers and their adhesion mainly determine the reliability. Figures 2; tables 5; references 5: 1 Hungarian, 4 German.

USSR

UDC 621.382.396(024)

MINIATURIZATION OF HEAT PIPE-RADIATORS FOR COOLING OF RADIO ELECTRONIC EQUIPMENT

Leningrad IZV. VUZ: PRIBOROSTROYENIYE in Russian Vol 21 No 1, Jan 78 pp 107-110 manuscript received 6 Jan 77

PECHENEGOV, YU. YA. and SEROV, YU. I.

[Abstract] Heat pipes, characterized by an extraordinarily high thermal conductance, are very effectively used for cooling of radio electronic equipment. Following the general trend toward miniaturization, it is necessary to minimize the size and the weight of such heat pipes. This can be done by means of a performance analysis, and here such a pipe-radiator is considered which operates under steady thermal conditions. The pipe is filled with a one-component fluid, without inert (noncondensing) gas, its evaporator part makes contact with the device which is to be cooled, and its finned condenser part dumps the heat into the atmosphere. The calculations are based on the equations of heat balance and heat transfer. The problem is solved by dimensional analysis and with empirical data, which yield a sufficiently accurate expression for the optimum saturation temperature of the working fluid as the basis for a minimum-size design. Typical working fluids are water, methanol, and ethanol. This paper was recommended by the Department of Industrial Heat Technology of the Saratov Polytechnic Institute. Figure 1; table 1; references 4: 3 Russian, 1 Western.

HUNGARY

AUTOMATED RESISTOR TRIMMING DEVICE FOR THICK-LAYER CIRCUITS

Budapest FINOMMECHANIKA-MIKROTECHNIKA in Hungarian Vol 17 No 2, Feb 78 pp 59-63

FABENYI, EDE, graduate mechanical engineer, Research Institute of the Communications-Technological Industry, Target Device Developing, Designing and Manufacturing Main Department

[Abstract] The device described uses the sand-blasting technique. The device, developed at the author's institute, is designated CG-40; trimming of the resistors is accomplished with the aid of a pneumatic apparatus controlling the sandblast on the basis of a bridge-circuit unit. The device combines all actuating, abrading, checking, and service units required for the trimming process. The subunits are (1) the sandblast unit, (2) the value-setting manipulator, and (3) the measuring and control system. Each of these subunits is described and illustrated with drawings. The measuring and control system features solid-state components and integrated circuits, operating on the basis of the bridge circuitry. The device also has a process control system which permits the trimming operation to be performed in a semi-automated manner. Figures 15; references 3: 2 Hungarian, 1 Western.

USSR

UDC 621.382.8:621.317.799

TESTER FOR CHECKING ASSEMBLY OF RADIOELECTRONIC EQUIPMENT AND HYBRID INTEGRATED CIRCUITS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1978 pp 45-46

GANOPOL'SKIY, L. S., RYABININ, V. I., engineers, and TSYPIN, B. V., candidate in technical sciences

[Abstract] The paper considers the principles of measurement which form the basis of a tester for checking the assembly of radioelectronic equipment and hybrid circuits. The tester was developed at the Penzensk affiliate of the VNIITPriborostroyeniya [All-Union Scientific-Research Technological Institute of Instrument Making]. The principal technical characteristics and an exterior view of the tester are presented. Figures 4; references 4: 3 Russian, 1 Western.

USSR

UDC 621.311.05.001.24

A METHOD OF EXTRAPOLATING UNPLANNED DEPARTURES FROM LEVELS OF POWER TRANSFER ACROSS INTERSYSTEM TIE LINES

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 7-11 manuscript received 12 Aug 77

AKHUNDOV, E. B., ANISHCHENKO, V. A., and PETROV, V. V., candidates in technical sciences. Belorussian Power Engineering Institute

[Abstract] The principal limitation on maintenance of an optimum intersystem power transfer is the insufficient capacity of weak overhead tie lines. An automatic regulation of power transfer to maintain and limit the levels of power transferred accordingly should also reduce unplanned departures from these levels. An extrapolator of such departures has been developed for this purpose on the basis of a probability analysis of load and frequency excursions in a power system, a nearly stationary and ergodic normal random process. Its autocorrelation function is closely approximated by an exponential function with a corresponding density spectrum and dispersion. Before the optimum extrapolation operator is found, the low-frequency power variations have been expediently filtered out. The performance of this extrapolator is illustrated in one typical case of fast regulation of stabilitywise dangerous power fluctuations and slow regulation of safe power fluctuations in parallel-tie lines. Further calculations indicate that the use of this extrapolator of unplanned departures from power levels makes automatic systems of power transfer more effective and also more efficient. Figures 5; references 10: 7 Russian, 3 Western.

USSR

UDC 621.311.001.24:681.321.12

FAULT IDENTIFICATION IN ELECTRIC POWER SYSTEMS

Minsk IZV. VUZ: ENERGETIKA in Russian No 2, Feb 78 pp 3-7 manuscript received 23 Jun 76

BOGATYREV, L. L., candidate in technical sciences, docent, BOGDANOVA, L. F., and STIKHIN, G. P., engineers

[Abstract] An adaptive algorithm has been constructed for fault identification in electric power networks by an automated management system. Such a system is actuated by a model of an approximating hypersurface which separates all design and performance parameters into two classes, namely normal and fault parameters, from a stability standpoint. A reliable decision rule can be established by extremely planning an experiment, even when the adaptive

sample is small. The system stability can then be determined without solving the system of differential equations describing this system. With the degree of stability or instability defined, it is thus also possible to optimally control transient processes. This paper was recommended by the Department of Electric Power Plants, Networks and Systems of the Ural Order of Labor's Red Banner Polytechnic Institute imeni S. M. Kirov. References 6 (Russian).

USSR

UDC 621.315.1:621.317.7

ANTENNA-TYPE VOLTAGE CONVERTERS FOR 6-35 kV POWER DISTRIBUTION NETWORKS

Moscow ENERGETIK in Russian No 2, Feb 78 pp 11-12

SELIVAKHIN, A. I., candidate in technical sciences, and SAGUTDINOV, R. SH., engineer

[Abstract] A series of fault-locating devices of the antenna type has been developed at MIISP imeni V. P. Goryachkin [expansion unknown] for use in 6-35 kV power distribution networks. When properly located at definite geometric points within the field of a three-phase h-v network, they tap h-v power for feeding the protective equipment, they check the protective equipment in substations for overheating, and they check the insulation in h-v networks with isolated neutral. They can also be used for checking the voltage level in various voltage control devices or for transmitting pulse communication signals over 110 kV lines. These devices convert capacitance to voltage signals. A typical application is restoring a fault indicator to its original position, after normal voltage has been recovered. Figure 1.

USSR

UDC 621.315.1:621.317.333.4

AN AUTOMATIC TROUBLE LOCATOR FOR FINDING THE POINT OF DAMAGE OF OVERHEAD ELECTRIC POWER TRANSMISSION LINES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 11, Nov 77 pp 64-65

BRAUDE, L. I., KOVALENKO, V. P., engineers, and SHALYT, G. M., candidate in technical sciences, VNIIE [All-Union Scientific-Research Institute of Electric Power Engineering]

[Abstract] The paper examines the LIDA automatic trouble locator for determining the distance to points of stable and unstable (in the case of successful automatic reclosure) damage to overhead lines by voltage of 330 kV or more. The LIDA device can be used to determine the state of the overhead

line (short circuits, ice load), and completely replaces the currently used R5-7 trouble locator. The device can be used at temperatures from 0 to +50°C, relative humidity up to 80 percent and altitudes up to 2000 m above sea level. The working principle involves measurement of the time interval between a probe pulse and the reflected pulse. It does not interfere with rf channels on nearby overhead lines. Figures 2; table 1.

USSR

UDC 621.316.925:621.316.1

ISOLATION OF A DAMAGED SECTION ON ELECTRIC POWER TRANSMISSION LINES BY USING A CURRENT PROTECTOR BASED ON SEALED CONTACTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 11, Nov 77 pp 66-68

POPOV, N. M., engineer, and POLYAKOV, V. YE., dr in technical sciences, Azov-Black Sea Institute of Mechanization of Agriculture--Ural Polytechnical Institute imeni S. M. Kirov

[Abstract] It is shown that the use of magnetically controlled sealed-contact relays can appreciably improve the sensitivity of maximum current protectors on 10-kV and 35-kV power transmission lines. The relay coil is connectly directly to the secondary of the current transformer. These protectors have a resetting ratio close to unity. A circuit is considered for a special device for isolation of a damaged transmission line section. This unit operates in the case of operation of the sensitive current protector and double automatic reclosure. The only source of current for the isolating device is provided by the current transformers of the disengaging switch. The proposed system has been thoroughly tested under laboratory conditions and is recommended for replacement of oil-filled circuit breakers. Figures 3; references 7 (Russian).

USSR

UDC 621.311.019.3

IMPROVING THE RELIABILITY OF ELECTRIC POWER SERVICE IN AREAS WITH INCOMPLETE
STANDBY FACILITIES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 11, Nov 77 p 80

PETERS, A. F., engineer, Kazenergonaladka [? Kazakh Power Repair]

[Abstract] An arrangement is described for providing electric power service of high reliability in territories where standby facilities are inadequate. It is shown that when the capacity of the local power plant is 20-30 percent of the power consumed in the region, provisions should be made in the regional substation connected to the power system by a single 110-kV or 220-kV overhead line to transfer the action of line protectors to disengaging the local power plant. This protects customers from outages in the case of automatic frequency relief when automatic frequency relief when automatic reclosure is successful. In the case of unsuccessful automatic reclosure, the power plant is isolated to a balanced load. Figure 1.

USSR

UDC 621.311.23.007.2

WORKSHOP ON USING ALGORITHMIC METHODS FOR TRAINING OPERATING PERSONNEL IN
ELECTRIC POWER PLANTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 9, Sep 77 p 94

BULAVITSKIY, YU. M., engineer, Kiyevenergo

[Abstract] A workshop on "Algorithmic Methods for Appreciable Improvement of the Training of Operating Personnel in Electric Power Plants" was held in Kiev. The workshop was organized by the Republic House of Economic and Scientific-Technical Propaganda, the Ministry of Power of the UkrSSR, Kiyevenergo, the Institute of Automation, and the Southern Division of ORGRES [State Trust for the Organization and Rationalization of Regional Electric Power Plants and Networks]. Participating in the workshop were representatives of various power systems and separate power plants. The reports given emphasized the advantages of the new training methods in clarifying situations where machine operators and linemen are most apt to make errors. The basic algorithmic aids for instruction are the tree of evaluation of a situation and the plans of action developed by the Southern Division of ORGRES. Practical verification of the new training methods has shown that instructional material is readily assimilated and retained, and that decision making capacity is as good in newly trained personnel as in those with 1.5-3 years of experience. It was decided that the new methods should be introduced as quickly as possible in large fossil-fuel and nuclear electric power plants.

USSR

UDC 621.315.1.004

ORGANIZATIONAL-TECHNOLOGICAL CHARTS FOR REPAIR AND OPERATION OF ELECTRIC POWER TRANSMISSION LINES

Moscow ENERGETIK in Russian No 11, Nov 77 pp 32-33

ABRAMOV, V. D., BUMAGINA, V. V., and LITVINOV, S. M., engineers, SKTB [Special Design and Technological Office] of VKT, Mosenergo [Moscow Rayon Administration of Power System Management]

[Abstract] Recommendations are made on standard organizational-technological charts to be used as guidelines in repair and operation of transmission lines. These charts are worked out on the basis of leading experience and technology, modern methods of labor, and compliance with safety rules. The charts contain the following sections: "Type of Work," "Number of Personnel and Skill Group," "Technical-Economic Indices," "Equipment," "Working Conditions," "Safety Requirements," "Special Conditions or Requirements," "Job Technology," "Sketches." The textual part of the charts is concise and clear with accompanying tables and graphs. Diagrams and sketches are sharp and precise, without excess dimensions and symbols. The chart may be in the form of a pamphlet or two-sided sheet.

USSR

UDC [621.311.25:621.039]:621.313.323.018.782.3.001.24

TRANSIENT PROCESSES IN RELIABLE SUPPLY SYSTEMS OF NUCLEAR ELECTRIC POWER PLANTS WITH SYNCHRONOUS ELECTRIC MOTORS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 9, Sep 77 pp 12-16

MERKUR'YEV, G. V., CHERNOVETS, A. K., candidates in technical sciences, and SHARGIN, YU. M., engineer, Lenenergo-LPI [Leningrad Rayon Administration of Power System Management--Leningrad Polytechnical Institute imeni M. I. Kalinin]

[Abstract] In an earlier paper [see G. V. Merkur'yev et al., "Electric Supply for Cooling and Accident-Localizing Systems in Nuclear Electric Power Plants," ELEKTRICHESKIYE STANTSII, 1977, No 3] the authors considered methods and results of calculating transient processes in autonomous reliable supply systems for nuclear plants with induction motors. The increasing power of nuclear reactors and improvement of parameters of synchronous motors has made it feasible to use these motors not only in the main circulation loop, but also for some of the mechanisms in the cooling and accident-localizing systems. In this paper the authors consider transient processes of starting and self-starting of synchronous motors through a transformer as applied to autonomous reliable supply systems for nuclear electric power plants. The

mathematical model allows for an arbitrary number of synchronous and induction motors in the load circuit with diesel-generator or gas-turbine starters connected directly to the load, or separate supply from fossil-fuel or hydroelectric generators. Reactions of the system to different kinds of perturbations are considered. It is shown that when the facilities for automated control are properly selected, the use of synchronous motors in the drives for the mechanisms of the cooling and accident-localizing system can improve the operation of the entire reliable supply system. Figures 6; references 4 (Russian).

USSR

UDC 621.311.052.63.001.57

MODELING DATA COMPRESSION ALGORITHMS IN TRANSMITTING TELEMETRIC INFORMATION IN POWER SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 11, Nov 77 pp 19-23 manuscript received 18 Apr 77

MITYUSHKIN, K. G., candidate in technical sciences, and KUTLER, G. P., engineer, Moscow

[Abstract] Some simple algorithms are considered for data compression in remote control devices in connection with the development of a large-scale automated dispatcher management system (ASDU). The algorithms incorporate adaptive programmed servicing of the telemetering sensors, i.e., the servicing procedure depends on the parameters being monitored. The statistical characteristics (mean square transmission error, average rate of deviations and absolute magnitude of deviations) and coefficient of compression of the frequency band are compared for various adaptive and cyclic algorithms modeled on the third generation 1010B Videoton digital computer. The adaptive algorithms considered are based on the floating aperture principle with approximation of processes by a zero-order polynomial. This principle is based on transmitting only those parameters that deviate from the last transmitted value by a certain amount (i.e. parameters that go beyond the limits of the given aperture). The aperture may be fixed or it may be narrowed by stages, and the parameters may be transmitted singly or in groups. The characteristics of the initial data blocks are considered, and computer modeling of the data transmission process is explained. Figures 5; references 6 (Russian).

USSR

UDC [621.315.052.63:512.83].001

SOME PROBLEMS IN THE DESIGN OF HIGH-FREQUENCY CHANNELS ALONG ELECTRICAL TRANSMISSION LINES

Moscow IZVESTIYA AKADEMII NAUK SSSR, ENERGETIKA I TRANSPORT in Russian No 1, Jan/Feb 78 pp 3-10 manuscript received 5 Feb 76; after revision 16 Jun 77

KNIZHNIK, R. G. and SHEKHTMAN, SH. M., Kiev

[Abstract] A digital computer is used in the design of high-frequency channels along electrical transmission lines, on the basis of admittance matrix calculations. The amount of computations can be reduced and the machine time thus shortened by utilizing the symmetry of a high-frequency line in cross section and by replacing the conductors of the "split" phase with an equivalent conductor. This method is illustrated on two three-phase lines, 500 and 750 kV respectively. Concatenation, series connection, and transposition are also considered. Figures 5; references 5 (Russian).

USSR

UDC 621.316.1.052.63

TRANSMISSION OF AN ASYMMETRIC CIRCULAR REMOTE CONTROL SIGNAL OVER A HIGH-VOLTAGE DISTRIBUTION NETWORK

Moscow ELEKTRICHESTVO in Russian No 11, Nov 77 pp 63-69 manuscript received 15 Feb 77

TUVARZHIYEV, V. K., TSYGANKOVA, L. G. and SHESTOPALOV, V. N., Institute of Electrodynamics, Academy of Sciences UkrSSR

[Abstract] The problem of transmission of a circular remote control signal is considered with treatment of the transmission line as a circuit with distributed parameters. The case of an asymmetric signal is examined with representation in the form of three components. A technique is proposed for calculating the level of a high-frequency signal when the network is loaded. A typical 110 kV distribution network is analyzed with regard to the influence that the working conditions of the neutral conductor of the power transformers have on the level of an asymmetric signal created in the network by a remote control device. Calculations showed that the signal level along the transmission line and the frequency dependence of the signal level are mainly determined by the parameters of the direct and return circuits, and that as the number of grounded neutrals increases there is a reduction in signal strength. Grounding of the neutrals in the last transformers along the line has the greatest effect. It is concluded that when the permissible error in

signal determination is 10-20 percent, the signal level can be determined without consideration of the particulars of the zero-sequence circuit. The results of the study are valid for both active and passive methods of signal formation. Figures 4; table 1; references 15 (Russian).

USSR

UDC 621.311.072:65.012.2

PLANNING THE TYPICAL OPERATION MODES OF 110-750 kV ELECTRIC NETWORKS IN TERMS OF VOLTAGE AND REACTIVE POWER

Moscow ELEKTRICHESKIYE STANTSII in Russian No 12, Dec 77 pp 51-55

FEDIN, V. T., candidate in technical sciences, PROKOPENKO, V. G., engineer, Belorussian Polytechnic Institute

[Abstract] An algorithm has been constructed for calculating and optimizing the performance of an electric network which, while based on the method of coordinate descent, also takes into account not only the characteristics of voltage and kvar regulation with transformers, autotransformers, and static capacitors but the voltage dependence of the corona loss as well. It leads to the proper selection of the transformation ratios and the kvar sources in a network, with the utilization factor and the load factor taken into consideration. The corresponding 150-point computer program is designed for a network with not more than 40 transformers and not more than 40 kvar sources involved in the optimization of up to 8 different operation modes. Figure 1; table 1; references 6 (Russian).

USSR

UDC 621.314.222

MATHEMATICAL SIMULATION OF INDUCTIVE REACTANCES OF CURRENT CONDUCTORS WITH THE MAGNETIC PERMEABILITY OF THE AMBIENT MEDIUM TAKEN INTO ACCOUNT

Minsk IZV. VUZ: ENERGETIKA in Russian No 2, Feb 78 pp 29-34 manuscript received 2 Jun 76

BORYU, N. V., candidate in technical sciences, docent

[Abstract] The inductive reactance of current conductors is calculated on the basis of mathematical simulation with the aid of electroconductive paper, also taking into account the effect of ferromagnetic structures in the vicinity. The calculations are shown first for an array of conductors in a homogeneous medium, and the normal cross section of these conductors is assumed to be plane-parallel. The effect of surrounding ferromagnetics is taken into

account in terms of secondary currents. The problem can be treated as an iterative one and solved by successive approximations, or as one with non-linear boundaries and solved by addition of an extra winding. Application of both methods to specific nonconventional conductor arrays yields results which agree with experimental data within 14 percent. The state of a ferromagnetic structure near an array of conductors is found to effect foremost the field distribution on the near side, so that individual conductors will have different inductances. The total inductance of a conductor array does not, however, change much from one set of test conditions to another. This paper was recommended by the Department of Power Supply for Industrial Enterprises of the Zaporozhye Institute of Machine Building imeni V. Ya. Chubar. Figures 4; references 4 (Russian).

USSR

UDC 621.316.1:621.319.4

FEASIBILITY OF SHUNT-CAPACITOR BANKS FOR SYSTEMS OPERATING AT VARIOUS NOMINAL POWER LEVELS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 12, Dec 77 pp 67-70

PEKELIS, V. G., candidate in technical sciences, and NALETSKIY, M. M., Energo-set'proyekt, Belorusskaye otdeleniye--Belenergoremmaladka [All-Union State Planning, Surveying and Scientific-Research Institute of Power Systems and Electric Power Networks, Belorussian Division--Belorussian Administration for Maintenance of Electric Power Equipment]

[Abstract] Existing series KS1 and KS2 shunt-capacitor banks in 6-10 kV networks can be made suitable for installation where the nominal power levels vary, if individual sections are protected against internal damaged caused by voltage rises. Such a protective relay system has been built for "we"---connected capacitor banks with an isolated neutral. The sensitivity of this protective system to the most probable fault mode, namely progressive damage of capacitors in one section, is evaluated here and found to be adequate so that it becomes unnecessary to provide for mutual standby duty of individual capacitors. With such a protective system, shunt-capacitor banks in the size from one to eight sections, depending on the economic tradeoff, can be installed and reliably operated. Figure 1; tables 2; references 4 (Russian).

USSR

UDC 621.316.022.001.24

DESIGN OF HIGH-FREQUENCY ELECTRIC POWER CONDUCTORS

Moscow ELEKTRICHESTVO in Russian No 2, Feb 78 pp 40-43 manuscript received 23 Apr 76

TOZONI, O. V. and RUDENKO, L. V., Kiev

[Abstract] Electric conductors can be designed by solving the integral equation which describes the current density and then calculating all the integral characteristics of the electromagnetic process as well as the electric properties of the circuit components. This method is applied here to a single-phase h-f circuit, with a modification based on the availability of additional a priori information about the current distribution over a conductor cross section. A conductor carrying h-f current is regarded as a bundle of parallel rectangular strands. Preliminary numerical estimates indicate that the one-dimensional Helmholtz field equation, with consideration of symmetry, yields sufficiently accurate results. At a fixed frequency the electric field intensity is found to remain almost uniform over the strand height and to vary longitudinally, becoming much higher at the conductor ends than in the middle. With increasing frequency, on the other hand, it increases at the surface and becomes more nonuniform over the conductor thickness in the outer strands. Increasing the number of strands results in a more uniform current distribution over the conductor bundle, with smaller power losses and electromagnetic interaction forces. Figures 3; tables 2; references 9: 8 Russian, 1 Western.

USSR

UDC 621.316.542.027.3.019.3

DETERMINING THE PERIOD BETWEEN OVERHAUL SHUTDOWNS FOR HIGH-VOLTAGE CIRCUIT BREAKERS

Minsk IZV. VUZ: ENERGETIKA in Russian No 2, Feb 78 pp 14-18 manuscript received 1 Feb 77

OBOSKALOV, V. P., candidate in technical sciences, docent

[Abstract] The period between overhaul shutdowns is generally optimized on the basis of the minimum cost. In the case of h-v circuit breakers it is also necessary to consider the magnitude of short-circuit currents. The resulting indeterminacy in the relation for the reliability of arc suppressors and in the functional dependence of expenditures on the magnitude of short-circuit currents is overcome by introduction of equivalent parameters for an approximating normal, gamma, or Erlang distribution. The recovery function is calculated on this basis, as the mathematical expectation of the number of circuit-breaker failures within a given period of time. Sudden faults because

of peak loads do not affect the optimum period between overhaul shutdowns and, if no data on the previous service period are available, the recovery function is determined in terms of the conditional probability of failure-free circuit-breaker performance. This paper was recommended by the Department of Electric Power Plants, Networks and Systems of the Ural Order of Labor's Red Banner Polytechnic Institute imeni Simikirov. Figure 1; references 5 (Russian).

USSR

UDC 621.316.925

NEW DESIGNS OF AUTOMATION EQUIPMENT FOR POWER DISTRIBUTION NETWORKS IN THE RIGA TEST STATION OF THE LATVIAN MAIN ADMINISTRATION OF POWER SYSTEM MANAGEMENT

Moscow ENERGETIK in Russian No 2, Feb 78 pp 17-18

SURVILO, I. K., KAN, I. I., FEDOTOV, I. A., and POPOV, I. A., engineers

[Abstract] Several new devices for 6-10-35 kV networks have been developed at the Riga test station of the Latvian Main Administration of Power System Management which include: the UPU-1 for indicating phase-to-phase faults, the SKZ-6 for counting the number of short-circuit disconnects with simultaneous recording of the current levels, the "Zond" fault locator already in production, the pulse-type directional IZS protective device for selective indication of unstable and stable phase-to-ground faults in compensated and in uncompensated overhead or underground 20-35 kV - 50 Hz lines of any length and configuration, also the directional bilateral LTZ current-limit protective device and the semiconductor-type PRV time-delay relay, both almost ready for production. Table 1.

USSR

UDC 621.317.32

DETERMINATION OF THE CONTACT VOLTAGE DURING GROUNDING THROUGH A LIVE BODY WITH SHIELDING BETWEEN MAN'S FEET TAKEN INTO ACCOUNT

Minsk IZV. VUZ: ENERGETIKA in Russian No 2, Feb 78 pp 132-134 manuscript received 3 Dec 76

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[Abstract] The conventional expression for the contact voltage during grounding through a live body

$$V_c = \frac{R_b}{R_b + 0.5R_1}$$

with E_c denoting the contact emf, R_b denoting the resistance of a man's body, and R_1 denoting the resistance of an insulating layer under one foot, must be corrected to as to account for the shielding between feet and read

$$V_c = \frac{R_b}{R_b + 0.5(1+c)R_1}$$

The coefficient here is the ratio of mutual impedance to self-impedance of the feet, it can be determined with the aid of a measuring circuit which simulates each foot grounded separately and then both grounded in parallel. The paper was recommended by the Department of Work Conservation and Production Instruction of the Azov and Black Seas Institute of Agricultural Mechanization. Figures 2; reference 1 (Russian).

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PROTECTION OF SEMICONDUCTOR DEVICES AGAINST ATMOSPHERIC OVERVOLTAGES

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[Abstract] Several circuits have been designed for the protection of small transistor and diode devices along communication and relay lines against overvoltages due to lightning, directly or as a result of indirect discharge pulses. In some regions where thunderstorms occur at high frequencies and the amplitude of overvoltage on a 100-km long line may reach 5000 V, 130

times a year or 1000 V, 1000 times a year. The simplest protective circuits consist of two dischargers, a pulse transformer, and the ground. In the transformer secondary voltage limiting diode pairs are installed back-to-back, in series or in parallel, or single diodes with other elements, or diode bridges. For special applications these circuits become more intricate; more than one stage is sometimes necessary. The effectiveness of such protective circuits is tested with pulse generators and pulse shaping devices. Figures 6.

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