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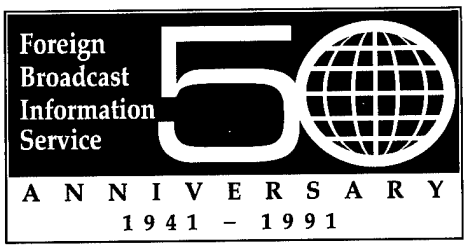

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Science & Technology

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JPRS-UEE-91-008 24 October 1991

CONTENTS

Broadcasting, Consumer Electronics

Circuits, Systems

Transportation

Power Engineering

Industrial Applications

Quantum Electronics, Electro-Optics

Architectural Lighting Design Concept of Shopping Building Interiors

917K0330A Moscow SVETOTEKHNIKA in Russian No 5, May 91 pp 1-5

[Article by N. V. Obolenskiy, Yu. R. Yaremchuk, Moscow Architectural Institute and Lvov Polytechnic Institute]

UDC 628.974.001.63

[Abstract] The following architectural lighting design principles are formulated on the basis of analyzing the architectural tasks involved in artificial lighting and its real technical capabilities: selection of the architectural lighting boundaries; differentiated approach to architectural lighting; and transformation of the architectural interior environment. For the purpose of this study, architectural lighting is defined as illumination which ensures comprehensive solution to functional and artistic problems in accordance with the composition concept. These principles are considered using the example of artificial lighting of shopping rooms. The requirements imposed on lighting installations for shopping rooms are formulated and two main ways of lighting design which ensure the transformation and variability of the interior'a architectural ambience are suggested: functional equivalence and localized arrangement and redundancy; and developing a variable lighting structure on the basis of partial substitution of lighting installation components and lighting fixture mobility. It is shown that implementation of these principles makes it possible effectively to utilize light as a means of shaping the architectural composition of the interior and may become a factor in increasing the total comfort and visibility of the illumination ambience in modern shopping rooms. Figures 3.

Luminance Characteristic Simulation of Lamp Filament in Optical Systems With Directionally Diffuse Reflection and Transmission

917K0330B Moscow SVETOTEKHNIKA in Russian No 5, May 91 pp 8-10

[Article by M. F. Smolyanskiy, Red Line Moscow Joint Venture, Lvov]

UDC 628.931

[Abstract] The role of specular reflectance (KZO) and directive transmittance (KNP) of optical surfaces as well as the angular dimensions of the cone into which the scattering ellipsoid is inscribed on their quality is discussed as it applies to manufacturing errors of automobile headlight lamps (LF), especially the issue of controlling the stability of the lamps' specular reflectance and directive transmittance. To this end, a design is used where the sealbeam lights have a controllable light beam and two filaments (TN) and the correlation between the maximum values of luminous intensity of both of the lamp's luminous elements is investigated, making it possible to examine the specular reflectance and directive transmittance stability during a rather long time span. In so doing, the luminance distribution of an equivalent luminous body (ST) is approximated by linear relations while the adequacy of the resulting model is checked by the constancy of the luminous intensity which, in turn, is ensured by introducing the quantity of equivalent luminous body luminance for a given reflector area. The light distribution problem is solved on a computer (EVM). In the case of helical filaments (SST) described by a spatial helix, the method of simulating it by a series of "embedded" helices with a gradually increasing filament diameter and decreasing luminance is more efficient. As a result, an algorithm and program are developed for identifying the specified luminance characteristics of luminous body elements whereby the luminous body itself may consist of cylindrical elements or SST elements. These characteristics are then used in designing luminous parameters of headlights as well as determining the luminous characteristics of mono- and bihelical luminous bodies some of whose segments have unequal pitch. References 5; figures 5.

Unified Series of Outdoor Lighting Fixtures

917K0330C Moscow SVETOTEKHNIKA in Russian No 5, May 91 pp 11-12

[Article by V. V. Kuznetsov, T. V. Sergeyeva, Likhoslavl Lighting Fixtures Plant and All-Union Lighting Engineering Institute imeni S. I. Vavilov]

UDC 628.971:621.32

[Abstract] Efficient utilization of electric power for outdoor lighting is examined in the light of the uneasy fuel-energy balance and ecological problems facing the country. The design of a new series of outdoor lighting fixtures ZhKU12-70 and ZhKU12-100 developed by the Likhoslavl plant and the optical system for these fixtures developed by the Lighting Engineering Institute is reported. The new efficient DNaT70 and DNaT100 lamps are used as the light sources. The type and principal specifications of the new lighting fixtures which have an efficiency of at least 65 percent and a utilization factor of at least 0.32 are cited. The luminous intensity of ZhKU12-100-002 lighting fixtures at various angular positions in two perpendicular planes is also cited in a table. Large-scale commercial production of the lighting fixtures has began at the Likhoslavl plant; the annual savings from using one fixture are 12 rubles. Figures 3; tables 2.

Light Sources for TV Stage Lighting: Status and Development Outlook

917K0330D Moscow SVETOTEKHNIKA in Russian No 5, May 91 pp 14-17

[Article by V. M. Doganovskaya, Television Engineering Center]

UDC [628.973.3:688.742.5]628.94

[Abstract] The importance of good light sources illuminating the stage in TV studios as well as on location

outdoor for obtaining a good TV picture quality and special requirements imposed on these light sources (IS) by the existing TV technology are discussed. In particular, the radiation color temperature at a rated voltage must be constant during the lifetime of the light source and remain within 3,200+/-500K or 6,000+/-500K while the emission spectrum must be as close as possible to continuous and encompass the entire visible spectrum, ideally approaching daylight spectrum. It is shown that to a certain extent, incandescent lamps (LN) meet these requirements. Two types of incandescent lamps used for TV studio stage lighting, gas-filled (KPZh) and halogen (GLN), and their design, specifications, and operating conditions are described. Special attention is focused on metal halogen lamps (MGL) and their use and principal characteristics; the shortcomings of metal halogen lamps are enumerated and principal trends of improving them are outlined. References 6; figures 4; tables 2.

Floppy Discs

917K0324A Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 91 pp 11-16

[Article by Yu. A. Vasilevskiy, Gosniikhimfotoproyekt]

UDC 681.327.634

[Abstract] Continued from *Tekhnika kino i televideniya* No. 1, 1991. Several types of floppy discs (GMD) are summarized and two of them, the 5.25 inch GMD-130 and 3.5 inch GMD-89, are considered in greater detail. The exploded view of the GMD-130 is presented and specifications of its components are cited; the main components of the GMD-89 are described. The principal characteristics of single- and double-sided floppy discs for all types of PC's (PEVM) are summarized. Characteristics of various specific types of GMD-130 and GMD-89 floppy discs are compared and their designations are explained. The difference in the marking of domestic (metric) and foreign (English) 5.25 inch GMD-130 floppy discs is noted. References 1; figures 7; tables 2.

Cable and Satellite Television: What Can Our Science Offer?

917K0324B Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 91 pp 27-35

[Article by A. P. Barsukov, A. P. Tkachenko, A. V. Ivanov, V. M. Signalov, G. V. Levko, R. A. Krasnoshchekov, V. A. Belyy, S. A. Ablov, G. A. Poliyevskiy, V. I. Kirillov, V. A. Bykhovskiy, I. K. Anufriyev, P. N. Gisich, D. D. Sudravskiy, A. I. Shabunin, M. G. Lokshin, A. S. Makunin, E. V. Atkin, Yu. A. Volkov, Yu. N. Mishin, A. P. Sazonov, I. I. Ilyushchenko, A. M. Kachkov, A. V. Samarin, V. I. Grigos, A. A. Shpileva, N. A. Ter-Ovanesov, L. N. Vagin, A. V. Sadchikhin, A. M. Trufanov, V. N. Katsap, Yu. A. Dusavitskiy, G. K. Lavrenchenko, V. N. Ulasyuk, V. V. Tsygankov, A. G. Smirnov, A. B. Usenok, V. A. Vysotskiy, I. M. Chertok, V. D. Kabeshev, V. V. Serikov, A. P. Tkachenko, N. V. Tarchenko, V. I. Levitin, K. I. Rabinovich, A. M. Temnov, I. N. Dutyshev, I. Levitin, F. G. Abramov, A. K. Kozlov, V. V. Lyakh, O. L. Mikhaylov, G. F. Degtyarev, S. N. Popov, N. S. Limanskiy, L. F. Nekrasov]

UDC 621.379.743

[Abstract] A continuation of a discussion by a group of scientists from various scientific, academic, and production organizations of the use of fiber optic transmission systems (VOSP) in television (TV) signal distribution systems, use of digital frame alignment devices for correcting the distortions of signals reproduced by VHS videotape recorders, characteristic features of digital TV signal processors, channel distribution in cable TV networks (SKTV), the outlook for producing TV signal gain control devices, data collection and transmission over switched telephone networks, fiber optic transmission line distribution and trunk network, videoconferencing signal transmission systems, high-definition TV equipment (TVCh), broadcast TV parameter optimization, consumer video electronics development trends, microelectronic photoelectric amplifiers, high-speed hybrid film IC video amplifiers, utilization efficiency of satellite repeater channels, liquid crystal display (ZhKE) modules for color TV sets, public use TV screens on the basis of liquid crystal displays, liquid photolayer light modulators, projection laser systems, etc. The proceedings of an HDTV conference held in Dusseldorf in May 1990 and its recommendations are discussed. The need to coordinate scientific and engineering programs in the field of television and solve the problem of commercial production of TV equipment is identified. The publication of "Who's Who" by *Tekhnika kino i televideniya* in the near future is announced. Tables 9.

Consumer Videocassette Quality. Number of Video Signal Dropouts

917K0324C Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 91 pp 36-38

[Article by Ya.A. Abrukin, Moscow Movie Duplication Studio]

UDC 621.379.452

[Abstract] The need to develop a system of parameters for assessing the image quality as well as methods of video quality monitoring is identified in the light of the large-scale production of consumer videocassettes, both blank and recorded. The number of dropouts is one of the most important parameters determining the image quality. The dropout is defined as a tenfold decrease (20 dB) in the frequency-modulated signal level being read by the VCR head corresponding to the 100 percent white signal lasting more than 15 μs. Videotape defects of various dimensions and their effect on the image quality and the number of dropouts are discussed. The dropout distribution curves of various types of VCR's and videotapes plotted experimentally and theoretically are

cited. An analysis of experimental and theoretical data shows that the presence of random FM signal variations leads to an image quality degradation while the mean number of signal dropouts and the maximum number of dropouts without a one-to-one correspondence are expedient for characterizing the videocassette quality; a large number of measurements must be used to assess the minimum and maximum number of dropouts (150-250). The second parameter characterizing the tape quality is the color signal noise level. It is shown that the videocassette quality is also determined by the degree of increase in the number of video signal dropouts in the tape's initial and final segments. Figures 4; tables 1.

Promising Trend in Closed Circuit TV System Improvement

917K0324D Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 4, Apr 91 pp 41-43

[Article by Z. P. Luneva, Moscow Television Science Research Institute]

UDC 621.397.13+621.397.7

[Abstract] The use of closed circuit television systems for monitoring various processes and reading instrument dials far removed from the operator as well as medical diagnostics is summarized and the shortcomings of the metal cables usually used in such systems for transmitting the signals, particularly their high attenuation (30 dB/km) and vulnerability to background noise which, in turn, calls for using equalizers, are considered. A promising trend in the development of closed circuit TV systems, the use of fiber optic cables, which will make it possible further to improve such systems and adapt them to other applications is described. The advantages of fiber optic communication lines (SLS), such as broadband transmission, low attenuation, noise immunity, charge isolation, small dimensions and mass, etc., are examined. Various types of specific fiber optic line designs and signal modulation and multiplexing methods in dedicated TV systems are described. It is shown that the spectral multiplexing method makes it possible considerably to increase the volume of TV data transmitted without increasing fiber optic cable outlays. References 6: 4 Russian, 2 Western; figures 3.

Amateur Radio Operators Are Conquering Space

917K0338A Moscow RADIO in Russian No 4, Apr 91 pp 4

[Article by editors]

[Abstract] The involvement of Soviet ham radio operators in the space program from its very inception, and especially since the launching of the first U.S. ham radio satellite (ISZ), is summarized and the launch of the Kosmos-2123 satellite which deployed a Radio-M satellite (originally scheduled for deployment in 1990) with the on-board radio-television complex BRTK-10 is reported. The BRTK-10 complex (described in detail in *Radio* No. 10, 1987, pp. 5-8) was developed by the Public Space Technology Lab at the State Space Exploration History Museum imeni K.E. Tsiolkovskiy in Kaluga. The BRTK-10 system which has been in operation since 1987 has the RS10 and RS11 call letters. The new systems operate alternately and relay signals in the same mode as before; their call letters are RS12 and RS13 but their operating frequencies are different; the BRTK-10 is equipped with a Robot transponder. The satellite is in a circular near-polar orbit at a 1,001 km altitude with an 83° inclination and a 105 min orbital period; its maximum line-of-sight reception duration is 17 min. Operating frequencies are listed. References 1; tables 1.

How to Apply for License

917K0338B Moscow RADIO in Russian No 4, Apr 91 pp 8-9

[Article by V. B. Gromov, Moscow]

[Abstract] The new right to own and operate personal two-way radios which was recently granted to the Soviet people without much fanfare is expounded and an example of the license to operate a portable two-way radio issued by the USSR Telecommunication Ministry's State Telecommunications Inspection Administration (GIE) is cited for illustration. The license to operate in the 27 MHz band can be obtained within 24 h and is valid for a year. The license costs 18.13 rubles. It is issued for specific types of equipment and indicates the equipment serial numbers and operating frequencies as well as the dates of purchase. The procedure for applying and the GIE office address are described. The license also covers citizens band (CB) radio and can be temporarily transferred to other persons. Figures 1.

Reception and Dissemination of Foreign Television Programs

917K0338C Moscow RADIO in Russian No 4, Apr 91 pp 15

[Article by editors]

[Abstract] Frequency bands and signal levels pursuant to the "Radio communications regulations" for television (TV) program transmission specified in the "Principal technical parameters of satellite earth stations" (Appendix 1 of World Regulations) are summarized. The parameters of video and TV audio signals on the receiver output and characteristics of the antenna design are presented. Procedures for applying for permit to install a

rooftop antenna stipulated by the USSR State Construction Administration are outlined. The problems affecting local cable TV systems are addressed. The 16 channels allocated in the 110-174 and 230-294 MHz bands or reception of additional TV programs by fifth-generation receivers (which must be complemented with a special tuner currently under development) are listed. References 1; tables 1.

Modular Personal Receiver Set

917K0338D Moscow RADIO in Russian No 4, Apr 91 pp 40-44

[Article by S. Sotnikov, Moscow]

[Abstract] Continued from *Radio* Nos. 11, 12, 1990 and Nos. 1, 2, 1991. The microwave (SVCh) converter of the modular personal TV set for receiving satellite TV programs in the 11 and 12 GHz band using sections of standard rectangular waveguides with shorting plungers and trimmers and its components such as transistors and mixers are described and the operation of specific components is explained. The development of low-noise amplifier (MShU) modules designed by the author in 1990 with a noise factor of 2.5 and 4 dB for use in the converter is reported; it is expected that these amplifiers' noise factor will improve and their cost will decrease with improvements in solid state circuitry and microwave microassemblies. The converter can operate with any commercial or custom-made tuner with any value of first intermediate frequency (PCh). The development of a special plug-in adapter executed on a single commercial microchip which turns any tuner into a tracking receiver is also reported. To be continued. References 3; figures 3.

New Commercial SECAM-PAL Decoders

917K0338E Moscow RADIO in Russian No 4, Apr 91 pp 45-49

[Article by L. Kevesh, A. Peskin]

[Abstract] Continued from *Radio* No. 3, 1991. The circuit diagram of the MTs-402 decoder capable of operating in both the SECAM and PAL standards and oscillograms of its characteristic points are presented and the composite color videosignal (PTsTV) path in the module is traced. It is shown that the band elimination circuit tuning in the SECAM mode changes from line to line so as to suppress more efficiently the chrominance subcarriers in the luminance signal; in the PAL mode, the band elimination circuit is tuned to the 4.43 MHz subcarrier. The circuit design and principal specifications of the PL-402 picture tube are cited and the operation of video amplifiers is described. They amplify the R, G, and B primary colors to a 75 V peak-to-peak amplitude. The oscillator is based on a crystal resonator which generates doubled 8.8672375 MHz frequency. To be continued. References 1; figures 6; tables 1.

Acoustic Design of Speaker

917K0338F Moscow RADIO in Russian No 4, Apr 91 pp 50-52

[Article by S. Gurin, Ryazan]

[Abstract] The issue of designing acoustic systems (AS) of high-fidelity sound equipment with a wide frequency band and low nonlinear distortions is addressed and it is shown that in today's acoustic systems, the greatest distortions are observed in the lower audio frequency range (20-200 Hz) due to imperfections of woofers heads operating near the resonance frequency of the cone suspension system. The author attempted to improve the parameters of the low-frequency section of a stereo audio system with three speakers: one common subwoofer reproducing the 20-200 Hz band and two midrange/tweeters reproducing the 200-20,000 band. The author used the twinned head design and encased it in a spherical box in order to eliminate the additional internal resonance between parallel box walls. It is suggested that a box shaped as an oblong ellipsoid of revolution can also be used to achieve a phase inverter acoustic design. The specifications and performance characteristics of the speaker and its scalar impedance curve are cited. The speakers are made from gauze wound around inflatable balloons and impregnated with the BF-2 glue after which the balloons are removed. The speaker assembly procedure is described. According to subjective estimates, the speaker has a more clear sound than conventional speakers. References 5; figures 4.

Slow Radio Signal Fluctuations in High-Altitude Tropospheric Paths

917K0341A Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 641-647

[Article by D. D. Darizhapov, G. S. Zhamsuyeva, D. Z. Tsydypov, N. B. Chimitdorzhiyev]

UDC 621.371.333.4

[Abstract] The results of experimental studies of the radio signal's fluctuation characteristics during various seasons conducted in two over-the-horizon parts located in the northern polar region with a common reception station in the town of Tiksi are presented; the experiments were carried out in the framework of studies of long-range troposcatter propagation (DTR) of UHF radio waves (UKV). In particular, the daily and seasonal slow signal level fading was examined. The seasonal variation of averaged signal components over the OTH continental polar tropospheric path revealed two maxima, one in the summer and one in the winter, and two minima, one in the spring and one in the fall. It is established that in the long-range troposcatter path in the coastal zone, seasonal variations of the signal attenuation factor median are characterized by a single maximum in the winter and a single minimum in the summer and fall. A winter-time UHF propagation anomaly manifested by a high signal level was identified. References 6; figures 3; tables 2.

On Complex Waves in Flaky Shielded Waveguides

917K0341B Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 652-658

[Article by A. S. Kogtev, S. B. Rayevskiy]

UDC 621.372.8.01

[Abstract] An attempt is made to describe the general pattern of wave dispersion in a circular two-layered shielded waveguide and determine the place occupied by complex waves in this waveguide's eigenmode spectrum. The analysis is performed on the basis of the results of numerical solution of the wave dispersion equation. It is speculated that the complex wave phenomenon is rather general and inherent in all electrodynamic guide structures which are described by nonself-consistent operators. The analytical results make it possible to draw the conclusion that complex waves make a significant contribution to such structures' eigenmode spectrum. It is emphasized that in formulating wave diffraction problems, degeneration of propagating and beyond-cutoff waves into complex waves in the corresponding frequency bands must be taken into account. References 12: 11 Russian, 1 Western; figures 5.

Statistical Attenuation Characteristics of Radiowaves Above 10 GHz Over Terrestrial Communication Links

917K0341C Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 689-700

[Article by Ye. Aleksandrova, V.V. Svyatogor, V.N. Pozhidayev, A. Kavetski]

UDC 621.371.3

[Abstract] The outcome of many years of experimental investigations of statistical characteristics of radiowave attenuation due to anomalies of the air's refractive index carried out over two 12.65 and 15.4 km long terrestrial paths in the vicinity of Dubna (USSR) and Warsaw, respectively, at the "Dubna-Interkosmos" International Satellite Communication Center and at the Polish National Testing Range is presented; the measurements were taken in the absence of rainfall. Measurements over the first path were taken at the 11.5, 19.3, and 29.3 GHz frequency and over the second, at the 18.6 GHz frequency. The resulting data are analyzed and compared to a theoretical calculation of these statistical relations. The causes of attenuation are physically interpreted and compared to analytical models. It shown that at frequencies above 10 GHz even over rather short paths, considerable attenuation is due to atmospheric refractive index irregularities. Compared to attenuation in the rainfall, their statistical weight is significant and must be taken into account in microwave communication link design. In addition to obtaining hitherto unavailable shielding-type attenuation data, the experiments revealed that the frequency dependence of multipath fading is nonmonotonic. References 8: 4 Russian, 4 Western; figures 11.

Detection of Known Signal Through Atmospheric Noise

917K0341D Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 722-729

[Article by D. S. Dobryak, Ye. A. Vershilin]

UDC 621.371.32

[Abstract] Optimal detection of a known signal against the background of atmospheric noise (ARP) in a model where the natural electromagnetic field strength (i.e., atmospheric noise) at superlow frequencies (SNCh) has the same statistical properties as a random process is considered. The model makes it possible to represent the optimal procedure of signal detection through atmospheric noise and is more convenient than the one suggested earlier by Khadzhi and the authors. The calculation produced an algorithm of optimal known signal detection through atmospheric noise which is represented as nonlinearly processed normal noise allowing

for the statistical relation between the samples. Asymptotically optimal and suboptimal weak signal detection algorithms are also examined. Analytical formulae are derived for estimating the signal/noise ratio (s/sh) on the output of nonlinear receivers under study and it is shown that a correlation detector with a limiter on the input is close to optimal from the signal/noise ratio viewpoint. It is emphasized that the legitimacy of using the atmospheric noise model in the very low frequency band (3-30 kHz) is experimentally corroborated by this study, i.e., its results are applicable in this frequency band too. References 5; figures 5.

Electron Current Density Analysis of X-ray Tube Target

917K0341E Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 778-784

[Article by I. M. Korzhenevich, A. A. Abgaryan, G.V. Kolesov, V. F. Romanovskiy, N. R. Tushev]

UDC 537.533.3

[Abstract] The relationship between the X-ray tube's service life and other performance characteristics and the operating conditions on the target whose surface may be heated to temperatures above 2,000°C is discussed and the importance of uniform distribution of the bombarding electron beam on the anticathode's working area surface is stressed. The stringent requirements imposed on the X-ray tube's electron-optical system (EOS) design are outlined. A method is suggested for calculating the electron current density in the X-ray-tube's transverse cross section, particularly in the target plane, allowing for aberrations, i.e., distortions; the method is an extension of the paraxial method of analyzing the current density outside the image plane of a time analyzing image converter. The problem is solved in a single-velocity approximation and allowing for the electrons' initial thermal velocities. A numerical analysis of one X-ray design is cited for illustration, showing the absence of the requisite current distribution uniformity on the target surface. It is stressed that the computational algorithms derived in the analysis are suitable only for X-ray tubes for which the paraxial approximation is not valid. References 6; figures 2; tables 2.

Characteristics of Electron Emission From Vacuum Tube Electrodes

917K0341F Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 4, Apr 91 pp 784-788

[Article by V. V. Blagorodnyy]

UDC 537.533.3

[Abstract] Prebreakdown phenomena are examined in situations which were not considered by the author in *Radiotekhnika i elektronika* Vol. 34 No. 8, 1989, p. 1723. To this end, the prebreakdown current in the case where the vacuum gap's voltage-current characteristic (VAKh) is represented by a straight line in the coordinates of Fowler-Nordheim and Richardson-Schottky equations is treated as current limited by the space charge in the emitting metal-insulator-metal structures located on the surface of the gap's negative electrode. The requirements imposed on the shape of the voltage-current curve for which this approach is valid are specified. The effect of heating on the prebreakdown current is analyzed and recommendation for reducing it are given. It is shown that by heating vacuum tubes (EVP) at an 873K temperature for 15 to 20 min as well as activating the cathode and electronically degassing the electrodes one can lower prebreakdown currents; this may be of interest to vacuum tube manufacturers. References 10: 8 Russian, 2 Western; figures 3; tables 1.

Miniature 360-Degree Microwave Phase-Shifters

917K0323A Moscow RADIOTEKHNIKA in Russian No 4, Apr 91 pp 33-35

[Article by V. I. Gvozdev, Ye. V. Makarova]

[Abstract] A variety of 360-degree microwave phase-shifter designs are proposed and analyzed together with symmetrical and asymmetrical slotted transmission line configurations. Relations are derived on the basis of a theoretical analysis for establishing the phase-shifter topologies and for varactor diode selection. The phase-shifter designs based on a combination of symmetrical and asymmetrical transmission lines have excellent size and weight characteristics, are simple to tune and manufacture and have improved linearity of the phase control characteristic. Block diagrams of the phase-shifter designs are provided together with equivalent circuits and coefficients for calculation of phase loop lengths and diode properties.

Synthesis of a Systolic Computer for Implementation of a Spatial Signal Processing Algorithm

917K0323B Moscow RADIOTEKHNIKA in Russian No 4, Apr 91 pp 40-42

[Article by Ye. I. Glushankov, A. N. Kolesnikov]

[Abstract] A systolic computer is synthesized for direct spatial signal processing applications. The computer is employed for solving a system of linear algebraic equations in adaptive antenna arrays with Toeplits correlation matrices. The systolic processor designs comprising this computer are fabricated from identical processor elements of simple structure with homogeneous local links operating in parallel. Data passes through the resulting systolic computer in a pipeline route, thereby generating the final result as the pipeline is loaded and dumped. The computer can find applications to fast signal processing systems.

Analysis of Multichannel Digital Filtering Methods in Broadband Radio Receivers

917K0323C Moscow RADIOTEKHNIKA in Russian No 4, Apr 91 pp 47-51

[Article by Ye. S. Poberezhskiy, S. A. Dolin]

[Abstract] Methods of implementing an array of complex digital filters that minimizes the number of multiplications for given array characteristics are analyzed and compared. Three promising nonrecursive digital filter arrays are proposed and examined. One is a pyramid array of comb-type equiband nonrecursive digital filters while the other two designs are modifications of the pyramid design employing stepwise decimation. Analysis of these designs suggests that it is possible to substantially reduce the number of multiplications by direct implementation of the array of complex nonrecursive digital filters.

Determination of Fragment Characteristics in Radar Image Processing

917K0323D Moscow RADIOTEKHNIKA in Russian No 4, Apr 91 pp 55-56

[Article by A. A. Belokurov]

[Abstract] A radar image processing technique based on detection of object boundaries in an image field with different properties is examined. This technique is based on a two-sample approach where the radar image field is represented as a set of bounded, locally-homogeneous sections with the decision rule based on a comparison of the statistical properties of the two samples from field sections. The approach to spatial processing of radar images provides invariance of the detection routines to the orientation of object boundaries and can be used for appropriate selection of fragments used in radar image processing and to assess the capabilities of the proposed detection algorithms.

Multichannel IR-Radiometer with p-n-Junction Modulator

917K0323E Moscow RADIOTEKHNIKA in Russian No 4, Apr 91 pp 73-76

[Article by Ye. S. Avdoshin]

[Abstract] An IR-radiometer design employing silver-halide optical fibers and semiconductor modulators with gallium arsenide p-n-junction modulators is described. The radiometer is a four channel design employing two-layer optical fibers to recover radiation from the target on three channels and a fourth reference channel that detects radiation from a laser source. This design employs amplitude modulation of the IR-radiation based on absorption of radiation by the charge carriers in the gallium arsenide junctions. Block diagrams of the radiometer are provided together with a cross-sectional view of the p-n-junction and its temperature and wavelength characteristics.

Iterative Optimization of Antenna Array Excitation and Spatial Signal Processing at Elevated Scanning Rate

927K0005A Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 3-7

[Article by A. D. Pluzhnikov, S. M. Kashayev]

UDC 621.396.677.494:621.391.24

[Abstract] Radar scanning in the angular coordinate for the purpose of spatial discrimination of returns from the same direction but from targets at a varying range, particularly spatial weak legitimate signal discrimination against the background of passive clutter (PP) from proximate local objects and underlying surface under rapid scanning conditions is addressed. Antenna array (AR) excitation and spatial signal processing are optimized for target detection through passive interferences. It is shown that such optimization makes it possible to obtain an additional signal/noise ratio gain compared to optimization only of the signal processing at a specified array excitation ignoring the interference environment. The results obtained for CW conditions demonstrate that the gain from the joint (simultaneous) optimization combined with weight processing of the detected signals increases with the scanning rate and reaches 15 dB. Figures 2; references 6.

Pseudonest Algorithms of Two-Dimensional Digital Signal Transforms

927K0005B Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 8-12

[Article by Yu. I. Gagarin]

UDC 510.725

[Abstract] Fast two-dimensional discrete orthogonal transforms used for processing images and other two-dimensional signals and their characteristic features, especially the discrete Fourier (DPF) and Hartley (DPKh) transforms, are analyzed. An examination of these types of fast transforms is extended to two-dimensional digital signals. In particular, the so-called pseudonest algorithms which correspond most closely to the specific features of digital image processing are proposed. To this end, a general matrix-vector notation of the one-dimensional transform in terms of odd-periodic functions is defined. It is shown that compared to known algorithms, for the Fourier transform the resulting algorithms are the lest complicated. It is also noted that although the number of nontrivial multiplications in pseudonest fast Fourier transforms (BPF) is

higher than in Nussbaumer-Quendell permutational algorithms, the former have considerably fewer additions, making these algorithms convenient for use in real time FFT realization. Tables 1; references 5.

Internal Injection Laser Modulation in Fiber Optic Microwave Signal Distribution Channel

927K0005C Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 12-18

[Article by A. N. Bratchikov, I. P. Glukhov, V. D. Kurnosov]

UDC 621.395.677.3

[Abstract] Microwave (SVCh) and EHF (KVCh) signal distribution among phased antenna array (FAR) modules with the help of fiber optic channels with the help of injection lasers (IL) and direct and interference photodetection (IFD) is addressed. The output radiation spectrum of an injection laser with an external mesastrip resonator given a harmonic pump current modulation is numerically analyzed and the sensitivity of a given type of injection lasers to amplitude and frequency modulation as well as the phase shift between the spectrum AM and FM components at the same frequency is determined; moreover, the relationship between these two injection laser parameters and modulation mode parameters, i.e., the amplitude and direct component of the pump current, is established. Based on this analysis, laser operation conditions are optimized by the criterion of maximum radio signal power at the modulation frequency or its harmonics. Optimal internal injection laser modulation conditions are realized experimentally for a single-mode injection laser with a passive resonator for microwave signal distribution channels with direct and quasiheterodyne interference photodetection. Figures 4; tables 2; references: 8 Western.

Description of Unpremeditated Interference Correlation Properties in Synchronous Cellular Communication Systems

927K0005D Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 19-24

[Article by V. G. Khromykh, V. V. Fertikov]

UDC 621.396.49:621.396.931

[Abstract] High-capacity cellular mobile communication systems using the principle of coded division multiplexing, i.e., channel synchronizing, and a method making it possible to estimate the electromagnetic compatibility (EMS) of synchronous cellular systems are addressed. An attempt is made to describe deterministically the system of signals formed as a result of coded division multiplexing and their numerous correlation properties. In contrast to known statistical method, the approach produces deterministic expressions which are necessary, e.g., for optimizing code systems and especially in synthesizing antenna radiation patterns (DN) which determine spatial signal discrimination. The territory is simulated by a circle divided into a certain number of hexagonal cells of equal size interacting and interfering with each other. To estimate the degree of mutual interference in the system, a cross-correlation function (VKF) method is used. It is noted that the proposed method of describing the time structure and correlation properties of unpremeditated interference in ground cellular communication systems is applicable not only in the case of synchronous operation but also for describing asynchronous systems, e.g., with traditional frequency division multiplexing. Ignoring mutual interferences of frequency channels in this case, the interference environment changes little from one cell location to another, so the method is also applicable for analyzing the noise immunity of mobile stations, i.e., estimating the EMC of all system facilities. Figures 2; references 4.

Analysis of Geometric-Optical Reflector Antenna Fields on Aperture Grids With Given Structure

927K0005E Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 33-38

[Article by M. D. Sazonov]

UDC 621.396.677

[Abstract] The task of analyzing far electromagnetic fields (EMP) of reflector antennae (ZA) by the aperture method by dividing the problem into internal and external ones, solving the former by means of the geometrical optics (GO) methods which produce the amplitude-phase distribution (AFR) of tangential electromagnetic field components of the feed reflected by the antenna reflector in the aperture plane, and computing the radiation integral (II) of this amplitude-phase distribution is summarized. The shortcomings of numerical realization of the aperture method of calculating the reflector antenna's electromagnetic field on the computer (EVM) are addressed. An efficient procedure of calculating geometrical-optics fields of reflector antennae on aperture grids of an arbitrary structure is proposed; the method makes it possible to eliminate from the antenna radiation field computation program the intermediate steps related to grid transformations of two-dimensional arrays. The algorithm's realization as a microcomputer program is used to calculate a rectangular grid of aperture field samples of parabolic and spherical antennae with an external horn feed. The program was written in the MS-Fortran-77 language for an IBM PC XT computer with an Intel 8087 math coprocessor. Figures 1; references 6: 2 Russian; 4 Western.

Driving Submerged Insulated Dipole by Pulsed Electromagnetic Field

927K0005F Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 38-41

[Article by V. I. Yevdokimov, O. V. Popov, B. V. Sosunov]

UDC 621.396.674.3

[Abstract] The issue of driving antenna devices immersed in various lossy media by a monochromatic electromagnetic field and analyzing transient wave processes near the interface is addressed. To this end, the problem of an electromagnetic pulse (EMI) with a Gaussian (bell) shape incident upon the interface of two media, e.g., air and ground, is considered. The method and algorithm of solving the problem of exciting a submerged insulated dipole by a pulsed electromagnetic field are analyzed and the results of calculations of the current behavior in the domain of time in this dipole's load located in a conducting half-space are presented. The calculations make it possible to estimate the current and voltage generated in the insulated balanced dipole (SV) when the interface is fed by a pulsed electromagnetic field and, as a result, evaluate the immunity of radio electronic facilities to the effect of high-power electromagnetic interference. Figures 4; references 5.

Power Spectrum of Echo Signal From Nonuniform Surface

927K0005G Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 63-66

[Article by V. A. Vishnyakov]

UDC 537.874.4:621.395.96 (024)

[Abstract] Mathematical models of remote sensing spectra where the echo signal is reflected by a nonuniform surface are considered. In particular, the power spectrum of an echo signal from an interface of two surface with different reflectance properties, e.g., land and sea, is examined in order to estimate Doppler shift measurement errors. The signal spectrum under study is nonsteady due to the signal modulation and reflecting surface anisotropy. A particular case where the signal modulation period is considerably smaller than the measurement interval of Doppler frequencies and the time it takes the radar to scan the probed area, whereby all legitimate frequency information is contained in the spectrum band averaged over the modulation period whose instability is determined only by the reflecting surface nonuniformity, is considered. It is shown that the echo signal power spectrum shape depends on the modulation law and the spectrum of the nonmodulated echo signal, thus reducing the problem to analyzing the latter spectrum. The analysis demonstrates that the spectrum shape depends on the mutual position of the antenna radiation pattern (DN) axis, velocity vector, and interface. The conditions under which the spectrum is especially skewed and symmetric are determined. Figures 2; references 2.

Correlation Signal Analysis in Acoustooptic Spectrometer

927K0005H Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 66-68

[Article by Yu. S. Dmitriyev]

UDC 621.391.1::535

[Abstract] Measurement of small (compared to the time delay carrier period) radio signals with the help of a two-channel acoustooptic interference spectrometer-phase meter whereby the measured delay range does not exceed the carrier period is discussed. It is shown that if the delay range exceeds the carrier period, the measurement will be accurate within an integral number of these periods. It is also shown that although this ambiguity can be resolved by using an additional signal correlator, this is not mandatory since the fringe pattern of the spectrometer-phase meter itself contains all the information needed for calculating the signals' cross-correlation function. The calculation algorithm is based on the spectral representation of the cross-correlation function. A comparison of the algorithm to known acoustooptic correlation analysis methods demonstrates that it is not inferior to them and is free of the additional terms in the output signal which depend on the processed signal levels and must be eliminated by a computer. Figures 1; references 4: 2 Russian, 2 Western.

Investigation of Polymer Composite Material-Based Dielectric Waveguides

927K0005I Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 74-76

[Article by S. V. Koshevaya, A. Yu. Kotomchak, M. V. Kononov, N. I. Litsov, G. Ye. Sokolov, V. B. Yakovlev]

UDC 621.317.335.3

[Abstract] The search for new dielectric waveguide (DV) materials prompted by the increasing use of the EHF (KVCh) band and the shortcomings of traditional nonpolar polymers, ceramics, ferrites, and high-resistance semiconductors are summarized. Polymer composite materials (PKM) which lend themselves to large-scale manufacturing and make it possible to produce dielectric waveguides by the die forging method are examined in order to obtain optimal dielectric waveguide parameters. Polyethylene - a nonpolar polymer - and finely dispersed thermostable filler were used as the ingredients of the polymer composite material which was made by mixing the filler with molten polymer at a

430K temperature thus producing a dielectrically uniform heterogeneous structure. The results of an experimental investigation of a dielectric waveguide on the basis of a polymer composite material at a 140 GHz frequency are presented. The study shows that the dielectric waveguide on the basis of a polymer composite material meets all requirements imposed on electrodynamic microwave (SVCh) elements and can be used successfully for making EHF band integrated circuits, particularly detector sections, avalanche-transit time diode oscillators, and couplers. In the EHF band, the dielectric waveguide on the basis of a polymer composite material has optimal dielectric permittivity (ε=3-7) combined with relatively low losses ($tg\delta$=(4-8)x10^{-4}) and a loss per unit length of 0.15 dB/cm. Figures 1; tables 1; references 3.

Energy Analysis of Fiber Optic Microwave Transmission Link

927K0005J Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 76-79

[Article by S. Sh. Gevorkyan, I. V. Barskiy, V. I. Kuznetsov]

UDC 621.372.8

[Abstract] The increasing use of optical principles, technologies, and methods in microwave engineering is discussed. In so doing, a fiber optic link is analyzed from the viewpoint of losses and electric power expended for transmitting microwave signals. Two types of microwave transmission lines are considered - a traditional microwave waveguide and a fiber optic link - and their losses are analyzed. An injection laser is used in the latter case. A comparative analysis of the two types of lines shows that the final decision on whether to replace coaxial cables with optical fibers calls for a relative analysis of the mass and overall dimension of coaxial and fiber optic lines, their noise, and other indicators. It is shown that in the future, losses in fiber optic links could be reduced by improving the methods of splicing the optical fiber with the laser and photodiode while the use of external laser radiation modulation with the help of traveling wave modulators will make it possible to widen the operating band, master the millimeter band, and improve performance. Figures 2; references 2: 1 Russian; 1 Western.

Millimeter Band Polarization Rotary Couplings

927K0005K Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 82-84

[Article by A. A. Kostenko, S. P. Martynyuk, G. I. Khlopov]

UDC 621.372.831.3

[Abstract] The use of rotary waveguide couplings (VS) for developing antenna feed devices with mechanical beam scanning, particularly polarization rotary couplings prompted by the increasing utilization of the millimeter band is discussed. Two versions of rotary coupling design are considered: using two 90° differential phasing sections (DFS) ore one 180° differential phasing section. Both make it possible to ensure linear polarization on the output whose plane rotates by the differential phasing section swivel angle. The differences in the operation of the above two coupling designs are analyzed and it is shown that the use of a single 180° differential phasing section is preferable since such sections are not critical relative to changes in the differential phase shift. It is shown that the use of such rotary polarization couplings makes it possible to develop millimeter band devices with rather low losses and sufficient bandwidth. Figures 3; references 1.

Comparing Characteristics of Discrete Filters of Analog Signals at Unknown Frequency

927K0005L Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 85-87

[Article by R. V. Pavlov, V. A. Vishnyakov]

UDC 621.396.019.4

[Abstract] The use of microprocessor-based methods for increasing the complexity of digital signal processing procedure and improving the accuracy of the signal parameter estimation and the limits of microprocessor speed and memory volume which, in turn, limit the use of optimal real time algorithms are discussed. The characteristics of various frequency filtering algorithms and their technical realization are compared whereby the processed signal is picked from the output of the receiver analog-to-digital converter. To this end, four digital filters are compared and the results of mathematical modeling of the third- and first-order filtering frequency measurements are presented. An analysis of the models makes it possible to calculate the speed and estimate the complexity of these filters' implementation. The filtering algorithm characteristics under study may be used for selecting the type of frequency meter in various radio engineering systems. Figures 2; tables 1; references 3.

Double-Frequency Double-Diode Quasioptical Millimeter Band Generator

927K0005M Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 3, Mar 91 pp 96-98

[Article by A. I. Borodkin, B. M. Bulgakov, V. N. Skresanov, M. P. Natarov, A. I. Shubnyy]

UDC 621.382.2

[Abstract] The comparative advantages of single- and double-diode generator are discussed. It is shown that in

a number of applications, such as plasma diagnostics, heterodyne receivers, etc., it is necessary to generate several frequencies simultaneously, and that this can be achieved in mulidiode systems employing a common open cavity (OR). The results of a study of a quasioptical double-diode double-frequency generator are presented. Its design utilizes the ability of open cavities with a fixed distance between the mirrors to resonate at the frequency of base oscillations and frequencies which correspond to excitation of oscillations with field variations in the transverse direction. The relationship between these frequencies is established. The double-frequency mode was examined experimentally using an open cavity formed by two spherical mirrors with a 100 mm radius of curvature. The dependence of the double-diode generator frequency, power, and difference frequency on the distance between the mirrors in the two-frequency operation is investigated and the field distribution is analyzed. The study confirmed that quasioptical generators employing a common resonance circuit can simultaneously oscillate at two frequencies and have an increased difference frequency stability. The oscillation frequency can be fine-tuned. Figures 3; references 4: 3 Russian; 1 Western.

Improving On-Line Traffic Control by Using Computers

917K0342A Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 5, May 91 pp 16-18

[Article by D. A. Kasumov, Azeri Railroad Computer Center]

UDC 658.012.011.56:681.3

[Abstract] Computer-aided control systems (ASU) being implemented at the Azeri Railroad which include a computer-aided railroad sorting yard control system (ASUSS) and a computer-aided on-line rail traffic control system (ASOUP) are described. The role of computers in the rail shipping, and in particular the YeS1022, YeS1035, and YeS1037 installed at the computer center, double-computer SM-2M systems at the Shirvan station, SM-1800 computers at the Beyuk-Kyasik station, TAP-34 microcomputers at the Balandzhary station, etc., is discussed. Various operations which are being automated in the railroad with the help of these computers, such as monthly scheduling, loss analysis, integrated railroad waybill processing, car delay and downtime analysis, and maintenance accounts receivable and payable are described. Specific tasks of improving ASOUP and ASUSS operation at various stations are outlined. The savings from individual automation implementation measures are cited. The role of trunk, railroad, departmental, and local communication channels and switching exchanges in developing a data transmission network (SPD) in forming the hardware basis of the system is explained. It is expected that localized independent control systems will be developed and merged into an integrated control system.

Architecture of Computer-Aided Signaling, Communication, and Computer Control System (ASU TsSh): Discussion

917K0342B Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 5, May 91 pp 18-20

[Article by B. A. Makridenko, Gomel Branch of the Scientific Production Association of Railroad Automation]

UDC 658.012.11.56:681.3:656.25.071.8

[Abstract] The poor level of computer applications in the signaling and communication functions is discussed as the need to reevaluate comprehensively the range of issues involved in developing an automated system controlling the signaling, communications, and computer facilities, formulate the concept of the automated control system, analyze existing scientific developments and the experience of their implementation, consider the functional composition of the system and its hardware and software, and outline the development trends and outlook is identified. The specific functions executed by all four system layers are described in detail. It is emphasized that the TsSh computer-aided system is a complex entity which can be successfully developed only in close cooperation with division, service, and administrative staff. Implementation of the automated system will make it possible to increase the reliability, efficiency, and performance quality of computer systems, improve maintenance procedures, and upgrade the industry by extensively using up-to-date computers and data processing methods. Figures 1.

Designing Switch Radio Control System

917K0333A Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 4, Apr 91 pp 5-6

[Article by Yu. A. Odnopozov, M. M. Moldavskiy, State Transport Signal and Communication Design Institute]

UDC 656.25:625.151.6.001.2:656.254.16

[Abstract] Successful completion of tests of a pilot batch of radio control switch equipment (ARSP) conducted by the Soyuzzheldoravtomatizatsiya scientific production association is reported. The remote radio control switch system was developed by experts from the All-Union Railway Automation Science Research Institute (VNIIZhA). The design diagram of the switching system controlled by radio from locomotives by the engineer is presented and the operating procedure is outlined. The serviceability of the remote radio control switch system is checked by an electrician with the help of a portable instrument kit containing a standard portable two-way radio set and a keyer. It it expedient to implement the remote radio control switching system at a station or area where there is no scheduled traffic and maneuvers are taken at speeds below 15 km/h. The cost of the ARSP system construction three- to fourfold lower than that of the METs all-electric interlocking system. Today, improved ARSP system designs are being developed for freight trains and scheduled traffic. Figures 1.

Utilizing Functional Capabilities of RV-1 Radio Stations During Their Operation

917K0333B Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 4, Apr 91 pp 6-10

[Article by V. F. Kalinichenko, A. I. Yashin, Voronezh Design Office of USSR Railway Ministry and All-Union Railway Automation Science Research Institute]

UDC 656.254.16

[Abstract] Operating procedures involved in using the ZhRU and ZhR-3M radio stations - standard equipment of today's rolling stock - are described and their gradual

replacement with the RV-1 radio station of the "Transport" series is reported. The serviceability check procedures of the RV-1 radio stations developed for train locomotives (see *Avtomatika, telemekhanika i svyaz* No. 4, 1988 for design description) is outlined. Functionally, the RV-1 radio station represents a dedicated microcomputer which is linked to a receiver, transmitter, control panel, and other units through appropriate interfaces. The diagnostic procedures for identifying the malfunctioning units are summarized. It is shown that the use of microprocessor technology in train radio communication devices in general and the RV-1 in particular makes it possible to shorten many operations or eliminate them altogether from the train driving process which, in the end, raises labor productivity. It is stressed that radio stations manufactured on the basis of computer technology are complicated and their repairs and maintenance calls for appropriate tools and devices and a high skill level. Tables 2.

Construction of Fiber Optic Communication Lines

917K0333C Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 4, Apr 91 pp 20-23

[Article by N. S. Zablotskiy, Belorussian Railroad]

[Abstract] Implementation of fiber optic communication lines (VOLS) in railroad transport is summarized and procedures involved in laying fiber optic cable (VOK), both inside stations and between them, are outlined. Ways in which fiber optic cable is shipped by the manufacturer to users are described and cable shipping and manufacturing specifications are listed. Methods of linking office and main cable and fire safety precautions to be taken when a considerable length of line cable is laid through building are examined. The incoming control procedures and related warranty documentation are explained. The specific operations involved in laying fiber optic communication cable, from marking the conductors to digging trenches and unwinding the cable from the drum to measuring its parameters, are described and illustrated using the example of the OK-50-2-5-8 cable with the SVM central reinforcing element manufactured by the Podolsk plant. Tests of this cable revealed that it fails to meet tensile strength specifications and cannot therefore be used for laying in cable ducts. Cable wiring and splicing procedures according to existing instructions and manuals are described. Optical cable vulnerability to damage and fault location methods are analyzed. It is reported that new equipment is being assembled at the Odessakabel plant together with experts from the Nokia-Maillefer company (Finland) for manufacturing fiber optic communication cable. The new cable is reported to have good transmission characteristics.

Industry and Science: Creativity Links

917K0321A Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 3, Mar 91 pp 15-20

[Article by D. P. Marchukov, Transsvyazstroy]

UDC 656.2:001

[Abstract] The work of the Transsvyazstroy railway communication line construction trust and its predecessors in the fifty years of its operation is described and the range of projects completed by the organization, including the transition from aerial to cable communication lines, is summarized. The changing demand for specialized skills of Transsvyazstroy personnel necessitated by the scientific and technical revolution and higher standards being imposed on the product quality is addressed. The emergence of fiber optic communication lines and digital transmission systems and the related shift in professional skill emphasis is analyzed. Summing up half a century of operation in the field of science, the author stresses the importance of mutually beneficial ties developing among scientists and industrial users, especially during the transition to a market economy when a lag in the pace of scientific and technical progress is fraught with the loss of competitive edge and a loss of contracts with all the attendant negative ramifications. The need to do away with past methods of submitting inflated economic impact statements and fraudulent technical indicators and retaining only businesslike ties which are economically beneficial for both the scientists and industrial end users is identified. Figures 4.

Creative Activity of Innovators

917K0321B Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 3, Mar 91 pp 20-23

[Article by A. I. Kurilo, Transsvyazstroy]

UDC 061.6:62:656.2

[Abstract] The work and accomplishments of the construction lab of the Transsvyazstroy railway communication line construction trust since its founding in 1967 are described and its principal functions, balancing adjustment of trunk communication cables, technical assistance in the field of cable wiring and measurements, assimilation and implementation of new technologies, and staff training, are outlined. A number of instruments and methods developed by the lab is summarized, particularly a device for converting an electric breakdown fault into a line-to-line fault, a unit for monitoring the quality of contacts and conductors in sleeves, a unit for locating conductor insulation faults in the 10-70 MΩ range, an accelerated method of locating faults in plastic covers of metal-sheathed cables, and a method of taking a cycle of crosstalk measurements over a repeater section for a certain type of VIZ-600 instrument positioning.

The operation of the Transsvyazstroy trust's training center at the Shcherbinka station which also trains USSR Railway Ministry personnel is described. Figures 4.

Outlook for Using Polyurethane Compositions in Cable Communication Line Construction and Operation

917K0321C Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 3, Mar 91 pp 24-31

[Article by V. Z. Yarotskiy, Transsvyazstroy]

UDC 621.315.1:656.2

[Abstract] The shortcomings of traditional hot soldering, molding, and welding methods used to restore metal cable sheathing during cabling and wiring operations are outlined and the development of high-molecular adhesive compounds for eliminating these shortcomings is reported. A new polyurethane nonfoaming composition, the VILAD-13, developed and implemented in 1983 for wiring cable power lines is described. The composition consists of two components: the VILAD-A-13 polyester with a mineral filler, or component A (TU 6-05-2000-85), and polyisocyanate D, or component B (TU 6-03-375-75), as well as a catalyst, tin bibutylcylaurate, for accelerating polymerization. The physical and technical characteristics of the VILAD-13 compounds, such as hardness, volume resistivity, dielectric loss tangent, dielectric permittivity, electric strength, heat stability, and water absorption are compared to those of the K-115 and K-176 epoxy compounds. The molding and simultaneous polymerization of the VILAD-13 compound which characterize all of its applications in cable sleeves and its use in specific types of cable sleeves and cable boxes are described. It is stressed that although today components for the VILAD-13 composition are produced domestically, their production is greatly complicated by shortages; it is expected that after the transition to a market economy, any organization will be able to obtain any amount of polyurethane composition, making cabling methods employing polyurethane compositions dominant in the industry. Figures 11; tables 4.

Restoring Generating Capacity of Kharkov's Thermoelectric Plant-3

927K0002A Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 3, Jul-Sep 91 pp 3-4

[Article by I. D. Sobol, V. Ye. Grinshteyn, V. I. Ponomarenko, Ukrainian State Power Engineering Design Institute and Kharkov Heat Supply System Enterprise]

UDC 621.18

[Abstract] The issue of generating unit redundancy which at some power systems is 8-19 lower than the specified level is addressed and an approach to the outlook for operating fossil fuel power plants and boilers is considered. A plan to upgrade thermoelectric plants which calls for replacing boilers and dismantling all turbines developed by the Kharkov AEP branch and a feasibility study of partially restoring the generating capacity of thermoelectric plants by installing back-pressure turbines and determining the necessary designs are summarized. With respect to TETs-3, it is established that installation of turbine-driven sets in the existing engine room will increase the power supply reliability for essential services and is both technically and economically feasible; it is shown that additional power generation will be accompanied by an almost twofold decrease in harmful atmospheric discharges. The annual profit is 282.6 thousand rubles, making it possible to recover capital outlays in seven years. Tables 3.

Examining Performance of Power Systems in Changing Economic Environment

927K0002B Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 3, Jul-Sep 91 pp 15-18

[Article by Ye. A. Beltyukov, S. N. Ungutyan, Odessa Polytechnic Institute]

UDC 336.45:621.311

[Abstract] Forecasts of the social and economic impact of decisions made in the power industry in a changing economic environment are addressed; to this end, the economic activity of power systems under study and their stable development trends are analyzed. As a result, an approach to examining the evolving socially-mandated outlays and producer interests is developed and experimentally tested and approaches to reconciling public and private interests are studied; in so doing, long-term social needs are defined as developing power systems by implementing regulated loads and storage units in order to cover the load curve of nuclear power plants (AES). It is shown than implementation of such accumulating units will increase electric rates and upset the existing rate and economic incentive system. It is suggested that a graduated rate increase system be implemented by bridging the gap between boiler and furnace fuel prices and costs. It is also suggested that all power plants except hydroelectric be charged rent for using land. Figures 1; tables 1; references 8.

Donbass's Promising Role in Supplying Ukraine With Energy and Fuel

927K0002C Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 3, Jul-Sep 91 pp 35-37

[Article by V. V. Yershevich, A. A. Reshetnyak, V. B. Yegorova, Industrial Economics Institute at the Ukrainian Academy of Sciences]

[Abstract] The role of Donbass which contains 14 percent of USSR's total coal reserves, 20 percent of bituminous coal, and 38 percent of $A+B+C_1$ industrial grade coal is discussed and two characteristic features of today's development of the USSR fuel and energy complex (TEK) - a sharp decrease in the volume of power generated by nuclear power plants and the ever-increasing independence of republic, regions, and local councils in deciding where to place industrial entities, including power plants - are summarized. It is demonstrated that due to a sharp decrease in the planned nuclear power industry development program, serious problems have arisen in supplying Ukraine with electric and thermal power; it is shown that since it is unrealistic to expect that the republic's energy problem can be solved by importing power from other regions, increasing natural gas imports, and developing nontraditional power sources, the sole and most realistic long-term development prospect is to meet Ukraine's electric energy needs by building several Donbass coal-burning thermal power plants (TES) and preserving or even increasing the generating capacity of existing power plants.

On Building New Power Plant in Central Ukraine: Discussion

927K0002D Kiev ENERGETIKA I ELEKTRIFIKATSIYA in Russian No 3, Jul-Sep 91 pp 37-39

[Article by I. Ye. Vorobyev, Kiev Branch of the Nuclear Power Plant Design Institute]

[Abstract] The resolution to shut down all generating units of the Chernobyl Nuclear Power Plant (ChAES) passed by the Ukrainian Supreme Council as a result of which by 1995 the installed capacity of the Kiev Power System Association will be reduced by 3 million kW and agricultural and industrial users will be forced to decrease consumption by 20 billion kWh, or roughly 7 percent of power generated by power plants of the Ukrainian Power Ministry, is discussed. The measures necessary to avoid disruptions caused by the ChAES shutdown, particularly by building a new 3.0-3.2 million kW fossil fuel condensation power plant (KES) in central Ukraine, are examined and three possible KES sites - in Chernobyl, Slavutich, and Chigirin - are considered. A

number of condensation power plant designs is investigated. It is shown that in order to ensure that the first generating units are brought on stream by 1997-98, it is necessary to start the development of design plans for the new condensation power plant no later than 1992 and that this development should be entrusted to a design institute intimately familiar with the site in the town of Chigirin in the Cherkassy oblast - the most promising of the three sites considered.

Electromagnetic Compatibility in Electric Power Supply Systems

917K0332A Moscow ELEKTRICHESTVO in Russian No 4, Apr 91 pp 1-6

[Article by S. M. Apollonskiy, D. V. Vilesov, A. A. Vorshevskiy]

UDC 621.396.96:621.391.82.001.1

[Abstract] General tasks of electromagnetic compatibility (EMS) are reviewed in the light of the development of radio engineering and electronics and the requirement to decrease the influence of electromagnetic noise (EMP) while ensuring simultaneous functioning of radio communication and electric power supply facilities. The problem of electromagnetic compatibility as it applies to electric power systems (EES) is analyzed and the principal issues involved in it are considered. In so doing, the problem of electromagnetic compatibility is analyzed in its totality without artificially dividing it into the issues of radio electronic facilities (RES), digital computer (TsVT) technology, and power electronics. To this end, the issues of electromagnetic noise sources and receptors, noise propagation, methods and devices for noise suppression, equipment protection from electromagnetic interference, testing and measurement resources, EMC standardization problems, and organizational aspects of EMC service are discussed. It is emphasized that today, not enough attention is being given to the issue of EMC in power supply systems and that little is being taught about it in schools. A range of measures to be taken in the field of EMC is formulated and it is suggested that a coordinating center on EMC problems be opened in the USSR. References 11; figures 3; tables 1.

Capacitor Technique for Starting High-Speed Surface Transportation With Composite Alternating Current Levitation and Propulsion System

917K0332B Moscow ELEKTRICHESTVO in Russian No 4, Apr 91 pp 21-25

[Article by A. V. Bayko, A. I. Khozhainov, Leningrad Railroad Transport Engineers Institute]

UDC 538.31.001.2

[Abstract] The development of magnetic levitation (maglev) high-speed surface transportation (VSNT) intended for ferrying passengers and cargo at speeds reaching 300-500 km/h without mechanical contact with the roadway is discussed and two types of direct current magnetic suspension (levitation) systems, electromagnetic (EMP) and electrodynamic (EDP) and their shortcomings are summarized. It is shown that these shortcomings can be largely eliminated by using single-phase alternating current electrodynamic suspensions (EDPOT) with liquid nitrogen-cooled hyperconductors which, in contrast to EMP, are characterized by a greater levitation gap (100-200 mm) and natural stability. The EDPOT's drawback is the need to compensate for the considerable reactive power. A composite levitation and propulsion system is proposed in order to combine EDPOT advantages and overcome its shortcomings. The composite system design and its operating principle are described in detail and the capacitive method of starting the vehicle is considered. It is shown that the vehicle can be started by using capacitive impedance and resistance which transform the static excitation system into two alternating pole systems shifted by the pole pitch from each other in space; the efficiency of this starting method is assessed. Tentative estimates demonstrate that the use of startup capacitors and resistors increases the electrical equipment mass by 2-3 percent compared to other methods but makes it possible to increase $\cos\varphi$ from 0.1-0.15 to 0.3. References 8: 5 Russian, 3 Western; figures 5.

Principal Power Industry Development Trends

917K0332C Moscow ELEKTRICHESTVO in Russian No 4, Apr 91 pp 74-79

[Article by A. N. Sherentsis]

UDC 621.311.001.1

[Abstract] A critique of V.V. Yershevich's and A.A. Makarov's article in *Elektrichestvo* No. 8, 1989. The general concept of power industry development expounded in the article in the light of the USSR Energy Program is discussed. The author evaluates the analyses of the state of USSR power industry made in the original articles and specifically addresses the issues of nuclear power plants (AES), especially the consequences of the Chernobyl catastrophe, hydroelectric power plants (GES), fossil fuel power plants (TES), nontraditional energy sources, such as wind and solar power plants and small hydroelectric power plants, and the USSR Consolidated Power System (YeEES). He concludes that the gap between electric power generation capabilities and needs has widened and that the nuclear power industry should be considered as one of the principal trends for increasing the electric power output in the foreseeable future. He calls for continuing new hydroelectric power plant construction on a limited scale allowing for environmental concerns while going ahead with large-scale fossil fuel power plant construction. He sees nontraditional power sources as playing only a supporting role and stresses the need to implement conservation policies. References 5.

On State and Development Outlook of Power Industry and Workers' Social Safety Net Under Market Economy Conditions

917K0322A Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 91 pp 2-9

[Article by Yu. K. Semenov, USSR Minister of Power Industry and Electrification, Moscow]

[Abstract] The proceedings of the first power industry workers congress held in the Pillared Hall of the Union Building in Moscow on 12-13 December 1990 are outlined. The congress elected 1,198 delegates each representing 1,650 workers and discussed three major issues the first of which, the state and development outlook of the power industry and industry workers' safety net under the conditions of a market economy, is summarized. USSR Minister of Power Industry and Electrification Yu.K. Semenov and First Deputy of the USSR Minister of Nuclear Power and Industry V.A. Sidorenko presented their reports on this subject. In his report, the minister identified the problems facing the industry during the transition to a market economy, such as the breakup of existing industrial relations, a trend toward separatism, a scarcity of goods in the consumer market, a rising inflation which leads to a growing disparity between the remuneration scale of state sector workers and cooperatives and joint ventures, and an escalating cost of living. The effect of the new laws being debated and adopted by the Supreme Council, such as the law of property, the law of enterprise, the law of annual leave, etc., is discussed. Urgent social issues facing the workers and ways of resolving them are addressed. An analysis of today's state of the industry and social safety net enabled the minister to propose a program for solving existing problems, including steps aimed at restoring the lost power industry prestige, preserving the integrity of the USSR Consolidated Power System (YeES) and implementing new economic and management mechanisms. The speaker called for an accelerated development and adoption of a real Energy Program which would balance financial, physical, and technical resources and ensure the supply of fuel and construction sites for new power plants, including nuclear. He also stressed the need for a new law governing the electric power industry.

Power Workers Congress' Appeal to Fourth USSR Congress of People's Deputies

917K0322B Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 91 pp 10-11

[Article by delegates to the Congress]

[Abstract] The delegates to the USSR congress of power industry workers who represent two million people working in the industry issued an appeal to the Fourth USSR Congress of People's Deputies calling on them to give serious attention to the critical situation which had developed in one of strategic branches of the national economy. Stressing the continuing importance of the industry to the national economy during the transition to a market economy, the workers assert that in the light of the law banning strikes in the power industry, decisive and urgent measures must be taken to maintain the manpower, industrial, and building potential of the power industry; in so doing,it is necessary to restore the lost prestige of the power industry profession and further strengthen the social safety net. The workers propose that bonus pay be established for the length of service and benefits for the use of electric and thermal power be given in the amount of 50 percent discounts; in addition, the retirement age of industry workers should be lowered. The workers also speak up against national and regional fragmentation and in favor of consolidation.

Total Fuel and Energy Resource Outlays for Full Nonferrous Metal Production Cycle From Ore Mining to Finished Product

917K0322C Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 91 pp 11-14

[Article by V. I. Rushchuk, Tsentroenergotsvetmet Production Association, Moscow]

UDC [669.2/.8:658.26].004.18.003.12

[Abstract] The shortcomings of existing methods of calculating specific outlays of energy resources for the production of nonferrous metals necessary for determining the need for fuel and energy resources are summarized. A new method is proposed for calculating the total energy outlay for producing 1 t of marketable nonferrous metal in the form of products utilized by kindred branches of the national economy, i.e., commercial-purity nonferrous metal intended for subsequent casting, rolling, etc. Outlays of all energy resources were included in calculation; as a result, total energy outlays for the production of aluminum, refined copper, zinc, lead, nickel, ferronickel, and titanium were broken down among processes of ore and raw material mining, ore beneficiation, concentration, and refining, auxiliary material production, and outlays for associated products. An analysis of the total energy resource outlay structure made it possible to conclude that the use of nondressed, and especially poor, ore calls for high energy outlays while dressing, especially by the flotation and gravity methods, sharply decreases the energy outlays for refining. Recommendations are made for decreasing energy outlays for the production of nonferrous metals, primarily by developing new dressing methods and using thermal properties of sulfur and its compounds. References 5; tables 1.

Energy Saving Policy in Marketing System

917K0322D Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 3, Mar 91 pp 16-18

[Article by I. A. Maksimchuk, Energy Savings Problems Institute at the Ukrainian Academy of Sciences, Kiev]

UDC 658.26.004.18.008

[Abstract] The concept of marketing is formulated as it applies to the problem of fuel and energy resources in a free enterprise system governing the activity of commercial enterprises. The energy saving policy in the marketing system and the concomitant organizational principles of management structures are defined; it is stressed that in carrying out this policy, it is necessary to take into account consumer needs, advances in scientific and engineering progress, and the interests of the company and the society as a whole. The principal components of the energy saving policy are identified from the marketing viewpoint and the trends of activity of large management structures, i.e., companies, conducted on the basis of the energy saving policy are outlined. The most important conditions ensuring successful implementation of the energy saving policy within the comprehensive marketing system are formulated. It is emphasized that the new approach to production calls for developing a new approach to energy saving whereby the energy saving policy is regarded as an integral part of any marketing system. References 5; figures 4; tables 1.

Energy Program's Basic Premises, Goals, and Aims in Power Industry Field

917K0340A Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 2-5

[Article by V. A. Dzhangirov, P. V. Goryunov, Yu. M. Kogan, G. S. Popova, USSR Energy Ministry and Energy Institute]

UDC 31.001.1.620.9.004.54

[Abstract] The draft Energy Program document debated and approved by the USSR Energy Ministry Collegium on 13 November 1990 is summarized; the program outlining the power industry development until 2010 was drafted at the behest of the USSR Council of Ministers Bureau of fuel and energy complex and other organizations. The program's section dealing with the electric power industry and covering two principal areas - industry-wide issues and the interests of republics and regions - is described in detail. The situation which exists today in the power industry and its causes and negative ramifications are identified. The principal goal of the Energy Program under today's conditions is defined as developing and implementing an energy policy and strategy for ensuring efficient, reliable, and safe energy supply to the national economy allowing for the changing external conditions. Short-range goals are defined as developing new organizational and technological structures for efficient and ecologically clean development and operation of the power industry under the conditions of emerging market mechanisms while subsequent goals are identified as ensuring the development of competitive, ecologically clean, and safe power industry allowing for an increasingly close interdependence of the world power industry. The basic premises underlying the energy policy during the transition period are outlined; priority is given to social goals of the power industry and electrification development. The development of nuclear power plants and commissioning of new generating units is addressed. The volume and structure of power generation, fuel consumption, and capital outlays in the industry are considered. Tables 5

Problems of Today's Nontraditional Power Engineering Development

917K0340B Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 6-12

[Article by A. F. Dyakov, USSR Power Industry and Electrification Ministry]

UDC 620.91

[Abstract] The report delivered by Deputy Minister of Power Industry and Electrification A.F. Dyakov to the First All-Union Conference on the Problem of Incorporating Nontraditional Renewable Energy Sources (NVIE) in the Country's Energy Balance held in the Crimea on 22-26 September 1990 is reprinted. The author addresses the issues of the role and place of nontraditional power engineering in the country's fuel and energy complex (TEK), management steps aimed at utilizing nontraditional renewable energy sources, particularly safe nuclear power, ecologically clean fossil fuel power plants, and hydrogen power engineering, geothermal power engineering, the use of heat pumps, wind power engineering, small hydroelectric power plants (GES), solar power engineering, and biomass power engineering. It is emphasized that today, nontraditional renewable energy source installations should be considered primarily as means of organic fuel conservation and that in ares far removed from centralized power supply systems where fuel delivery costs are high, nontraditional renewable energy source installations may become quite competitive or even dominant. The need to adopt a law of power supply which would reflect economic incentives for nontraditional renewable energy source development is identified. Tables 2.

Nontraditional Power Engineering in USSR Today and Tomorrow

917K0340C Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 12-16

[Article by P. P. Bezrukikh, Bureau of Fuel and Energy Complex and the USSR Council of Ministers]

UDC 620.91

[Abstract] The report delivered by P.P. Bezrukikh to the First All-Union Conference on the Problem of Incorporating Nontraditional Renewable Energy Sources (NVIE) in the Country's Energy Balance held in the Crimea on 22-26 September 1990 is reprinted. The report covers the comprehensive program of mastering nontraditional energy sources in 1991-1995 and up to 2005 developed by the Bureau of

Fuel and Energy Complex and the USSR Council of Ministers in collaboration with the USSR State Planning Board, USSR State Committee on Science and Technology (GKNT), USSR Academy of Sciences, USSR Construction Administration, USSR State Agroindustrial Administration, and USSR Energy Ministry as well as republican departments and ministries. The program sets goals for the production of electric power (in millions of tons of equivalent fuel) from solar, geothermal, wind, biomass, heat pump-extracted low-potential heat, and small hydroelectric energy in 1995, 2000, and 2005. Specific goals for the first (1991-1995) and second (1996-2005) phases of the program are outlined. Production goals for solar collectors, generating units, raw materials, and auxiliary equipment for utilizing solar and geothermal energy as well as the energy of small rivers and biomass, wind power equipment, and heat pumps and small hydroelectric plant units are cited. It is stated that in 1989, the level of nontraditional energy source utilization reached only 49 percent of target. The principal causes of this failure are identified and measures necessary for resolving the situation are discussed. Tables 5.

Resolution of All-Union Conference on Problems of Nontraditional Power Engineering

917K0340D Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 16-19

[Article by congress delegates]

[Abstract] The resolution adopted by the All-Union Conference on the Problems of Nontraditional Power Engineering is expounded; the delegates call for expanding the concept of USSR power industry development by incorporating into it decentralized power production based on nontraditional renewable sources of energy (NVIE) and for making appropriate revisions in the State Energy Program. In particular, the resolution touches upon the following aspects of nontraditional energy sources: geothermal power engineering, small hydroelectric power plants, manufacture and utilization of heat pumps, solar power engineering, wind power engineering, and biomass and biogas utilization. In addition, the resolution addresses the issue of providing economic incentives for the development of nontraditional power engineering and suggests that seminars and symposia on nontraditional power engineering development trends be held annually.

Wind Energy Resources, Wind Energy Utilization Status and Outlook

917K0340E Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 20-24

[Article by V. P. Kharitonov, Vetroen Scientific Production Association]

UDC 621.548

[Abstract] Wind energy resources in the USSR are assessed and it is shown 8,000,000 km^2 of the country's territory where the average annual wind velocity at a 10 m altitude exceeds 10 m/s are suitable for wind power utilization on a commercial basis. Assuming that 1 percent of this territory is allocated to wind power stations, the total installed capacity of these wind power stations will exceed 300 GWh, i.e., will be commensurate with the total installed capacity of all power plants in the world. It is demonstrated that realistically, 8,000 km^2 of land otherwise unsuitable for agriculture could be allocated to wind power plants for generating 10 percent of the total power produced in the country. The wind power outlook for different foreign countries and regions of the USSR is estimated and the demand for various types of wind power plants and devices as well as their unit and total power, total annual production, and the resulting annual fuel savings are summarized. The concomitant decrease in the discharge of harmful substances is evaluated. Today's development of wind power engineering abroad is assessed, the experience of wind power unit operation within power grids is described, and modern trends in the development of wind power units (VEU) intended for cogeneration purposes are identified. The specialization of some foreign wind power engineering companies is analyzed. An analysis of the state of domestic and foreign power engineering shows that 0.1-4 kW wind power units are commercially produced in the USSR and preparations for producing 16-100 kW units are underway while wind power units generating up to 450 kW are being manufactured abroad, making up to 98 percent of the total capacity of all wind power units produced. The need for joint ventures in the field of wind power engineering is identified. References: 4 Western; tables 5.

Wind Power Plants. Development Outlook

917K0340F Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 24-25

[Article by O. L. Perfilov, V. N. Shvarin, Energobalans Wind Power Engineering Promotion Association]

UDC 621.311.24

[Abstract] The wind power plant development outlook is assessed whereby wind power plants (VES) are defined as a group of wind power units (VEU) which are consolidated into a single power generating entity serving a single user, such as a consolidated power system or individual isolated entities removed from centralized power supply zones. The Master Plan for the Development of Wind Power Engineering Until 2010 drafted by the Gidroproyekt Hydraulic Engineering Institute is outlined. The plan estimates the wind potential over the USSR territory at altitudes under 100 m, identifies the most promising regions for wind power plant construction with annual mean wind velocities of over 5 m/s, determines effective design wind velocities in various regions, and calculates feasible capital outlays for wind power engineering. The fuel and fuel cost conservation is

used as the principal criteria in wind power plant feasibility studies. It is shown that the most efficient wind power plants can be built in the European North and in isolated regions of the Asian North and East. The issue of ecological compatibility of wind power plants is addressed. It is stressed that wind power engineering is capable of making an appreciable contribution to the fuel and energy balance of the country and relieving the ecological situation in a number of regions. The need for comprehensively solving all problems associated with wind power engineering by a combined effort of several organizations is emphasized.

Medium-Power Wind Unit Development Experience

917K0340G Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 40-42

[Article by V. I. Kukushkin, Yuzhnoye Scientific Production Association]

UDC 621.311.24

[Abstract] The experience of joint development of 100 and 250 kW wind-driven electric power plans at the Yuzhnoye and Vetroen scientific production association in the framework of on-going conversion from defense- to civilian- oriented production is summarized and the design of the AVE-100 and AVE-250 electric wind turbine generators with a 100 and 250 kW output, respectively, intended for operating either autonomously or within a power grid is presented. Specifications of the three-blade windmill and its rotor, blades, tower, reduction gear, and generator are described. It is stressed that standard units and parts, such as the GSS-104-E and GS4-100 generators, Ts2N-500 reduction gear, and rotary base as well as power drives and controls developed and made by the Yuzhnoye were utilized to the utmost in designing and manufacturing the AVE windmills. The joint development of the wind power plant represents a firs step along the complex path toward developing Soviet wind power industry. Figures 1; tables 1.

Moscow Energy Administration Development Alternatives

917K0340H Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 3, Mar 91 pp 69-73

[Article by A. G. Shcheglov, L. V. Iglova, L. G. Bantsevich, N. V. Dorozhkina, M. A. Arkelyan, Ye. L. Bykanova, Energy Research Institute at the USSR Academy of Sciences and Moscow Management Institute]

UDC 621.311.23:721.438

[Abstract] The threatening ecological situation which has developed in Moscow due to the high concentration of power generating sources, such as thermoelectric plants (TETs) and rayon and departmental boiler rooms, and the intolerably high concentration of nitrous oxides in the air, especially in the central and southeastern parts of the city is described and the alternatives to Moscow Power System development are examined in the light of the increasingly stringent environmental regulations and requirements. As a result of the study, four development alternatives and conditions for their implementation are identified: using modern ecologically clean equipment (generating units with PT-80-130, PT-135-130, T-120-130, and T-250-240 turbines); substituting obsolete steam power plants with steam-gas units (PGU); commissioning low-power nongenerating steam-gas units and gas-turbine plants (GTU); and commissioning other steam-gas units and gas-turbine plants. A comparative analysis of all four alternatives demonstrates that in each case a transition to new, ecologically more efficient equipment is necessary; the high ecological efficiency of the fourth alternative is emphasized. The estimated gas, fuel oil, and coal requirements of all four alternatives are compared. It is shown that implementation of the development alternatives will make it possible to avoid the planned construction of the Northern thermoelectric plant in Moscow and new power plants in the Moscow oblast as well as increase the power supply reliability and efficiency and clean the environment. Figures 4; tables 2.

Use of Deductive Method in Developing Operating Staff Training Programs

927K0003A Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 91 pp 14-17

[Article by Ya. A. Tsirel, Leningrad Branch of the All-Union Industry Workers Advanced Training Institute]

UDC 621.31:331.86.056

[Abstract] The development of training and retraining programs, and in particular for the operating staff of power generating installations, e.g., a new power plant being commissioned, and electric supply network enterprise or its service area, etc., is summarized. Uses of two diametrically opposite methods of logical reasoning - the inductive and deductive - are discussed and principal attention is focused on the deductive method whereby the reasoning progresses from the more general to the less general and particular notions. Specific details of preparing training questionnaires are outlined and the advantages of the deductive method, particularly the practical impossibility of leaving any question out while ensuring the application of the differentiated approach to the extent of individual question detail. The deductive approach of compiling the program is illustrated by the "logical reasoning tree". The division of training questions into functional and object-oriented is discussed. It is shown that a similar approach may also be used to plot flow charts for other personnel training tasks. Figures 5; references 2.

Data Input System for Microprocessor-Based Recording Instruments for Analyzing Emergency Situations in High-Voltage Power Network

927K0003B Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 91 pp 70-71

[Article by Ye. A. Arzhannikov, A. M. Chukhin, Ivanovo Energy Institute]

UDC 621.311.22:681.3

[Abstract] Two methods of analog and digital data input into automatic control systems (ASU) - centralized and decentralized - and their advantages and shortcomings are discussed. It is shown that some of the shortcomings of centralized systems can be eliminated in decentralized microprocessor systems in which processors in all lines operate in parallel and each processes a relatively small volume of data. A decentralized analog data collection system developed by the authors is described. Together with a digital data collection system, the system which is being implemented at a state regional electric power plant is a part of the plant's automatic control system. The system employs MFI-1 sensors produced by the Riga Energoavtomatika plant. The sensors which represent a microprocessor recording instrument is installed in each line and measure the phase current and voltage and, if necessary, the parallel line zero sequence phase current. The resulting multiprocessor system made it possible completely to relieve the central computer of lengthy and voluminous operations with analog data and obtain the necessary data over a time span sufficiently short for making a decision affecting subsequent personnel actions. The system is also as reliable as other multiprocessor system even if the computer fails - the MFI remain operational as local devices. The system has passed laboratory tests. References 2.

Analysis of Wiring Stress in High-Voltage Power Lines

927K0003C Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 91 pp 84-85

[Article by Ye. P. Nikiforov, All-Union Scientific Research Institute of Electric Power Engineering]

UDC 621.315.1.001.24

[Abstract] Mr. Nikiforov critiques M.M. Krymskiy's article "On the procedure for calculating the wiring stress and conductor sag of high-voltage power line wires allowing for residual deformation" in *Elektricheskiye stantsii* No. 6, 1989. Recommendations on calculating the wiring stress by the permissible stress method and relevant guidelines appearing in other sources are discussed. Mr. Nikiforov concludes that Matveyev and Kiselman suggested correct equations for calculating wiring stress in high-voltage power lines (VL); that Krymskiy's critical remarks are based on erroneous notions while his remarks on the possible violation of regulations are without merit. Figures 1; references 7.

Shift Operator and its Applications in Electromechanics Problems

927K0001A Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 4, Apr 91 pp 5-12

[Article by R. V. Filts, Lvov Forestry Institute]

UDC 621.3

[Abstract] The shift operator which transforms coordinates by shifting the independent variable reference point by a given quantity is defined. The properties of the shift operator and its derivative operators are examined to demonstrate the possibility of using the latter operators for transforming the equation of state of balanced electromechanical circuits in order to reduce the number of variables and refine numerical algorithms for analyzing electric circuits. The shift operator and its derivative operators make it possible to use nontraditional approaches in order to formulate a series of function for a given function which, when used in mathematical modeling of electromechanical circuits,

opens up additional possibilities of analytically transforming the equations of state for the purpose of simplifying them. The use of the shift operator is illustrated by the example of a salient pole synchronous generator carrying a high-power load and excited from a direct current source through a half-wave rectifier. Figures 1; references 2.

Heterogeneous Sphere in Homogeneous Alternating Magnetic Field

927K0001B Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 4, Apr 91 pp 18-21

[Article by L. S. Frumkis, A. P. Ryabtsev, V. S. Semenov, Siberian Engineering Physics Institute, Tomsk]

UDC 538.26

[Abstract] A number of technical issues of electromagnetic shielding which call for analyzing the fields of spherical shells, especially the problem of nonconcentric spheres, is addressed. An axisymmetric problem of two nonconcentric spheres located in a uniform alternating magnetic field is considered. The solution of a boundary value problem for these spheres is used to derive a system of four algebraic equations. Coefficients of this system which assume a convenient form for numerical calculations are found. Figures 1; references 3.

Ferromagnetic Body Acceleration in Pulsed Magnetic Field

927K0001C Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 4, Apr 91 pp 79-85

[Article by I. F. Gaynulin, N. A. Semashko, Ye. F. Sayapin, Komsomolsk-na-Amure Polytechnic Institute]

UDC 538.3+621.313.7

[Abstract] The use of shot blasters for shot blasting product surfaces in foundries and the operating principle of such devices - accelerating shots under the effect of centrifugal forces - are summarized and the shortcomings of such devices, primarily the rapid wear of their parts, are addressed. The idea of developing an electromagnetic device in which shots are accelerated along a rectilinear diamagnetic guide tube due to the interaction of the ferromagnetic shots' magnetic moment with the magnetic fields of solenoid-type inductance coils is discussed. The results of theoretical and experimental studies of one ferromagnetic shot acceleration stage of pulsed electromagnetic shot blasters (IEDA) are presented. It is shown that an adequate consistency of the results is observed in analyzing a body motion model which takes into account the behavior of the inductance coil current, magnetic field strength, and magnetic characteristics of the ferromagnetic material in the domain of time. Multistage acceleration is recommended for attaining high shot blaster efficiency. It is demonstrated that the electromagnetic forces applied to the ferromagnetic body in the pulsed magnetic field can be calculated by means of rather simple analytical formulae which are convenient for computer applications and do not call for considerable machine time outlays. The proposed model lays the groundwork for developing and designing a pulsed electromagnetic shot blaster. Figures 2; tables 1; references 9.

Analysis of Nonsymmetric Inductance Parameter

927K0001D Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 4, Apr 91 pp 86-91

[Article by V. A. Vlasov, Tomsk Institute of Automated Control Systems and Radio Electronics]

UDC 621.372.41

[Abstract] The properties of inductance parametric oscillators (IPG) are summarized. The operation of such an inductance parametric oscillator in the frequency follower mode excited by harmonic voltage is analyzed. It is shown that threshold devices with phase shifting, phase splitting, and stabilizing properties can be developed on the basis of inductance parametric oscillators. Basic computational relations are derived for measuring magnetic and electric characteristics of the parametric inductance oscillator. In analyzing the oscillator, it was assumed that there were no magnetic leakage flux, no losses in cores and windings, that both cores are identical, and that instantaneous values of induction and field strength are related to each core. It is shown that the proposed parametric inductance oscillator makes it possible to establish all important relationships between the parameters in a general form and make the necessary calculations and that in the future it will be possible to avoid approximating the magnetization curve but use real characteristics of magnetic materials instead and make calculations on a computer. The analysis also demonstrates that phase splitting and phase shifting circuits may, in principle, be realized using purely reactive elements. Figures 3; references 8.

Comparison of Local Area Networks for Nuclear Power Plant Automatic Control Systems Based on Fiber Optic Communication Lines

917K0339A Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 8-11

[Article by V. Ye.Khazatskiy, Central Scientific Research Institute of Integrated Automation, Moscow]

UDC [681.324:658.51.011.56:621.039].001.36

[Abstract] Methods of distributed monitoring and control executed by a series of controllers in modern automatic process control systems (ASUTP), i.e., local process stages (LTS) and control computer systems (UVK)

linked to each other by local area networks (LVS) are considered. Models for analyzing and comparing redundant star, concatenated star, and ring LAN structures executed on fiber optic communication lines (VOLS) on the basis of the following criteria are suggested: mean time between failures, mean message transmission time, total optical cable length, and maximum data transmission distance. LAN indicators of a nuclear power plant (AES) automatic process control system of a generating unit with a water-moderated water-cooled power reactor VVER-1000 are compared for illustration. An analysis of the results shows that the concatenated star LAN topography with passive connectors is superior to the other configurations with respect to the MTBF, data transmission time, and total link length. As for the transmission distance, ring structure is superior yet this property is not crucial for nuclear power plant automatic process control system where the maximum distance between the net nodes does not exceed 3-5 km. References 5; figures 1; tables 3.

Knowledge Design for Automating Digital Device Test Development

917K0339B Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 15-16

[Article by N. N. Datsun, Donetsk Polytechnic Institute]

UDC 681.325.001.63:001.5

[Abstract] The experience of using expert systems for designing digital circuit and VLSI circuits (SBIS) as well as diagnosing electronic circuits of varying degree of complexity is considered and an approach to knowledge design in instrumental computer-aided digital device testing development systems is proposed. The structure of the knowledge base for developing digital device tests is examined and its hierarchy is discussed. The concurrent hierarchical fault simulation method is used in the knowledge base design. The SI language is suggested as the simulation language for test development systems since it possesses linguistic means of working with bit-by-bit data and has efficient compilers. References 11: 3 Russian, 8 Western.

Suggestions on Metrological Terms and Definitions

917K0339C Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 20-22

[Article by E. G. Mironov]

UDC 389.006.89

[Abstract] The publication of a reference dictionary of metrological terms and definitions (Yudin, Selivanov, *et al*, Moscow, Izdatelstvo standartov, 1989) which are largely identical to those contained in state standard GOST 16 263-70 is reported and critiqued. The author elaborates on some terms and definitions and suggests that revision be made to, *inter alia*, the terms and definitions of measurement, measurement result, and measurement result error and error components. In his opinion, formulation of some terms as precise mathematical expressions will make it possible to resolve ambiguities and liberal interpretations of these terms as well as use these terms as algorithms for solving applied metrology problems. References 3; tables 1.

Photoelectric Primary Transducers and Translation Recording Systems

917K0339D Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 22-25

[Article by P. -Ju. P. Zilinskas, J. Ju. Verkjalis, A. J. Vaskjavicene, Vilnius University]

UDC 621.383.4:621.383.9

[Abstract] The methods and devices for recording certain types of translational motion represented in the form of optical signals with the help of photoelectric transducers characterized by their geometrical configuration are outlined and design principles and properties of systems for recording translational motion allowing for the shape, number, and position of photodetectors in the photodetector array are considered. In so doing, the type of optical input and the method of electric signal processing are taken into account. Principal specifications of silicon-based primary transducers (PP) manufactured by the same technology but differing in their geometric configuration as well as position-sensitive photodetector systems (PChFS) on their basis are described and the results of their experimental investigation are presented. The primary transducer error does not exceed 2 percent within a wide range of parameters. The primary transducers have been used to design devices for classifying parts by size in an automatic sorting machine, tracking the transport robot line, and monitoring the strip edge position. References 2; figures 5.

Intelligent Moment-of-Force Transducer

917K0339E Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 28-29

[Article by S. A. Vorotnikov, Ye. V. Gogin, S. V. Runkov, Moscow Engineering School imeni N.E. Bauman]

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[Abstract] Problems facing the designers of integrated adaptive manufacturing systems (GPS) containing industrial robots (PR), transducers, and process equipment, especially in the absence of developed programming languages and industrial robot operating systems, are addressed. The principle of designing industrial robot moment-of-force "sensitization" transducers is discussed and a versatile moment-of-force transducer

intended both for autonomous applications, e.g., monitoring and measurement operations, and as a part if integrated industrial robot control system is described. It is suggested that such transducers be designed on the basis of real applied tasks and characteristic features of robotized complex control system design. The interchangeable modular structure of such a transducer with a standardized input/output system and a microcontroller driven by a single-chip K 1816 VYe35 (48) microcomputer is described. The principal transducer performance data are cited. The transducer may be used for solving various application tasks within a broad range of adaptive manufacturing systems containing diverse industrial equipment. Complete product specifications are available upon request. Figures 3; tables 1.

Reversible Analog-Discrete Tachometer

917K0339F Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 31-32

[Article by N. V. Kirianaki, V. P. Deynega, R. V. Goltsgauzer, Lvov Polytechnic Institute]

UDC 621.317+531.77

[Abstract] The advantages and shortcoming of digital and analog dials of instruments are discussed and an analog-discrete tachometer capable of taking measurements under heavy-duty operating conditions, such as in mobile objects, during jolting and vibration, and under considerable pressure and temperature drops, is proposed. It combines the advantages of digital measurement methods with analog measurement data display. The analog-discrete tachometer (ADT) contains a rotational speed transducer (DChV), a frequency-to-code converter, and an angle encoder. Mathematical expressions necessary for designing the analog-discrete tachometer are cited. With respect to displaying the values which remain constant against the background of impact loads, vibration, and jolts as well as with changes in the object position, the analog-discrete tachometer tachometer is virtually indistinguishable from conventional analog tachometer and also displays redundant data necessary for reducing the probability of serious operator errors. It is shown that instruments with such a readout may be designed for measuring other nonelectric and electric parameters. References 3; figures 2.

Thermocompression Fittings for Diffusion Welding of Sensors

917K0339G Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, Apr 91 pp 42-43

[Article by M. M. Gordiyenko, V. M. Kosogorov, S. E. Shlifer, V. I. Belyakov]

UDC 621.791.18.03:681.586

[Abstract] The use of diffusion welding in a vacuum for connecting parts made of dissimilar materials employed in sensors is discussed. A specialized thermocompression fitting system developed by the NIIFI in cooperation with the Moscow Aerospace Institute is described. The fittings make it possible to perform diffusion miniature welding on a wide range of products used in radio engineering and instrument-making in standard general-purpose industrial vacuum furnaces. The fittings were used to make sensors (ChE) for the SDAI 408.854.005 semiconductor pressure transducer in which a silicon chip is welded to a metal membrane and sensors for the E 214-50-87 accelerometer where a silicon chip is welded to the metal inertial mass. The operating principle of the fittings is based on utilizing the difference in the thermal linear expansion coefficients (KTLR) of the fitting materials and the welded parts in order to develop and impart the necessary compressive force to the welded part. The fitting design and some of its other applications are described. References 4; figures 2.

Application of Electron-Beam Lithography to Fabrication of Submicron Semiconductor Structures for Analysis of Quantum Effects

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[Article by V. M. Kudryashov, M. M. Kachanova, N. V. Yeliseeva, T. A. Gavrilova, A. L. Aseev]

[Abstract] Quantum effects in semiconductors are analyzed on the submicron level by fabrication of submicron devices by electron-beam lithography. Delta-silicon-doped gallium arsenide samples fabricated by molecular-beam epitaxy are used to achieve one-dimensional quantum structures for this analysis. The structures fabricated on the ZBA-10/1 electron-beam lithography system include a bridge 1,000 nm in length and 100-300 nanometers in width together with zero-dimensional quantum points (the latter on a silicon-oxide-polysilicon system). Magnetoresistance measurements of the bridge reveal dual-level resistance fluctuations ("telegraph noise") associated with charge exchange between the individual impurity centers. It is determined that the magnetoresistance derives from interference of the conduction electrons at a potential of random configuration in samples of such size. Application of an inhomogenous surface potential to the silicon-oxide-polysilicon system (a MISFET structure) is found to generate quantum wells for the charge carriers present.

Analysis of the Change in Characteristics of Field-Effect Transistors Upon Cooling

917K0325A Moscow MIKROELEKTRONIKA in Russian Vol 20 No 3, May-Jun 91 pp 268-273

[Article by N. A. Bragina, A. B. Pashkovskiy, A. S. Tager]

[Abstract] The changes in output characteristics of Schottky barrier-gate field-effect transistors attributable to cooling to nitrogen temperatures are analyzed. A variety of temperature factors affecting the gain, noise figure and response times of these FETs are analyzed theoretically. The active-layer donor concentration is found to have the strongest effect on the minimum noise figure and the corresponding gain. Cooling these devices to nitrogen temperatures also causes a noticeable jump in the drift velocity, therby increasing its speed and response time. The distributions of the noise sources in the FET channel are also investigated; the levels of such noise sources are found to increase upon cooling to nitrogen temperatures.

Effect of the Potential Barrier on the Free Surface of an Active Layer on the Noise Properties of Field-Effect Transistors

917K0325B Moscow MIKROELEKTRONIKA in Russian Vol 20 No 3, May-Jun 91 pp 274-278

[Article by A. B. Pashkovskiy, A. S. Tager]

[Abstract] A theoretical analysis of the effect of the potential barrier present on the free surface of FET's on the output characteristics of the devices is carried out. The analysis focuses on low-noise FET's with a submicron gate having optimum output characteristics at a low input voltage. The potential surface barrier is found to noticeably reduce the transconductance and elevate the drain resistance of the transistor while simultaneously increasing the noise figure and reducing both the gain and speed of the device. One possible method of reducing the negative effect of the potential barrier on transistor characteristics (increasing gate depth) is discussed and found to cause the minimum noise figure to appear at higher source-drain voltages.

Magnetooptically-Controlled Transparencies in Fiber-Optic Switches

917K0325C Moscow MIKROELEKTRONIKA in Russian Vol 20 No 3, May-Jun 91 pp 304-311

[Article by A. A. Balakhonskiy, N.N. Kiryukhin, V.A. Nikerov, Yu.A. Polyakova, A. Ya. Chervonenkis]

[Abstract] Two magnetooptically-controlled transparency designs used as a fiber-optic switch for light transmission and switching applications are examined. In the first design the transparency functions as a multichannel light switch supporting a two-way link between an arbitrary input and output channel, while in the second design the transparency is a 16x16 or 32x32 multichannel deflector. Both transparencies were fabricated from matrix cells based on epitaxial Bi-containing ferrite-garnet films by local diffusion annealing followed by ion etching. Characteristic control patterns in coherent light of the transparencies are given together with their corresponding Fourier transforms from crossed polarizers. The first transparency design is found to be an effective multichannel light switch in switching devices with few optical channels, while the second multichannel deflector transparency is found to be more effective in switching devices with a large number of channels.

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