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# ***JPRS Report***

# **Science & Technology**

## ***Central Eurasia: Electronics & Electrical Engineering***

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toxic emissions of fossil fuel combustion products. References 8: 7 Russian, 1 Western.

**All-Union Scientific-Engineering Symposium on Discharge Light Sources**

927K0132D Moscow SVETOTEKHNIKA in Russian  
No 12, Dec 91 pp 26-27

[Article by V.A. Petrova, All-Union Scientific Research Institute of Light Sources]

UDC 621.327.06.053

[Abstract] The proceedings of the All-Union Scientific-Engineering Symposium on Discharge Light Sources organized by the Elektrosvetotekhnika All-Union Association, the All-Union Scientific Research Institute of Light Sources (IS), and Poltava Gaseous Discharge Lamps Plant (PZGRL) are reported. The symposium was held in Poltava on 15-18 October 1991 and drew more than 70 experts from 28 scientific research and academic institutes and enterprises; four plenary reports were presented at the symposium. They covered the issues of electric energy savings from using compact fluorescent lamps, minimizing or eliminating the mercury use in the development of gaseous discharge lamps, new phosphor development, and industrial and economic aspects of light source development. The symposium recommended, *inter alia*, that the development of compact fluorescent lamps be accelerated, work on developing ecologically clean lamp designs be continued, and studies aimed at developing nonmercury compact fluorescent lamps be expanded. The next symposium is tentatively scheduled for 1994.

**RF Amplifier for 11 GHz Satellite TV Broadcasting Equipment**

927K0128A Moscow RADIO in Russian No 7, Jul 91  
pp 40-43

[Article by V. Botvinov (UB5EAG), Krivoy Rog]

[Abstract] Home satellite TV broadcast (STV) reception systems and their components are discussed and a low-noise

amplifier—one of the most difficult satellite TV broadcast reception units—employing domestically manufactured radio elements is described. The circuit diagram of a low-noise RF amplifier with bipolar power supply is cited and its components are described. The RF three-stage low-noise amplifier has a 10.95-11.60 GHz frequency band, a noise factor of no more than 3 dB, and a gain of at least 20 dB. AP324 and AP326 transistors are used in each stage. The amplifier is executed with printed boards with striplines. The low-noise RF amplifier is capable of reliably receiving TV programs from the STAR-1, TV-5, Superchannel, CNN, and other satellites in the European part of the USSR and the ASTRA-1 in western Ukraine and Belarus as well as Baltic states. Procedures for assembling the amplifier and installing the transistors are recommended. Several such amplifiers have been made by the authors. Figures 5; tables 1.

**Computer Radio Networks**

927K0128B Moscow RADIO in Russian No 7, Jul 91  
pp 12-13

[Article by S. Bunin, Kiev]

[Abstract] The proceedings of a conference devoted to the state of, and outlook for, computer network development held in March 1991 in Kiev are reported. The conference was organized by a number of scientific research institutions, the Astra computer radio network association, and the Ukrainian Knowledge Society and drew representatives from 63 organizations involved in the development and implementation of computer networks using radio channels as a physical communication medium. Reports presented at the conference dealt with terrestrial short and ultrashort wave networks using special repeaters for amateur digital radio communication, bulletin board systems (BBS) and their capabilities (including the forwarding function), packet communication networks, and other issues. The conference emphasized the need to hold a union-wide conference on radio communication-based computer networks in 1992 and accelerate the development of a ham radio section in the framework of the association. Conference organizers are hopeful that the conference will give an impetus to the development of computer (EVM) networks in the country.















**Acoustic Emission Instrument Complex for Monitoring Heat Treatment Conditions of Polymer Composite Material Products**

927K0112A Moscow IZMERITELNAYA TEKHNIKA  
in Russian No 5, May 91 pp 41-43

[Article by O.L. Petrovskiy, V.N. Shalygin]

UDC 678.6.028:53.082.4

[Abstract] The need to detect spontaneous departures from the structural continuity of polymer composite materials (PKM) during heat treatment which in the end, may lead to unacceptable macrodefects, is identified and an acoustic emission instrument complex (AEIK) for monitoring the heat treatment condition of items from polymer composite materials developed on the basis of a domestic AF-15 acoustic tester is described. A block diagram of the new nondestructive testing instrument is presented and its operating principle is outlined. The new device makes it possible to ensure an almost 100 percent confidence of detecting and locating structural macrodefects in polymer composite material products thus laying the groundwork for their optimum correction and resolution. The acoustic emission (AE) method's sensitivity exceeds that of the ultrasonic nondestructive testing instrument by almost an order of magnitude, making it a reliable tool for monitoring heat treatment conditions of a wide range of polymer composite material products. Figures 2; references 4.

**State of Transducer Development in Europe**

927K0112B Moscow IZMERITELNAYA TEKHNIKA  
in Russian No 5, May 91 pp 65-70

[Article by B.I. Podlepetskiy]

UDC 53.087.92

[Abstract] The proceedings of the Eurosensor-IV international conference held in Karlsruhe, Germany, in October 1990 and attended by delegates from 20 European countries are summarized. It is noted that in 1989 alone, nearly 3,000 types of sensors valued at over DM 9 billion were produced in Western European countries. A broad range of sensors and transducers covered in 267 reports are described: transducers of mechanical quantities (i.e., pressure, displacement, force, velocity, and acceleration), miniature microphones, resonator-based transducers, chemical sensors, magnetic field induction pickups, temperature-sensitive elements, and hygrometers. It is emphasized that most of today's transducers of physical and chemical quantities are based on the use of high-tech state-of-the-art devices and technologies and that a clear trend toward developing integrated transducers containing sensor and actuator elements with subsequent microprocessor-based signal processing in order to automatically calibrate and/or equalizer the systematic errors is emerging. References: 41 Western.



**Response to Article 'On Improving Relationships  
Among Electric Power Users and Suppliers'**

927K0133C Moscow *PROMYSHLENNAYA  
ENERGETIKA* in Russian No 10, Oct 91 p 54

[Article by M.M. Bobrov, A.G. Sidorov]

UDC 621.311.4.003.13.001.8

[Abstract] The authors agree with F.A. Olenev's (*Promyshlennaya energetika* No. 12, 1990) assertion that existing relationships among electric power consumers and producers do not provide the former an incentive to develop energy saving programs but strongly disagree that fees should be charged according to the actual electric power at

the power system's combined peak loads since the processes of electric power generation, distribution, and consumption are continuous and virtually concurrent. The authors also dismiss Olenev's suggestion that fees be charged for a uniform electric power demand distribution through the day, i.e., encouraging the load curve equalization. The authors concur with critical comments regarding para. 1.10.1 and 1.10.2 of the "Electric Power Usage" Rules since they are not conducive to developing reactive power compensating systems. Finally, the authors are soliciting responses to A.P. Aleksandrov's article about the relationship between the Moscow Power Utility (POEiE) and its users on the basis of new contractual arrangements (*Promyshlennaya energetika* No. 7, 1990). References 2.

**Visualization of Weak Infrared Signals by Anti-Stokes Phosphor in 1.4-1.7  $\mu\text{m}$  Band**

927K0063B Minsk ZHURNAL PRIKLADNOY SPEKTROSKOPII in Russian Vol 55 No 1, Jul 91 pp 104-110

[Article by A.V. Kurochkin, O.Ya. Manashirov, P.A. Mikheyev, D.K. Sattarov, B.V. Smirnov, O.V. Tsyurupa, Leningrad State University, State Optics Institute imeni S.I. Vavilov, and Lyuminofor Scientific Production Association, Stavropol]

UDC 537.37:621.383.4:628.9.035

[Abstract] The spectral response and energy characteristics of infrared (IK) anti-Stokes  $\text{Er}^{3+}$  luminescence in various matrices are studied in order to develop high-efficiency anti-Stokes phosphor (ASL) for visualizing weak radiation fields in a 1.4-1.7  $\mu\text{m}$  band with the help of image converters (EOP). Polycrystal anti-Stokes phosphor three-layered samples consisting of a thin anti-Stokes phosphor layer between two transparent substrates with given parameters were used in experimental studies. The anti-Stokes phosphor was excited by a light-emitting diode radiation with  $\lambda_{\text{max}}=1.55$   $\mu\text{m}$  as well as an incandescent lamp with a halogen cycle through a set of light filters; the excitation power flux density varied within  $10^{-2}$  to  $10^{-6}$   $\text{W/cm}^2$ . Luminescence spectra were examined using a computer-aided spectrometer. Experimental anti-Stokes phosphor samples synthesized by the high-temperature solid-phase method were investigated; the following substances were used as the anti-Stokes phosphor basis: oxysulfides, oxychlorides, and fluorides, including  $\text{GaF}_2:\text{Er}^{3+}$ , and rare-earth element oxides, mixed yttrium, barium, and sodium fluorides, etc. As a result, a two-phase "Ikavizor-1.5" visualizer was developed; the device has a 20-30 lines/mm resolution whereby an infrared excitation power density of  $10^{-4}$ - $10^{-5}$   $\text{W/cm}^2$  is sufficient to ensure an

image converter screen luminance of  $1 \text{ cd/m}^2$ . When an image converter with a Ga-As photocathode is used, the device's sensitivity reaches  $10^{-8}$ - $10^{-11}$   $\text{W/cm}^2$ . Figures 4; references 28: 24 Russian, 4 Western.

**Real Time Digital Recording Equipment for Irregular Processes at Frequencies of up to 7.5 GHz**

927K0063C Minsk ZHURNAL PRIKLADNOY SPEKTROSKOPII in Russian Vol 55 No 1, Jul 91 pp 156-158

[Article by A.F. Denisov, A.G. Kosakovskiy, A.G. Onishchenko, Yu.V. Stasyukinas, Radio Instruments Scientific Research Institute, Vilnius]

UDC 621.317.755:681.335

[Abstract] The two most popular methods of recording pulse signals in real time on the basis of a single pulse - direct analog-to-digital conversion (ATsP) with subsequent digital storage and oscillography with subsequent photorecording or conversion to a digital form (digitizing) of the image from the cathode ray tube screen (ELT) - and their advantages and shortcomings are reviewed. Principal specifications of high-speed digital oscillographs and recorder manufacturers in the USSR, the United States, and the Netherlands, particularly the number of channels, sampling rate, capacity, frequency band, RAM volume per channel, and measurement error, are compared. It is shown that the new oscillographic instruments summarized combined with commercial general-purpose devices are suitable for quickly developing multi-channel and computer-aided field and lab instruments for digital recording of irregular processes in real time for a wide range of experimental research tasks within a broad amplitude and frequency band (from direct current to 7.5 GHz) with minimal outlays of time or resources. Tables 1; references 2: 1 Russian; 1 Western.