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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering

(27)

Summary No. 4436

21 March 1963

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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering (27)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations, from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, five, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, Physics and Mathematics, and Organization and Administration of Soviet Science, are issued monthly. The sixth series, Chinese Science, is issued twice monthly; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. ELECTRONICS

Communications

1. Portable Two-Way Radio for Spotting Fires

"New Types of Radio Stations," by S. Zhdanov, A. Yevseyev, and A. Smirnov, Pozharnoye Delo (Fire Fighting), No 5, 1962, p 21 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-7-139 i)

In spotting fires, the portable FM simplex short-wave 27RI set is used for two-way communication, using two identical sets or one 27RI in conjunction with type 28RI and 32RI sets. The output power does not fall below 0.4 watt at a nonlinear distortion factor not over 15 percent. The sensitivity of reception is 2 microvolts at a signal-to-noise ratio of 5:1 and 7-kilocycle deviation. It is powered by two STsD-12 batteries. The set requires 1.2 amperes to receive and 3.0 amperes to transmit. It weighs 3.5 kilograms and is 265 x 78 x 183 millimeters in size. With a quarter-wave vertical antenna, it operates under city conditions over a distance of 2.0-2.5 kilometers with identical sets at both ends, over 4-5 kilometers in conjunction with a radio mounted in a fire truck, and for 6-8 kilometers in rural areas. It can send and receive tone signals at a frequency of 1,450 kilocycles. A block diagram of the transceiver is given.

2. Using Petroleum Industry Power Lines for Communications and Telemechanics

"On the Question of Using the Power Distribution Networks of the Petroleum Industry for the Transmission of Communications and Telemechanics Signals," by M. Ye. Plekhanova and V. K. Zhegalov, Trudy Vsesoyuznogo Neftegazovogo Nauchno-issledovatel'skogo Instituta (Proceedings of the All-Union Petroleum-Gas Scientific-Research Institute), No 35, 1961, pp 98-116 (from Referativnyy Zhurnal--Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-152 k)

Results are given of an experimental study of power lines of the petroleum industry as channels for telemechanics. The study produced the following: (1) the attenuations of the communications and telemechanics channels for various connections of the telemechanics equipment to the power line in the frequency range 0.5-150 kilocycles, (2) the output impedance of the 0.4-kilovolt line, and (3) the magnitude and type of interference.

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The most favorable frequency range for transmitting telemechanics signals lies within the range 30-100 kilocycles for phase-to-phase and phase-to-ground connections.

3. Production of Television and Radio Receivers in USSR

"Fifth Year of the Seven-Year Plan"; Moscow, Radio,
No 1, Jan 63, pp 1-2

The article contains the following passages:

"In 17 design organizations, there are design experts, engaged in problems of radio and television receiver design. The production of television receivers is organized at 19 plants; radio receivers, at 32 plants. These plants, located in various cities, manufacture radio and television receivers of different design and size, which often belong to the same class. In 1962, 12 types of television receivers and 47 types of radio receivers were in production.

"Such an unjustifiable multiplicity of types interferes with organized mass production of television and radio receivers, hinders application of highly productive mechanized equipment, and prevents lowering costs and improving quality."

4. Progress in the Field of Electronics

"Electronics and Progress in Engineering," by V. Balashov,
Major General of Engineering and Technical Service; Moscow,
Krasnaya Zvezda, 8 Dec 62, p 6

Marvelous quantum devices for generating high-directivity oscillations in the optical and infrared frequency range are now being built on the principle of quantum radiophysics. Such amplifiers are able to improve the sensitivity of radio receivers several hundredfold, i.e., to increase the radio range many times. Progress in solid state physics and radio-electronics has led to a new branch of electronics -- molecular electronics or "molelectronics." A multicomponent "molelectronic" circuit may be in the form of a very small piece of semiconductor material having a volume of but one thousandth of a cubic centimeter. Here by diffusing the desired amount of impurities at the surface and at predetermined depths, various zones are formed which function as diodes, triodes, resistors, capacitors, and other circuit components. With the aid of "molelectronic" circuits, it is possible to mount more than 1,000 components in a single cubic centimeter.

The article contains the following passage:

"The armed forces of our nation will receive various radio-electronic equipment which will possess higher reliability and high tactical and operating characteristics. Together with the radio, radar, and radio-navigation equipment, our troops are using widely electronic computers which improve the command efficiency of officers and staffs in guiding the troops."

5. New Specifications for Television Receivers

"Black-and-White Television Receivers," by A. N. Tikhonov;
Moscow, Standartizatsiya, No 1, Jan 63, pp 53-58

The State Committee on Radioelectronics, Council of Ministers USSR, has worked out tentative specifications for a new state standard covering black-and-white television receivers. This new tentative standard does not extend to transistorized television receivers, nor to those operating from a self-contained dc power source. Television receivers are divided into three classes on the basis of screen size: The first class has a screen over 59 cm (diagonal); and the third class, a screen of 35 cm. The screen size is not specifically defined for the second class.

The standard covers receivers for ranges of 48.5-100.0 Mc and 174.0-230 Mc. The standard specifies horizontal resolution in terms of lines of not less than 500 for the first class, 450 for the second, and 400 for the third. Sensitivity in microvolts for both audio and video channels should be not less than 50 for the first class, 80 for the second, and 200 for the third. Intermediate frequency for the audio channel is fixed at 38.0 Mc and for the video channel, at 31.5 Mc for all classes. Selectivity in decibels for the video channel is 40 for the first channel, 30 for the second, and 24 for the third. Mean sound pressure at a distance of one meter in bars for table models is 8 for the first class, 6 for the second, and 3 for the third. The passband of the audio channel for table models is 80-12,000 cps for the first class, 100-10,000 cps for the second, and 150-6,000 cps for the third. The power requirement in watts is not over 200 for the second class and 160 for the third.

The new standard requires further refinement because a number of qualitative indexes, such as norms for brightness and contrast of image, are not specified.

6. Long-Distance Telephone Service Irregular

"Green Light to Through Intercity Conversations," by
V. I. Osipova; Moscow, Vestnik Svyazi, No 1, Jan 63,
pp 21-23

Shortage of telephone channels not only delays the availability of long-distance telephone service, but also often makes it totally unavailable for several days.

Almost daily the Kiev telephone exchange fails to provide connections with other cities. The Kuybyshev exchange is often unable to make connections with Aktyubinsk, Orenburg, Saratov, Penzan' and Ul'yanovsk. The Leningrad exchange daily refuses to accept calls for Murmansk, Novgorod, and Volkhov. The Novosibirsk exchange daily refuses to accept calls for Karaganda, Irkutsk, Komsomol'sk-na-Amure, and Khabarovsk.

Components

7. Transistor Classification

"New Transistors"; Moscow, Radio, No 1, Jan 63,
pp 52-57

The State Committee for Electronic Engineering, Council of Ministers USSR, has introduced three classes for transistors and semiconductor diodes. The low-power class has dissipating capacity at the collector of not over 300 milliwatts. To this class belong the following transistors: P20, P21A, P25-P26, P27-P28, P29-P30, P410-P411A, P414-P415B, P416-P416B, and P501-P503. To the second class belong the medium-power transistors with dissipating capacity at the collector from 300 to 1,500 milliwatts. To the third class belong the high-power transistors with dissipating power at the collector above 1,500 milliwatts. The designation of the medium and high-power transistors are P209, P209A, P210, P210A, P302, P303, P303A, P304, P601, P601A, P601B, P602, P602A, P604, P604A, P604B.

On the basis of operating frequency, the transistors are divided into: low-frequency transistors for operation at less than 3 Mc, medium-frequency for operation at 3 Mc -30 Mc, high-frequency transistors for operation at 30 Mc-120 Mc, and superhigh frequency for operation above 120 Mc.

The article includes nine tables with basic parameters for all the above-designated transistors.

8. Tunnel Diode Triggers

"Amplitude Triggers With Tunnel Diodes," by M. S. Neyman and G. P. Zemtsov; Moscow, Radiotekhnika, No 1, Jan 63, pp 40-47

The article discusses the problem of tunnel-diode trigger application in systems of discrete radio-pulse computer and logic automation utilizing the amplitude method of information recording. The advantage of the tunnel diode when used as an amplitude trigger lies in its high negative conductivity, which permits the realization of auto-oscillations in systems with a very low Q-factor. This latter fact reduces the time required for switching from one state to another, i.e., increases speed of operation of the trigger.

The tunnel-diode triggers were examined for operation at frequencies of 4.9 and 520 Mc. Further improvement in tunnel diode technology should extend the range of their operation to several gigacycles.

Of germanium tunnel diodes tested for trigger mode of operation at a frequency of 520 Mc, seven gave satisfactory performance.

9. Performance of Transistor Switches Used With Electromagnetic Devices

"Investigation of the Operation of a Transistor Switch With a Resistive-Inductive Load," by V. G. Bosenko, N. B. Sutorikhin, and G. Z. Maksimov; Moscow, Elektrosvyaz', No 1, Jan 63, pp 64-68

Results are given of experimental investigations of the reliability of transistor switches loaded by electromagnetic actuating instruments served as the collector load of triodes connected in a circuit with a common emitter. For comparison purposes, oscillograms were made of the processes occurring in three circuits -- the first containing only a relay, the second containing an identical relay in series with a transistor switch, and the third containing a transistor switch in series with an active resistance. On the basis of experimental and theoretical results, it was concluded that:

1. Overvoltages occurring in the collector junction during switching off of the triode are not harmful to the triode and have no apparent effect on its reliability.

2. A triode with resistive-inductive loading operating in a switching regime will function reliably if the power dissipated in the collector is within limits prescribed for the given type of triode.

3. Types P26 and P26A low-power triodes may reliably perform control functions for a number of electromagnetic instruments.

10. Tier-Arranged RC-Filters

"Tier-Arranged RC-Filters," by V. L. Zmudikov; Moscow, Radiotekhnika, No 1, Jan 63, pp 61-67

A new type of tier-arranged RC-filters is suggested which has a considerably higher frequency discrimination than conventional RC-filter. Such tier-arranged filters can be looked upon as 2T-filters in which the phase-shifting networks are replaced by RC-circuits with transfer constant greater than one. The simplest form of such a filter is the two-tier arrangement; however, the number of tiers can be increased to any desired number.

11. Titanium Coatings in Place of Gold for Grids of Miniature Electron Tubes

"The Use of Titanium Coatings for the Grids of Electron Tubes," by L. A. Dudnik, Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta (News of the Leningrad Electrical Engineering Institute), No 46, 1961, pp 23-28 (from Referativnyy Zhurnal--Avtomatika i Radioelektronika, No 11, Nov 62, 11-3-27 kh)

Preliminary data indicates that the use of titanium in place of gold as coating for the grids of miniature input amplifier tubes is more effective. In an experimental tube, a regular industrial type oxide cathode was used as a vaporizer; the substrate was the thin wire used to make the grids; the anode of the tube served as a collector in the measurements of the filament emission current. To provide a uniform coating of active substance on the examined conductor, the center part of it was separated out by means of nickel screens. The temperature of the conductor was measured with a chromel-aluminum thermocouple and optical micropyrometer. The experimental tubes were evacuated, degassed, and sealed off on automatic industrial installations; then the barium getters were diffused in them. The pressure of the residual gases in the tubes was 10^{-6} millimeters of mercury. The work function of the gold-plated surface was measured after evaporation and heating to 800 degrees centigrade and found to be 3.0-3.2 electron volts. For the purpose of comparison, the emission properties of a titanium coating on molybdenum and tungsten wires were studied. One of the criteria of suitability of the

coating for suppressing emission was the temperature at which a noticeable emission current flowed; this current (10^{-3} microamperes) occurred at about 950-1,000 degrees centigrade in the case of the titanium and at about 600 degrees centigrade for gold. Upon contact with air, the titanium surface becomes covered with a film of TiO_2 . When an active layer from the oxide cathode is evaporated onto it at a temperature not less than 300 degrees centigrade, a chemical combination of the products of vaporization of the cathode (BaO) and the titanium oxide occurs. This chemical compound has a stable work function and a higher emission factor than the gold.

12. Selection of Transistors on the Basis of Noise

"On a Method of Selecting Transistors on the Basis of Noises," by L. G. Lishin, Trudy Vsesoyuznogo Nauchno-issledovatel'skogo Instituta Zvukozapisi (Proceedings of the All-Union Scientific-Research Institute of Sound Recording), No 9, 1961, pp 81-85 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-4-47 b)

Transistors used in the input stages of audio (reproduction) amplifiers can be selected on the basis of noises. In culling out the transistors, it is important to know the integral value of the power of the excess noises $P_{n.ex.}$.

$$P_{n.ex.} = \frac{1}{R_{eq}} \int_{f_h}^{f_b} U_n^2(f) \cdot K(f) \cdot df,$$

where R_{eq} is the equivalent noise resistance at output of the test amplifier; f_h is the lower limit of the frequency characteristic of the audio (reproduction) amplifier; f_b is the upper limit of the excess noises of the transistor; $U_n^2(f)$ is the mean square voltage of the transistor noises in relation to frequency; and $K(f)$ is the frequency characteristic of the audio (reproduction) amplifier in relation to output power. It is suggested that $P_{n.ex.}$ be measured by conducting two successive measurements of the transistor noise using two different band filters with pass bands Δf_1 and Δf_2 differing in value by a factor of 10-20, whereby the lower frequency of the passband of both filters should be equal to f_h . The integral value of the mean square voltage of the excess transistor noises is computed

with the expression

$$U_{n.ex.}^2 = \frac{(\Delta f_1 / \Delta f_2) \cdot U_{n2}^2 - U_{n1}^2}{(\Delta f_1 / \Delta f_2) - 1}$$

where U_{n1}^2 and U_{n2}^2 are successively measured mean square noise voltages.

Results are given of an experimental selection of 70 transistors of the alloyed type.

13. Automatic Indication of Admissible Inverse Volts in Semiconductor Diodes

"A Device for the Automatic Determination of the Admissible Inverse Voltage of Semiconductor Diodes," by M. P. Vayvars, Trudy Instituta Energetiki i Elektrotehniki AN LatvSSR (Proceedings of the Institute of Power Engineering and Electrical Engineering Academy of Sciences Latvian SSR), Vol II, 1961, pp 87-93 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No II, No 62, 11-4-47 sh)

At the present time, the sorting of semiconductor diodes is done by observing on an oscilloscope the trailing edge of the volt-ampere characteristic, and the admissible inverse voltage is determined by the volt-ampere value at which the volt-ampere characteristic begins to deviate abruptly. Since such a method is inaccurate and, because of the absence of quantitative criteria, subjective, particularly in the case of transistors, a device was designed for the purpose of sorting diodes automatically according to precisely formed quantitative criteria. The device is based on computer elements. The selection criteria are the maximum admissible value of the inverse current with respect to voltage and the maximum admissible power before disruption of the p-n junction. The first criterion applies for semiconductor diodes with steep volt-ampere characteristic; and the second, for those with flat volt-ampere characteristic. Block and principle circuit diagrams are given.

14. Compensating Temperature Differences in Thermistors

"A Method of Compensating the Differences of the Temperature Curves of Semiconductor Thermistors," by M. A. Kaganov, Leningrad; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 97-103.

Two earlier English-language articles (E. Anderson, Bulletin of the American Meteorological Society, Vol 30, No 5, 1949; E. Keonyan and J. Shaffner, Electrical Engineering, Vol 73, No 10, 1952) did not establish conditions which guarantee the most accurate compensation or considered only the case where a minimum reduction of the temperature coefficient is guaranteed.

This work presents a method of synthesizing compensation circuits for the differences of the temperature characteristics of thermistors, whereby the calculation of the circuit parameters is based on the guarantee of a minimum measurement error in view of the spread of the parameters of the sensing elements. Those compensation circuits are considered which have two and three invariable resistances and which provide accurate measurements over a wide range of temperatures.

15. Noise in Discrete Synchronization Systems Examined

"Experimental Investigation of the Noise-Immunity of a Synchronization System," by V. Ye. Buldviner; Moscow, Elektrosvyaz', No 1, Jan 63, pp 3-12

A description is given of the laboratory method used to compare the noise-immunity of a discrete synchronization system with different averaging devices. The "conditional" or reference synchronization system used in the experiment consists of a regenerating device to which are simultaneously applied telegraph signals distorted by a time-distortion simulator and regenerating pulses which are cophased in the same telegraph signal oscillator. At the same time, the distorted telegraph signals enter a second regenerator; but, in this case, the regenerating pulses are obtained from the output of the tested synchronization system. The amplitudes of time distortions at the inputs of the conditional and the test systems are compared.

It is concluded that:

1. A discrete synchronization system with a reversible counter used as the averaging device has high noise-immunity, short response time, and does not require fine phase adjustment.
2. The disadvantage of synchronization systems with indirect control is the small frequency range which results when the modulation pulse-spacing is increased; it is, therefore, advantageous to use automatic blocking of the averaging device.

16. Optimum Characteristics of Quantizers

"Optimum Characteristics of Quantizers," by A. I. Velichkin; Moscow, Radiotekhnika, No 2, Feb 63, pp 3-9

The author examines the characteristics of devices used to quantize continuous processes according to levels which are optimum for mean root square error and information criteria. The optimum characteristics are described graphically and do not require the use of computers. The following conclusions are made:

1. The optimum characteristics of quantizers are determined by one-dimensional distributions of continuous information. The characteristics, optimum in the sense of mean root square error and information, are not coincident.

2. Quantizers with uniform characteristics have optimum properties if they have the appropriate compressors before them and expanders behind them. With regard to information criteria, the optimum characteristic of the compressor coincides with the integral law of distribution of the process. The optimum characteristics of the expanders are not the reciprocal characteristics of the compressors.

3. In evaluating distortions of the process during quantization, it is sometimes advantageous to use the entropy noise intensity of quantization.

Instruments and Equipment

17. Focusing Device for Tubular Electron Beams

"Device for the Electrostatic Focusing of Long Tubular Electron Beams," by Yu. N. Pchel'nikov, USSR Patent, Class H 01j; 21g, 1317. No 151732 (752574/26-9, 20 Nov 61); Moscow, Byulleten' Izobreteniy, No 22, Nov 62, p 34

A device is described for the electrostatic focusing of long tubular electron beams which uses a centrifugal-electrostatic focusing system with an inner electrode in the form of a rod. To increase the sharpness of focus of both the internal and external edges of the beam, decrease the focusing difference of potentials, and facilitate the introduction of the electron beam into a delay system, its external electrode has a periodic (double helix) structure, between the elements of which is applied a constant difference of potentials.

18. Device for Correction of Gyro Drift Patented

"Airborne Device for Correcting the Drift of Gyroscopes Relative to Fixed Directions in Inertial Space," by A. S. Grishin, USSR Patent, Class G 01c; 42c, 2550. No 151835 (763871/26-10, 13 Feb 62); Moscow, Byulleten' Izobreteniy, No 22, Nov 62, p 46

This airborne device for correcting the drift of gyroscopes relative to fixed directions in inertial space contains several free gyroscopes with measuring axes pickups, an amplifier, and a platform suspension system connected to the stabilization and control system. For the purpose of increasing the accuracy of maintaining the aircraft's course, a programmer is connected to the control system which causes the gyroscope frames to turn around the axis of rotation of the rotor by angles of

$B_i = (-1)^{i-1}$, where $i = 1, 2, 3, \dots n$ cycles of programmed turns. Automatic compensation for the constant components of drift errors of the free gyroscopes is provided by connecting to the programmer a computer which is linked to the torque pickup units of the platform.

19. Method of Measuring Spurious High Frequency Radiation

"Method and Apparatus for Measuring the Intensity of Spurious Radiations of Short-Wave Transmitters," by I. I. Seleznev, M. S. Safin, and A. D. Taranenko; Moscow, Elektrosvyas', No 1, Jan 63, pp 13-16

A new simple method of measuring spurious radiations of short-wave transmitters, based on the principle of measuring values proportional to the current and voltage in the antenna feeder line, is described. A single-loop frame enclosed in an electrostatic screen is used as the pickup for the magnetic field created by the current in the feeder. The emf induced in the loop is fed by cable through an active matching four-pole network to a high frequency filter which suppresses the voltage of the fundamental frequency. From there it moves through a high frequency wide-band balancing transformer to a frequency-selective microvoltmeter. The wire loop is placed under the feeder and moved along it while maximum and minimum deflections are read on the voltmeter, which is tuned to the known frequency of the harmonic component. Using the known values of characteristic impedance of the feeder and the coefficient of proportionality, it is possible to determine the power radiated by the feeder. Total error of the method under the most unfavorable conditions does not exceed = 25%.

20. Georgian Institute Improves Phase Meter Performance

"Increasing the Accuracy of Measuring the Phase Shift Between Two Sinusoidal Oscillations," by V. P. Kashakashvili, Trudy Instituta Energetiki AN GruzSSR (Proceedings of the Institute of Power Engineering, Academy of Sciences Georgian SSR), Vol 15, 1961, pp 57-64 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-7-187 e)

A method is described for measuring the phase difference of two sinusoidal voltages by means of a circular scan and a peaker which produces brightness markers as the voltages to be measured pass through the null point. The measured difference of phase is equal to the angle between the brightness markers on the circular scan of the oscilloscope.

The frequency for the circular scan is multiplied by a factor of four in order to increase the accuracy. A circuit diagram is given for a phase meter with a guaranteed error under 0.6 degree at a frequency of 500 cps.

21. Phase-Angle Meter for Ultralow Frequencies

"Generator and Phase-Angle Meter for Ultralow Frequencies,"
by Ye. P. Bochkarev; Moscow, Izmeritel'naya Tekhnika, No 1,
Jan 63, pp 44-45

At present, Soviet industry manufactures rather complicated ultralow-frequency instruments incorporating vacuum tubes which do not provide a direct reading of phase shift.

A new, small-size, direct-reading transistorized generator and phase-angle meter for the frequency range of 0.1 to 10 cps was recently designed. This device consists of a square-pulse generator with pulse repetition rate from 360 to 36,000 cps and a frequency divider with a factor of 3,600 ($2 \times 10 \times 3 \times 3 \times 10 \times 2$). The square pulses, after division, are converted to a sinusoidal wave with the aid of two integrating circuits.

The investigated ultralow-frequency signal is compared to standard frequency, and the phase shift between the two is registered directly in degrees. The instrument has overall dimensions of 492 x 352 x 220 mm. The accuracy of phase-shift measurements is about one %. The nonlinear distortion factor of the ultralow-frequency output voltage is less than 2.5%.

The principal drawback of the instrument is that it generates only 24 discrete frequencies.

22. Instrument for Measuring Ice Formation in Water Mains

"Experience in Measuring Thickness of Ice Formation on Internal Walls of Water Mains," by M. P. Suslov; Moscow, Priborostroyeniye, No 1, Jan 63, p 25

Continuous control of ice formation in water mains is required to prevent possible disruption of water supply. Up to the present time, no instruments were available which could automatically and continuously register ice formation in water mains and transmit such information to a distant control point.

The All-Union Scientific-Research Institute for Water Supply, Sewerage, Hydrotechnical Structures, and Hydrological Engineering has designed an instrument for automatic monitoring of ice formation in water mains. This device operates on the principle of change in electric capacitance with change in thickness of ice formation. An electric capacitor is installed in a section of water main by inserting a tight insulating sleeve over which are placed two semicircular capacitor plates. The sheet of ice in the pipe acts as a dielectric material for this capacitor. By measuring the changes in capacitance, it is possible to estimate the thickness of the ice.

23. New Measuring Instruments

"Plans Are Put to Life," A. Gavrilov, Chairman, Main Administration, Scientific and Building Industry; Moscow, NTO SSSR No 1, Jan 63, pp 34-36

The Council of the Scientific-Technical Society at the Leningrad plant "Vibrator" has designed a standard series of oscillographs and oscillographic vibrators which will be for the first time, manufactured in USSR.

The All-Union Scientific-Research Institute for Metrology imeni Mendeleev designed a new compensated high-precision voltmeter for testing industrial high-frequency meters.

The Tbilisi Scientific-Research Institute for Instrument Building and Automation Equipment has designed a computer for optimal distribution of electric power of thermal electric stations.

Members of the Scientific Technical Society of the Instrument Building Industry has designed a test stand for the alignment of "Ural-2" (computer) printing mechanisms.

24. Starting Device for Large Fluorescent Lamps

"Starting Device for Large Tubular Xenon Lamps Type DKST-2000," by A. L. Vasserman; Moscow, Svetotekhnika, No 1, Jan 63, pp 2-12

Soviet industry has mastered the production of powerful ballast-free fluorescent tubular lamps type DKST-2000. The Moscow Electric Bulb Plant has developed a firing circuit and automatic starting device for such lamps.

Firing such fluorescent lamps with the aid of a spark generator is accomplished by connecting the primary winding of the transformer to the power line, while the voltage from the secondary winding is applied to a capacitor. At the instant the voltage across the capacitor reaches the breaking-down value of the gap, pulsed current rushes through the primary winding of a pulse transformer, inducing high-voltage, high-frequency pulses in the secondary winding. These high-voltage, high-frequency pulses start the fluorescent lamp.

The DKST-2000 xenon lamps operate from a 380-v, cps power source. The voltage generated by the pulse transformer which starts the lamp varies from 296 to 396 kv.

Some of these new xenon lamps have been installed on the streets of Moscow.

25. Method of Remote Temperature Measurement

"Investigation of the Temperature Field of Electrical Equipment With an "Evaporograph," by I. B. Levitin, N. G. Myasnikova, K. B. Popova, and V. N. Sintsov; Moscow, Vestnik Elektromyshlennosti, No 1, Jan 63, pp 18-23

The "evaporograph," operates on the principle of difference of evaporation or condensation of a thin layer of liquid on the detector membrane heated by infrared radiation from the examined object. The infrared radiation from an object is focused on the membrane by a special lens. One side of the membrane is covered by a layer capable of absorbing infrared radiation, while the other side of the membrane faces a cavity filled with saturated vapors.

Depending on the temperature of the membrane, the vapors either condense or evaporate from it. If the examined object has a temperature gradient, then a "liquid" relief is formed on the membrane. This "liquid" relief is displayed through the phenomenon of light interference in thin films.

The "evaporpgraph" is able to determine temperature in a range from 300C up to several hundred, with an accuracy of $\pm 2^{\circ}$ in the range of 30-400C.

The device incorporates provision for photographing the thermal images of electrical equipment and wiring circuits.

26. Ultrasonic Device for Testing Wear Resistance

"Ultrasonic Device for Testing Materials for Cavitation-Abrasion Wear," by S. P. Kozyrev, Institute of Machine Studies; Moscow, Zavodskaya Laboratoriya, No 2, Feb 63, pp 229-232

The Institute of Machine Studies of the Academy of Sciences USSR has designed a device for testing the cavitation-abrasion wear of various materials. The device operates on the principle of inducing ultrasonic oscillations in a stream of liquid carrying abrasive particles.

In this type of device, the magnetostrictive characteristic of certain materials, such as nickel, in an alternating magnetic field is utilized. For this purpose, a thin-walled nickel tube is used, one end of which is placed into a magnetic coil, while the other--with sample attached is immersed in a bath with water. High-frequency current in the coil induces magnetostrictive oscillation in the tube, thus creating a cavitation zone at the surface of the sample. The amplitude of sample oscillations is about 100 microns at a frequency of 7 to 10 kc. The wear resistance of the sample is evaluated by a gravimetric method, and comparison is made with standard wear-resistant material.

27. Modernized Voltage Regulator

"Modernized Automatic Voltage Regulator Cabinet," by L. A. Spasskaya and M. I. Soloveychik; Moscow, Vestnik Svyazi, No 1, Jan 63, pp 12-14

The newly designed automatic voltage regulator SARN-M provides stabilized feed voltage for heater filaments and plate circuits of long-range communication equipment. Since the mass production of powerful voltage regulators suitable to serve the needs of long-range communication equipment has not yet been properly organized in USSR, first models of the modernized SARN-M voltage regulator were built with some of the older components.

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The modernized SARN-M cabinet may contain up to six voltage regulators and is able to maintain voltage within +3% of rated value. The device provides stabilized voltage of 21.2 v for heating filaments and a stabilized voltage of 200-212 for plate circuits.

Mass production of the modernized SARN-M voltage regulator will begin during the second half of 1962.

28. Single Action Accelerometers

"Accelerometers of Single Action," by A. S. Zhmur, V. S. Il'inskiy, and V. P. Nenyukov; Moscow, Izmeritel'naya Tekhnika, No 12, Dec 62, pp 12-16

The simplest device for measuring acceleration is the single-action, "crusher" accelerometer which does not require any electric pick-up units. But due to incomplete study of the theory of such accelerometers, proper corrections to actual readings to raise reliability and accuracy have not yet been ascertained.

The purpose of this work is to determine calibration methods for both static and dynamic application, e.e., for measurements with falling and colliding bodies. The "crusher" accelerometer consists of a steel cylinder with two lead plugs at its ends and a free-moving pointed steel plunger placed between the two lead plungers. The pointed ends of the plunger are in form of a 120° cone.

When the accelerometer is subjected to impact acceleration, an impression of the plunger is left on the surface of the lead plug. The diameter of the impression is proportional to the magnitude of force and acceleration. Depending on the value of the measured acceleration, the weight of the plunger is varied from 250 to 10 grams for the acceleration range from 400 to 10,000 g's. Tests carried out with the "crusher" type accelerometers have shown that the readings are low for short duration impacts. For instance, if the form of impulse acceleration is in the form of a 500-cycle semisinusoidal, then the readings are about 5-8% low, while at 7,000-cycles the readings may be up to 70% low.

Thus, by introducing proper correction to actual readings fairly accurate results can be obtained for various accelerations and duration of impact.

29. New Electronic Devices

"It Is Interesting To Know"; Moscow, Trud, 31 Jan 63, p 3

A short note reads as follows:

Soviet experts have designed a new electronic instrument which counts parts in darkness. Its "secret" consists of the fact that its sensing element responds to invisible infrared rays.

Of interest also are the new thermistors -- sensitive detectors of temperature. They may be placed in the windings of electric machinery. If the temperature of the winding rises above the rated value, the device signals to stop the machine, thus preventing possible damage.

30. Progress of Soviet Metrology

"Metrology -- to the Level of Modern Requirements";
Moscow, Izmeritel'naya Tekhnika, No 1, Jan 63, pp 1-2

The article contains the following passages:

"The international comparison of standards has shown that Soviet standard units of length, mass, force, intensity of light, and electrical quantities are identical in precision with those of other countries, except for standard units of electrical resistance which were found to be inferior in stability to those abroad.

"Among the most urgent problems related to the development of standard measures can be named the following: an increase in precision of the existing standard of length by a factor of ten, obtaining of domestic Kr^{86} having a purity of more than 99%, creation of a set of standard sources of radiation, increasing the stability of standards of frequency, and building a standard dynamometer up to 1,000 kilonewtons."

31. Recent Soviet Patents in Field of Electronics and Instrumentation

"Class 21. Electrical Engineering; Class 42. Metering Instruments and Apparatus" Moscow, Byulleten' Izobreteniy, No 21, Nov 62, pp 27-32 and 40-47

Class 21a¹, 32₁₁. No 151379; by V. F. Vorob'yev. Method for Synchronizing Television Image in Video-Taperecorder.

Class 21a¹, 32₁₁. No 151380; by M. G. Arutyunov. A Block of Magnetic Heads for Ferrographic Recording of Numbers.

Class 21a¹, 32₅₀. No 151381; by A. M. Yerkina. Ionic Photorelay.

Class 21a¹, 36. No 151382; by N. N. Laptev, V. S. Moiseyev, and L. Ye. Smol'nikov. Relaxation LC Oscillator With Silicon Controlled Diode.

Class 21a¹, 26. No 151383; by V. I. Kurotchenko. Converter of Synchronizing Pulses.

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Class 21a¹, 26. No 151 384; Ye. I. Usyushkin. Semiconductor Pulse-Frequency Divider.

Class 21a², 1808. No 151385; by S. Ya. Sosul'nikov. Wide-Band Resonance Amplifier.

Class 21a³, 2101. No 151387; by V. M. Danchakov. Differential Step-by Step Selector.

Class 21a³, 5920. No 151388; by K. P. Mel'nikov. Device for Estimating the Utilization of Connecting Lines.

Class 21a⁴, 1401. No 151390; by V. P. Skuridin. A Method of Phase Radio-Telemetry.

Class 21a⁴, 4603. No 151392; by V. N. Uryadko. Pneumatically Operated Antenna.

Class 21c, 4650. No 151393; by I. K. Shrago. G. A. Makarov, and V. S. Shorgin. An Arrangement for Testing the Malfunctioning of Programmed-Control Pulse Systems

Class 21f, 39. No 151394; by B. A. Bakunovich. Method for Obtaining Hermetic Seals Between Mica and Metal in Vacuum Devices.

Class 21g, 405. No 151396; by V. P. Konoplev. Time Relay.

Class 21g, 1102. No 151397; by V. I. Savchenko. A Method for Measuring the Depth of p-n Junction in Germanium Plates.

Class 21g, 1102. No 151398; by A. P. Lyashok, V. P. Chalov, Yu. A. Ratnek, and V. P. Zubkov. Automatic Device for Welding Leads to Semiconductor Devices.

Class 21g, 1102. No 151399; by V. G. Mel'nik. Electrode Outlet of Silicon Semiconductor Device.

Class 21g, 1102. No 151400; by V. S. Soboleb and P. F. Kalinin. Device for Measurement of Resistivity in Small Semiconductor Crystals with Low Resistivity.

Class 21g, 1350. No 151402; by A. D. Kostinskiy and A. B. Piontkovskiy. Automatic Method for Measuring Gas Content in Electrical Vacuum Devices.

Class 21g, 1350. No 151403; by A. I. Il'yenkov and F. A. Zhuravel'. Method To Control the Parameters Stability of Semiconductor Devices.

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Class 21g, 20₀₁. No 151405; by L. Ya. Pishchik and V. A. Osokin. X-Ray Flaw Detector for Tapes.

Class 21g, 30₀₂. No 151408; by Yu. B. Shaub. Device for Measuring of Amplitude Ratio and Phase Shift.

Class 21g, 30₀₂. No 151409; Yu. V. Khomenyuk. Measuring Method for Geoelectric Prospecting.

Class 42c, 39₀₁. No 151479; by B. V. Dubrovskiy. Device for Determination of Astronomical Coordinates on Land.

Class 42c, 42. No 151480; by K. A. Ushakov and I. V. Potrakhov. Device for Determining the Ratio of Two Forces.

Class 42d, 10. No 151482; by L. S. Grinberg. Linear Two-Winding Potentiometer for Reproduction of Nonlinear Functions.

Class 42d, 10. No 151483; V. I. Turchenkov. Method of Integration (Differentiation) of AC Amplitude Envelope.

Class 42d, 10. No 151484; by V. I. Turchenkov. Method of Simulating a Function of Type $U=f(\frac{Y}{X})$.

Class 42h, 10₁₉. No 151486; by A. I. Liber. Method of Focusing and Optical System to Infinity.

Class 42i, 20₀₁. No 151488; by M. I. Shepelev and B. A. Mayzelis. Lifting Device for Radiosonde.

Class 42k, 10₄. No 151489; by V. F. Bol'shakov. Device for Measuring Torque on a Rotating Shaft.

Class 42k, 38₀₂. No 151494; by A. A. Ushakov. Device for Determination of Force of Friction in an Air Flow.

Class 42m, 14. No 151502; by V. L. Benin and V. U. Kizilov. Device for Multiplication and Division of Electrical Values.

Class 42m, 14. No 151503; by V. A. Mamchits. Magnetic Core Decoder.

Class 42m, 14. No 151505; by B. I. Petrenko. Method of Voltage-Frequency-Number Conversion.

Class 42m, 14. No 151506; by D. A. Tambovtsov. Device for Time or Frequency Selection of Electric Voltage Pulses.

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Class 42m, 14. No 151507; by I. V. Berg and F. G. Staros.
Ferrite Plate for Magnetic Storage Device.

Class 42m, 14. No 151508; by V. N. Ktitarev. Direction-of-Shift Transducer for "angle -- code" Converter of Storage Type.

Class 42m, 14. No 151509; A. P. Belyakov. Univibrator Incorporating Silicon Switching Diodes.

Class 42m, 14. No 151510; by Yu. V. Pshenichnikov. Binary Register for Digital Automatic Compensator.

Class 42m, 14. No 151511; by A. A. Sychev. Method of Executing Logical Operations.

Class 42m, 14. No 151512; by Yu. K. Pekshurov. Device for Solution of Laplace Equation.

Class 42m, 14. No 151513; by M. I. Kuznetsov. Binary Code Converter.

Class 42m, 15. No 151515; by V. Ye. Nakonechnyy and V. A. Brondukova. Voltage Divider for Digital Instruments.

Class 42m, 36. No 151516; by O. M. Zyablikov. Device for Processing Echo-Diagrams.

Lasers

32. Soviet Laser Research

"A Beam That Known No Obstacles," by I. Radunskaya;
Moscow, Smena, No 1, Jan 63, pp 28-29

V. A. Fabrikant was first to suggest the principles of simulated emission of radiation, and soon after World War II he and his associates were granted an authorship certificate for this discovery. It is difficult to explain why Fabrikant limited himself to filing application for his invention and did not present an official report before other scientists at that time.

In 1952, the young Soviet physicists N. G. Basov and A. M. Prokhorov, not being aware of Fabrikant's work, reported on their independent work in developing a molecular oscillator and amplifier. Although Fabrikant was the first to suggest the general principles of a molecular oscillator, American scientists arrived at the same conclusion independently.

In 1954 Basov and Prokhorov discovered that atoms and molecules may generate radio waves if such atoms or molecules are excited by bright light of proper wave length. Then the American scientist Blombergen applied this method to radiowave amplification with the aid of special crystals immersed in liquid helium. After this, the laurels went back to Moscow, where Fabrikant suggested another method for amplifying visible and infrared light with the aid of a gas cell.

Scientists of the Physics Institute have found two ways of amplifying light and infrared waves. They have build the first models of light and infrared wave amplifiers utilizing ruby crystals (studied in detail by Prokhorov) and the mineral fluorite (studied in Leningrad by Feofilov).

33. Soviet Lasers

"A Beam Penetrating Metal"; Moscow, Pravda, 23 Dec 62, p 3

A. M. Prokhorov, Corresponding Member of the Academy of Sciences USSR and an outstanding Soviet Scientist in the field of quantum generators, describes briefly the operation of a ruby laser.

President of the Academy of Sciences USSR M. V. Keldysh states that Soviet scientists have developed lasers capable of "burning" holes in any hard material, including diamond and ruby.

Materials

34. Secondary Emission Unaffected by Substrate Reflectivity

"Comparison of the Methods of 'Null' and 'Mirror' Substrates in the Secondary Electron Emission of Thin Metallic Films," by R. B. Segal', Uchenyye Zapiski, Cheropovetskiy Gosudarstvennyy Pedagogicheskiy Institut (Scientific Reports, The Cheropovetsk State Pedagogic Institute), Vol 3, No 3, 1962, pp 13-21 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11 Zh 287

It is shown that, in the investigation of the secondary electron emission of thin metallic films, the use of one or the other types of substrates has no effect on the results. The author consider a "null" substrate one for which the coefficient of inelastic reflection of electrons is considerably less than that of the top film and a

"mirror" substrate one for which the opposite applies ($\gamma > \gamma_s$). Examples of the first combination are Be, Ca, and Mg on a substrate of Ag, Bi, Ni, etc.; the second case would be, for example, Pt, Ag, and Bi on a Be-substrate.

35. New Standard for Germanium Determination

"Determination of Germanium Content in Coal," by I. N. Nikolayev; Moscow, Standartizatsiya, No 12, Dec 63, pp 37-38

A new standard, GOST-10175-62, on the matter of germanium determination in coal and coal ash will become effective on 1 January 1963. The necessity for this new standard was dictated by the fact that coal ash is now being recognized as a potential source of germanium.

The procedure consists in reducing the coal sample to ash at a temperature not over 625°C so as to prevent any loss of germanium. Then the germanium is extracted from the ash by a mixture of nitric, hydrofluoric, and phosphoric acids. It is then separated from other elements either by distillation as germanium tetrachloride or by extraction with carbon tetrachloride. Final determination of germanium is carried out by the phenylfluorone colorimetric method.

36. New High-Molecular Compound

"New High-Molecular Compound"; Moscow, Moskovskaya Pravda, 3 Feb 63, p 2

A short note reads as follows:

Armenian physicists and chemists have obtained a new high-molecular compound with pronounced dielectric and piezoelectric properties by adding various groups of molecules to a polymer. Experts believe that replacement of paper and mica with such a polymer dielectric will improve the performance of capacitors and reduce their size considerably. Plates from such compounds may be used in place of quartz and certain other materials employed in ultrasonic generators and pressure recorders.

37. Influence of Staining on Electrical Properties of KCl and NaCl Crystals

"On the Electrical Properties of Alkali-Haloid Crystals Stained From a Pointed Cathode," by G. D. Taresenko, Uchenyye Zapiski Leningradskogo Gosudarstvennogo Pedagogicheskogo Instituta imeni A. I. Gertsena (Scientific Reports of the Leningrad State Pedagogical Institute imeni A. I. Gertsen), 207, 1961, pp 163-175 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-4-7 a)

On KCl and NaCl specimens grown from a melt, a study was made of the dependence of currents on time when a cloud of staining substance was introduced from a pointed cathode into the specimens and then removed. Observations were made of the velocity and nature of the leading edge of the propagating cloud of F-centers. Measurements were made at temperatures of 450-700 deg C and at potentials of 100-1,200 volts. The electrical conductivity of the stained and then decolorized crystals was compared with the conductivity of untreated crystals at various temperatures.

The study showed that the staining resulted in an irreversible reduction of the ion conductivity of the crystals and a reduction in the intensity of the cloud, but an increase in its rate of motion. It is assumed that the conductivity of the stained crystal is the result of the interaction of two types of carriers, ion and electron, and does not represent the simple sum of the electrolytical and introduced electron conductivities.

Ultrasonics, Acoustics

38. Higher Frequencies Reduce Influence of Seiche on Phase of Underwater Sound Signal

"The Influence of Seiche Oscillations of the Surface of a Lake on the Phase Fluctuation of an Acoustic Signal," by L. N. Zakharov, Chair of Acoustics, Moscow State University; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 433-437

A connection was established between the seiche oscillations of the surface of a body of water and the fluctuations of the phase of a sound signal transmitted under the surface. During the propagation in a water layer of sound signals with wave lengths comparable to the depth of water at the test site, slow fluctuations of phase can be observed during seiche fluctuations of the surface. With increased frequency of the sound signal, the magnitude of these fluctuations is reduced.

The work was supervised by S. N. Rzhevkin and V. S. Nesterov.

39. Scattering of Sound Waves at Periodically Uneven Surface

"On the Question of the Scattering of a Plane Wave at a Periodically Uneven Surface," by A. D. Lapin, Acoustics Institute, Academy of Sciences USSR, Moscow; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 442-446

A special case is considered for the two-dimensional problem of the scattering of a soundwave at a periodically uneven surface which is slightly different from a symmetrically serrated surface with rectilinear teeth. It is shown that this problem is equivalent to the problem of the reflection of normal waves from the end of a wave guide which is terminated in an element with a similarly uneven surface. The latter problem is solved by the method of small perturbations and sewing together of the fields at the edges of those regions in which the eigenfunctions are known. For the amplitudes of the spectra (superpositioning) of the scattered field, an infinite system of algebraic equations is obtained, which is solved by a numerical reduction method in the case of certain relationships between the parameters of the uneven surface and the length of the sound waves.

40. Interferometric Study of Vibrational Breakdown of Piezoelectric Plates

"On the Static Deformation of Piezoelectric Plates During Oscillation at Natural Frequencies," by B. A. Finagin, Leningrad Shipbuilding Institute; Moscow, Akusticheskii Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 454-459

A description is given of the phenomenon of static deformation of piezoelectric plates when they vibrate at certain natural frequencies. Experimental data and photographs are given of the interferometric surface patterns of these plates during such oscillations. It is believed that the deformation of the plates may result from the fact that, prior to breakdown, certain of the components of the oscillations reach values at which the elasticity limit is exceeded and the oscillations become nonlinear. The presence of inhomogeneities may also contribute to the fact that certain plates breakdown at different resonances.

It is concluded that the occurrence at a certain resonance of a general change in the interferometric picture characterizing the static deformation state is an indication that this resonance is dangerous for the plate and, thus, that the plate should not be used at this resonance, or only at this resonance when the excitation voltage is reduced.

The tests were conducted on 12 quartz and tourmaline specimens ranging in diameter from 10 to 20 millimeters and in thickness from 0.58 to 2.86 millimeters; the vibration frequencies ranged from 0.00 to 4,924.82 kilocycles per second; and the maximum amplitudes, from 0.15 to 0.3 micron; the excitation and resonance voltages ranged from 20 to 270 volts.

41. Scattering of Sound Wave From Statistically Rough Surface

"On the Correlation of the Amplitude and Phase Fluctuations of Waves Reflected From a Statistically Rough Surface," by E. P. Gulin, Acoustics Institute, Academy of Sciences USSR, Moscow; Moscow, Akusticheskii Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 426-432

Within the framework of the perturbation method, expressions are obtained for the longitudinal and transverse autocorrelation functions for the amplitude and phase fluctuations of a spherical sound wave reflected from an absolutely soft, statistically rough surface. On the basis of the method of stationary phase, geometrical approximations are established for those areas on the uneven surface which are most important as far as scattering is concerned.

42. Scattering of Sound Waves From Fish and Jellyfish in Water

"The Scattering of Sound From Bodies With Low Shear Modulus Located in a Liquid," by I. A. Chaban, Acoustics Institute, Academy of Sciences USSR, Moscow; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 483-484

The interesting hydroacoustical problem of the scattering of sound from fish and jellyfish in water, since the density and compressibility of the living tissues are not greatly different from those of the water, must account for shear modulus, in addition to density and compressibility. Since the shear stress is not small in comparison with the pressure in the incident sound wave, the problem of scattering in this case cannot be solved by the method of small perturbations. It can be solved, however, in an approximation of the smallness of the wave length of shear by comparison with the dimensions of the object, a method more common to the ultrasonic frequency problem. Since the attenuation of shear waves in living tissue is high, an approximation method analogous to the Kirchhoff method can be used, whereby the boundary conditions for the shear waves at each point of the surface of the body can be written as if the boundary were plane.

It is shown that, in this case, the scatter field can be expressed in the form of volume integrals which are proportional to the smallness values

$$\frac{\rho - \rho_0}{\rho_0} \quad \text{and} \quad \frac{\lambda + 2\mu - \lambda_0}{\lambda_0}$$

and in the form of a surface integral which is proportional to the smallness value μ / λ_0 . Here λ , μ are the Lamé constants; the values with subscript 0 refer to the liquid, and those without the subscript 0 to the biological object.

43. Shutilov of Leningrad University Reviews Literature on Ultrasonic Nuclear Magnetic Resonance

"Ultrasonic Magnetic Nuclear Resonance. A Survey," by A. Shutilov, Leningrad State University; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 383-406.

Following a general discussion of the main trends, approaches, experimental results, and interests in ultrasonic magnetic nuclear resonance research, referenced by a 58-item bibliography, Shutilov comes to the following summary conclusions:

"Thus the scope of possible applications of ultrasonic nuclear resonance is very wide and is far from covered by currently completed research, which has revealed only certain aspects of the interaction of nuclear spin systems with the oscillations of the simple cubic lattices of ionic crystals. No studies have been made of crystals with lower symmetries, nor of a nucleus with $I = 1/2$, in substances with strong magnetic spin-lattice interaction. Considerable interest has been devoted to the study of liquids, for which considerably lower effect have been predicted theoretically and can even be detected experimentally under certain specific conditions. In this regard, the value of the quantitative information which can be obtained from acoustic research, to a considerable degree, is determined by the accuracy of the absolute measurements of ultrasonic fields, which poses a very difficult problem in the case of large volumes of liquid and is even more complex with respect to very large crystalline specimens."

44. Two-Crystal Interferometer for Handling Higher Frequencies

"An Interferometer With Two Oscillating Crystals," by Yu. A. Bashlachev, V. V. Voytonis, and V. F. Yakovlev, Moscow Pedagogic Institute imeni N. K. Krupskaya; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4 Oct-Dec 62, pp 412-414

A new design is given for a two-crystal interferometer in which both crystals are radiators which produce ultrasonic waves that compensate one another. The design affords the possibility of increasing the accuracy of measurements and widens the range of application of the interferometer in the direction of much higher frequencies. A two-curve graphic shows the change of impedance as a function of distance between radiating crystals for $r = 2.0$ cm and $\lambda = 0.06$ cm.

45. Measuring Ultrasonic Intensity in Liquid

"A Relief-Capacitance Method of Measuring the Intensity of Ultrasound," by V. V. Bogorodskiy and V. N. Romanov, Arctic and Antarctic Scientific-Research Institute, Leningrad; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 415-419

The possibility is considered of measuring the intensity of ultrasound according to the deformation of the free surface of a liquid or of the interface of two immiscible liquids upon or at which an ultrasonic beam impinges. The pressure the acoustic radiation produces a relief of the surface or interface which causes a change in the capacitance of a capacitor consisting of a electrode and the agitated surface or interface. Although the method appears to be feasible for use in practice, one important limitation is the fact that it cannot be used to measure intensities in ultrasonic beams which are not vertical.

46. Sonic Generator Studies at Odessa Poly

"Study of the GS-8 Gas-Jet Sonic Generator," by M. L. Varlamov, G. M. Manakin, and K. P. Belenavichyus, Nauchnyye Zapiski, Odesskiy Politekhicheskii Institut (Scientific Reports, The Odessa Polytechnic Institute), Vol 37, 1962, pp 60-68 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-5-28 t)

The GS-8 is a modified Hartman generator with movable reflector, cylindrical horn, and a system for suctioning off the supplied air in order to eliminate the dilution of the aerosol exposed to sonic waves. The ration of the diameters of the resonator and the nozzle varies from one to 1.55. In the determination of the optimal distance between the nozzle and the resonator, the resonator was positioned in the first zone of instability (computed by formula) and, as the depth of the resonator was being varied, the maximum intensities of the sound were ascertained. The fundamental frequency of the radiation (depending on the diameter of the jet and adjustment) was 9 to 10 kilocycles per second. It was noticed that increasing the ration of the resonator/jet diameters did not always lead to an increase of output power. The dependencies of maximum intensity and frequency of radiation on air pressure and on the distribution of air pressure for various generator adjustments were plotted.

"On the Question of Computing the Energy Coefficients of Gas-Jet Sound Generators," by M. L. Varlamov, G. A. Manakin, and K. K. Belenavichyus, Nauchnyye Zapiski, Odesskiy Politekhicheskii Institut, Vol 37, 1962, pp 76-81 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-5-28 y)

A difference method is given for computing the energy of the air jet, which is required in the computation of the efficiency of gas-jet generators; the methods suggested by Hartman and other are shown to be unsatisfactory. It was found that the calculation of the efficiency of the reversible processes, as done up until now, cannot be done according to formulas, since the expansion of the gas in the generator is irreversible. The absence of a precise determination of the efficiency is connected with the difficulty of measuring the temperature of the gas flow leaving the nozzle, which would afford the possibility of determining the degree of irreversibility of the process. The admissible maximum ratio of the diameters of the resonator and nozzle was computed by various methods for the GS-8 sound generator and found to be 1.6.

"Study of an Improved High-Power Gas-Jet Sound Generator," by M. L. Varlamov, G. A. Manakin, A. N. Gospodinov; Nauchnyye Zapiski, Odesskiy Politehnicheskii Institut, Vol 37, 1962, pp 31-40 (from Referativnyi Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-5-29 v)

The generator considered is the GS-5, which has a nozzle diameter of 9.14 millimeters and resonator diameter of 9.61 millimeters. The region of generation is located in the focus of a parabolic reflector. At a pressure of (air) 2.25-2.90 atmospheres (gauge), the generator produced 1.0-1.6 kilowatts of acoustic power at frequencies around 6 kilocycles. Directivity diagrams were plotted, and the acoustic power of the radiator was determined for operation with and without the parabolic reflector; the highest output power was produced without the parabolic reflector. For exhausting the air leaving the nozzle, the generator has a device which consists of an annular opening in the cylindrical horn, coaxial with the resonator. At optimum tuning, the efficiency of the generator is 30 percent.

47. Efficient Gas-Jet Sound Generator With Oblique Shock Wave

"Gas-Jet Sound Source With an Oblique Shock Wave," by V. P. Kurkin, State Scientific-Research Institute for Industrial and Sanitary Scrubbing of Gases, Moscow; Moscow, Akusticheskii Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 438-441

A description is given of a gas-jet sound source which uses an oscillating oblique shock wave, produced by the insertion of a conical-head rod opposite the nozzle within the resonator. The nozzle and resonator, together with the rod, are positioned coaxially in the throat of an exponential horn. Tests indicate that this type of acoustic generator has a relatively high acoustic efficiency.

48. Charging of Colloidal Particles of Organic Liquids and Electrolytes in Ultrasonic Field

"Charging of Suspended Colloidal Particles in an Ultrasonic Field," by I. B. Moskovenko, Ye. D. Pigulevskiy, and N. G. Semenova, Leningrad Electrical Engineering Institute imeni V. I. Lenin; Moscow, Akusticheskii Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 479-480

The difference in the nature of the electrification (charging) of the colloidal particles in organic liquids and the dipole electrification of the colloidal particles in electrolytes may possibly be explained by

the fact that, in the first case, the width of the binary layer is considerably greater than in the electrolytes, reaching dimensions several times greater than the dimensions of the particles. Consequently, the cohesive forces affecting the diffused layer and the particles are sharply reduced, and the ultrasonic field cannot only deform the layer, but also disrupt it entirely. The probability of this effect is, apparently, greatly enhanced by the presence of cavitation.

Wave Propagation and Antennas

49. Communications At Frequencies Above the MUF of the F₂-Layer

"Scattering of Short Radio Waves in the F₂ Layer of the Ionosphere," by V. I. Bocharov, O. M. Nesterova, and I. I. Nesterova, Trudy Sibirskogo Fiziko-tekhnicheskogo Instituta pri Tomskom Universitete (Proceedings of the Siberian Physicotechnical Institute at Tomsk University), No 38, 1960, pp 74-79 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-7-30 u)

In consideration of the possibility of scattering short waves in the lower portion of the vhf ranges within the F-layer of the ionosphere, it is shown that, if an operating frequency considerably higher than the critical is used, it is possible to expect an intensity of a signal scattered at the F layer to be no lower than that of a signal scattered at the E layer under the same conditions. Experimental data are given on the scattering of waves at a frequency of 21.12 megacycles in the F₂ layer over a 1,340-kilometer route. Particular attention was paid to the dependence of the average level of a signal scattered by the ionosphere on the maximum usable frequency of the F₂ layer. Plotted theoretical and experimental curves indicated that: (1) short waves can be scattered in the F layer, which suggests the presence of minute inhomogeneities in the inhomogeneity spectrum; (2) it is possible to establish communications at frequencies twice and thrice that of the maximum usable frequency of the F₂ layer; and it can be shown through experiments that the fluctuation of the mean level of a signal with a fluctuation of the maximum usable frequency f_{mp}^2 is described by the refraction factor

$$[1 - f_{mp}^2 / f^2]^{-13/2}$$

50. Propagation of Radio Waves Above a Stratified Medium

"The Propagation of Radio Waves Above a Stratified Course," by V. V. Novikov, Leningrad (Leningrad University Press), Problemy Difraktsii i Rasprostraneniya Voln (Problems of the Diffraction and Propagation of Waves -- a collection of articles), Vol I, 1962, pp 116-132 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11 Zh 184).

The problem considered is that of the excitation of an electromagnetic field by a vertical electrical dipole located above a stratified medium in the form of a homogeneous plane-parallel dielectric sheet of finite thickness over a homogeneous dielectric half-space with any different permittivity value. For a strict formulation of the problem, the solution is given in the form of a Fourier-Bessel integral. For the far zone and for a number of assumptions regarding the properties of the medium, the integrals are reduced to a form which will permit satisfactorily simple numerical computations. Besides the strict formulation of the problem, an impedance-approximation solution is also considered, in which a surface impedance, corresponding to a two-layer medium, is assigned at the edge of the half-space in which the origin is located. The impedance solution coincides with the approximate form of the rigorous solution; thus there is a possibility of estimating the limits of applicability of the approximation. On the basis of the approximate solution, a numerical computation was conducted, the results of which are presented in a great number of graphics which indicate the dependence of the field of radiation on the position of the source and the properties of the medium. The structure of the radiated field proves to be very sensitive to the structure of the medium.

"Experimental Study of the Transient Processes During the Propagation of Radio Waves," by A. K. Bulgakov and V. M. Rysakov, Leningrad, Problemy Difraktsii i Rasprostraneniya Voln (Problems of the Diffraction and Propagation of Waves -- a collection of articles), I, 1962. pp 151-155 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11 Zh 186)

A study is made of the influence of various routes on the shape of a radiofrequency pulse in the medium-wave range. The radiator, a short vertical antenna, is fed a current $i = I(t) \cos \omega_0 t$, where $I(t)$ is the only switching function. When a point dipole is fed this current, the field in the zone of radiation has the form:

$$E(t) = \frac{1}{c^2 R} [\delta(t) - \omega_0 \sin \alpha_0 t],$$

were c is the speed of light, R is the distance from the dipole to the point of observation, and $\delta(t)$ is the Dirac pulse function. For an antenna of finite length, instead of the δ -function we obtain a pulse of limited amplitude with a distorted leading edge. For this reason, the idealization of the source in the form of a point dipole leads to a divergence of theoretical and experimental data, and since a rigorous solution of the problem is extremely complicated, the authors consider only the most practicable solution to the problem. The described experiments were conducted with a vertical 18-meter whip antenna fed a current $i = I(t)\cos\omega_0 t$ with a duty cycle of 550 kilocycles per second.

At the point of observation, the signal is received by a vertical antenna 0.5 meter high and amplified by a wideband (200 kilocycles to 6 megacycles) amplifier, then fed to the oscilloscope. It is shown that, if the conductivity of the route is high, the shape of the pulse remains practically unchanged over a distance of up to 3 kilometers. If the conductivity is on the order of $3 \cdot 10^{-3}$ ohms per meter, however, a diminution of higher frequencies at the leading edge of the pulse is noticeable beyond one kilometer. As the distance increases, the higher frequencies disappear, and the slope of the pulse gets flatter and flatter. The authors explain this on the basis that the attenuation of radio frequencies over a poorly conducting ground is greater than that of low frequencies. Wave propagation experiments over two-layer structures (upper poorly conducting and lower well conducting) indicated that the resulting signal represents the sum of two signals (one direct, moving along the ground, and the other reflected from the lower layer), shifted in time by $\tau = 2l\sqrt{\epsilon_m}/c$, the amplitude of which is (-2α) times smaller (ϵ_m is the permittivity of the upper layer, l is the thickness of the layer, and α is the attenuation factor). The oscillograms obtained afford the possibility of determining the thickness of the upper layer, and a more detailed analysis provides information on the structure of the lower layer.

51. Detailed Study of Asymptotic Properties of Whittaker Differential Equation

"Asymptotic Representation of Whittaker Functions," by E. M. Gyunninen and G. I. Makarov, Leningrad (Leningrad University Press), Problemy Difraksii i Rasprostraneniya Voln (Problems of the Diffraction and Propagation of Waves -- a collection of articles), Vol I, 1962, pp 24-62 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11 Zh 168)

Since a number of problems in electrodynamics, in particular the problem of the propagation of electromagnetic waves in nonhomogeneous media and certain problems of diffraction, are reduced to the Whittaker differential equation

$$\frac{d^2W}{dz^2} + \left(\frac{1}{4} + \frac{\lambda}{z} + \frac{1/4 - \mu^2}{z^2} \right) W = 0,$$

a detailed study was made of the asymptotic properties of the solution of this equation. The asymptotic representations of the Whittaker functions are derived for large arguments and for large parameters of the equations for λ and μ , which, generally speaking, are considered to be complex. The study involves two methods; in one, the asymptote of the formulas is obtained by the saddle-point method for $|z| \gg 1$, $|z| \gg \lambda$, $|z| \gg \mu$ and $|\lambda| \gg 1$, $|\lambda| \gg |z|$, $|\lambda| \gg |\mu|$. Here a more detailed analysis is made for the important partial case of the Whittaker functions, i.e., the formulas for the parabolic cylinder.

In the other method, the asymptotic representations of the Whittaker functions are obtained by "the standardized equation." In this case, the main equation for the variation of the argument $|z| \gg \sqrt{1-4\mu^2}$ (large z values) and $|z| \ll 4|\lambda|$ (small z values) is replaced by a simpler approximate "standardized" equation, satisfied by "standardized" functions. In the intermediate range, where both representations of the solution of the Whittaker equation should hold true, it is necessary to sew together the solutions obtained for the different regions and, conversely, to obtain the asymptotic representation of the solution which is correct in the case of all values of the argument. The method was used to obtain the asymptotic representation of $W_{\lambda, \mu}(z)$ for $|\lambda| \gg 1$, for arbitrary z values. Topographies of the coefficient $W_{\lambda, \mu}$ are adduced, and $\lambda = \text{one}$ and $\lambda = \text{seven}$ are obtained for the values $\mu = 0.25$ and 0.75 , respectively.

52. Forecast of Minimum and Maximum Critical Frequencies of F_2 at Tomsk

"Long-Range Forecasting of the Maximum and Minimum Critical Frequencies of the F_2 Layer," by A. I. Likhachev, Trudy Sibirskogo Fiziko-tekhnicheskogo Instituta pri Tomskom Universitete (Proceedings of the Siberian Physico-technical Institute at Tomsk University), No 38, 1960, pp 47-56 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-7-39 ya)

On the basis of a study of the correlation of the median values of the critical frequencies at noon and in the morning hours and the establishment of a pattern of variation of the ratio depending on the activity of the sun and the zenith angle of the solar component of ionization of the F_2 layer, a method is described for determining the minimum and maximum median values of the critical frequencies according to data of a solar activity forecast. The forecast is reduced to numerical calculations and the plotting of graphs. The proposed method of forecasting was devised on the basis of a determination of frequencies

over an extended period, on the order of an 11-year cycle, although it can be used for a 6-months' or 12-months' forecast. Sufficient conditions for the prognosis are: (1) a prognosis of the average yearly values of the Wolff number, (2) a calculation of the yearly fluctuation of the sine of the zenith angle, and (3) the yearly (July-June) minimum values of the fF_2 values and of the ratio fF_{2min}/fF_{2max} .

An example forecast is given for Tomsk, and the forecast data are compared with experimental data for an 18- to 20-year cycle of solar activity. The deviations of the theoretical data from the experimental, and corrections for them, are taken into account.

53. Maxwell-Boltzmann Distributions of Electrons in Gas Discharge

"On the Determination of the Distributions of Electron,"
by Yu. G. Fliner, Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta (News of the Leningrad Electrical Engineering Institute), No 46, 1961, pp 337-339 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 63, 11-3-10 ye)

The processes considered involve the interaction of electrons with atoms and ions in a gas discharge in the vicinity of pair interactions; the collective effects are not taken into account. It is shown that, when any mechanism reaches a Maxwell distribution of electrons with respect to velocity, the radial field during a very small period of time reaches a Voltzmann distribution of electrons with respect to the coordinates. The initial factor, however, which establishes the distribution of the electrons with respect to velocity may be only the interaction of these electrons.

54. Reflection of Normal Waves From Baffle at End of Wave Guide

"On the Question of the Reflection of Normal Waves From the Closed End of a Wave Guide, " by A. D. Lapin, Acoustics Institute, Academy of Sciences USSR, Moscow; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 476-477.

In an earlier work (Akusticheskiy Zhurnal, Vol 8, No 2, Apr-Jun 62, pp 189-193), the author treated the two-dimensional problem of the reflection of normal waves from the end of a wave guide terminated in a rigid or soft baffle plate positioned at an angle of 45 degrees to the axis of the wave guide. Here this problem is generalized for the case where the baffle is positioned at an arbitrary angle to the axis of the wave guide.

55. Transmission Level Indicator Designed by Moscow Sound-Recording Institute

"A Transmission Level Indicator Based on Semiconductors," by V. T. Suslikov, Moscow, Trudy Vsesoyuznogo Nauchno-issledovatel'skogo Instituta Zvukozapisi (Proceedings of the All-Union Scientific-Research Institute of Sound Recording), No 9, 1961, pp 135-137 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-7-54 s)

A description is given of a type RI-60 transmission-level indicator devised by the institute (VNIIZ - Moscow) and based on the P-13A and P-201A semiconductor triodes. The technical ratings given for the RI-60 are: a 2-second reset time for the needle, 1.32-volt input, 60-micro-second integration time, range of 0-25 decibels, frequency response 20-20,000 cycles per second plus-minus one decibel, 6-watt power requirement, 1.6 kilograms in weight, and dimensions 110 x 123 x 145 millimeters.

56. Correlation Function of Diffracted Image in Focal Plane of Paraxial Focussing System

"The Correlation Characteristics of a Diffracted Image Formed by a Focussing System," by Ya. S. Shifgin, Khar'kov; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 460-465

Expressions are obtained for the correlation function of a diffracted image formed by a paraxial focusing system for arbitrary fluctuations in: the incident wave and arbitrary ratio of the system dimensions to the radius of correlation. Graphics are plotted to illustrate the nature of the correlation function in relation to the magnitude of the fluctuations and the ratio of the dimensions of the system to the correlation radius.

The results obtained may be used directly in the study of the correlation function of the field of an antenna in the far zone. The value $R(0, \Psi)$ characterizes the correlation of the field in two major planes, whereby one point of observation lies in the direction of the major maximum.

57. Wave Propagation in Presence of Cross-Radiating Lines

"Propagation of Plane Electromagnetic Waves Over a Real Earth in the Presence of Horizontal Cross-Radiating Line," by Yu. A. Yerukhimovich; Moscow, Radiotekhnika, Vol 18, No 2, Feb 63, pp 15-26.

The author computes the field of a wave cross-radiated by an ideally conducting infinitely extended horizontal line suspended above a real earth which is arbitrarily incident to the line of a plane wave. The changes in amplitude and phase, as well as the angle of rotation of the front of the total wave relative to the front of the incident plane wave, are determined. Relationships are derived which can be used to find the minimum permissible distance to the cross-radiating line for which reception would be free of distortion. For a given distance to the line, it is possible to determine, relative to concrete conditions, the spatial sectors of angles which would be most subjected to such distortions.

The author suggests that the results of this analysis may be used to determine the effect of the proximity of horizontal cross-radiating lines (telephone and telegraph lines, power transmission line, railway power lines, etc.) on the operation of receiving antennas of communication centers, goniometers, radio range-finding devices, etc.

58. Efficiency of Surface Antennas

"The Effect of Phase Distortions on the Efficiency of a Surface Antenna," by V. G. Yampol'skiy; Moscow, Radiotekhnika, Vol 18, No 2, Feb 63, pp 10-14

Engineering formulas are given for determining the efficiency and direction of maximum radiation of a surface antenna with respect to the phase and amplitude distributions of field intensity in the aperture. The method may be used not only for linear antennas, but also for antennas with circular or elliptical apertures. The method is based on a procedure described by the author in a previous work (Radiotekhnika, Vol 10, No 5, 1955).

Miscellaneous

59. New Books on Television

"Books on Motion Pictures and Television Scheduled for Publication in 1963," by N. D. Panfilov; Moscow, Tekhnika Kino i Televideniya, No 1, Jan 63, pp 87-89

The following books are scheduled for publication in 1963;

Chemistry and Technology of Polymer Films, by P. V. Kozlov and G. I. Braginskiy.

General Sensitometry, by Yu. N. Gorokhovskiy and T. M. Levenberg.

Motion Picture Films and Their Processing, by Ye. A. Iofis.

Motion Picture and Television Technique, by V. A. Burgov.

High-Speed Motion Picture Camera SKS-1, by V. G. Pell' and V. I. Lavrant'yev.

Motion Picture Projectors for 16-mm Films, by A. M. Bolokhovskiy and A. N. Karal'nik.

Pocket Handbook for Motion-Picture Amateur.

Sound in Motion Pictures, by N. D. Panfilov.

Design of Elements for Pulse Radio Engineering Systems by Yu. M. Kazarinov and A. B. Kraychik.

Television Receiver Manual, by S. A. El'yashkevich.

Efficiency and Sensitivity of Television Systems, by S. B. Gurevich.

Fundamentals of Applied Television Systems and Design of Equipment, by Yu. V. Kostykov.

New Developments in Television Reception Technique, by V. Ye. Neyman and I. M. Pevzner.

Parameters of Cathode-Ray Tubes and Their Measurement, by L. A. Kurakin and V. A. Miller.

Trouble Elimination in Television Receivers, by L. M. Kuzinets.

C-O-N-F-I-D-E-N-T-I-A-L

Qualitative Indices of Television Image, by V. F. Samoylov.
Practice of Magnetic Recording, by Yu. A. Vasilevskiy.
Testing and Adjustment of Tape Recorders, by V. G. Korol'kov.
Pulse Technique, by L. M. Gol'denberg
Electronic Amplifiers, by G. S. Tsykin.
Electronic Amplifiers, by G. V. Ramm
Vacuum-Tube, Low-Frequency Amplifiers, by G. V. Voyshvillo
Fundamentals of Television Measurements, by M. I. Krivosheyev.
Outdoor and Indoor Sound Amplifying Installations, by L. Z.
Papernov.
Modern Radio Transmitting Equipment for Radio and Television
Broadcasting on VHF, by A. I. Lebedev-Karmanov
System for Transmission of Television and Telephone Conversation
With the Aid of Space Retransmitters, by N. I. Kalashnikov.
Improvement of Qualitative Indices for Camera Channels at
Television Centers, by I. I. Sheyfis.
Television Receiving Antennas, by G. P. Samoylov.
Video Signal Amplifiers in Television Receivers, by A. M.
Shneyderovich.
Power Supply Units in Television Receivers, by L. M. Dubinskiy.

II. ENGINEERING

Automatic Control Engineering, Computers60. Synthesis of Correcting Devices in Linear Systems With Variable Parameters

"A Method of Synthesis of Correcting Devices in Linear Systems With Variable Parameters," by A. A. Gorskiy; Moscow, Izvestiya Akademii Nauk SSSR; Otdeleniye Tekhnicheskikh Nauk; Energetika i Avtomatika, No 6, Nov-Dec 62, pp 96-102

The author considers a dynamic system with known properties consisting of a number of components, the characteristics of all but one of which are known. The problem is to determine the unknown characteristic, the correcting component.

Several methods for the solution of this problem are discussed by the author; some are theoretically, but not practically, feasible. The one chosen by the author is as follows: Instead of the differential equation or weighting function of the correcting component, an integral equation expressing the correcting component is found. The same operations necessary in the solution of a differential equation for the correcting component are also necessary in this case, but the number of such operations is considerably less.

61. Raising Quality of Control Systems With Pulse-Width Modulation

"Raising the Quality of Control Systems With Pulse-Width Modulation," by V. M. Kuntsevich; Moscow, Izvestiya Akademii Nauk SSSR; Otdeleniye Tekhnicheskikh Nauk; Energetika i Avtomatika, No 6, Nov-Dec 62, pp 120-127

Underlying all methods for studying control systems with pulse-width modulation and determining their periodic, natural oscillations is the fact that the natural oscillations of a nonlinear system with pulse-width modulation occur as a system with periodically varying parameters.

Such a pulse system with variable parameters can be transformed into an equivalent system with constant parameters by replacing the pulsing elements with a period T and with a variable pulse duration by a parallel connection of N pulsing elements with a period NT , operating on a time shift T and producing pulses of constant duration at the output.

62. Linear Programming Methods in Theory of Servo Systems

"Application of Linear Programming Methods to a Problem in the Theory of Servo Systems," by L. S. Gnoyenskiy and S. M. Movshovich; Moscow, Izvestiya Akademii Nauk SSSR; Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 6, Nov-Dec 62, pp 50-66

The article concerns a servo system in which the controlling action $f(t)$, together with its derivative $f'(t)$, amplified by a variable gain factor $c(t)$, is supplied at its input to improve the quality of its operation. The system is expressed by the equation

$$L_N(y) = a_0(t)y^{(N)} + a_1(t)y^{(N-1)} + \dots + a_n(t)y = f(t) + c(t)f'(t)$$

with initial conditions $y(0) = y'(0) = \dots y^{(N-1)}(0) = f(0) = 0$.

Several theorems are given for the optimal operation of servo systems.

63. Astaticism in Variable Structure Servo Systems

"Producing an Astatic Condition in Variable Structure Servo Systems," by S. V. Yemel'yanov and A. I. Fedotova; Moscow, Avtomatika i Telemekhanika, Vol 23, No 10, Oct 62, pp 1298-1312

There is considered the principle of designing variable structure servo systems with a high-order astatic condition (reproducing with a zero static error a broad class of control actions $g(t)$ without increasing the number of integration elements in the regulator.

Reproduction of the linear function $g(t) = a_t$ ($t \geq 0, g(t) = 0$) by a variable structure system having one integrating unit in the regulator is analyzed.

64. Design of Devices for Sampling Control and Regulation by Deviation

"Design of the Basic Parameters of Devices for Sampling Control and Regulation by Deviation," by I. M. Shenbrot; Moscow, Avtomatika i Telemekhanika, Vol 23, No 10, Oct 62, pp 1323-1333

The statistical analysis of the process of sampling control of critical quantities is made. The dependence of the mean frequency of approach of the control process to the danger level on the characteristics of the process (in the absence of the control), the value of the danger level and comparison level, the sampling period, values of corrective action, and accuracy of comparison is found.

65. Automatic Adjustment of Functional Converter

"Automatic Adjustment of a Universal Functional Converter With a Piecewise-Linear Approximation," by K. B. Norkin; Moscow, Avtomatika i Telemekhanika, Vol 23, No 10, Oct 62, pp 1343-1351

There is considered a means of plotting a broken ten-section curve of the best approximation for a given function $r(x)$ by the mean square method. Some ways of automating this problem for determining the static characteristics of the equipment and for approximating the functional dependence are proposed.

66. Optimal Control of Systems With Random Properties

"Optimal Control of Systems With Random Properties," by E. A. Lidskiy; Moscow, Prikladnaya Matematika i Mekhanika, Vol 27, No 1, Jan-Feb 63, pp 33-45

The article concerns systems in which the controlled object undergoes random changes. A rule of control is determined for the condition of the minimum integral criterion of quality for a finite interval of time. The question of the existence of a solution is discussed. Results obtained in two articles in Avtomatika i Telemekhanika ("Analytic Design of Controls," by A. M. Letov, Vol 21, Nos 4,5,6, 1960; Vol 22, No 4, 1961. "Analytic Design of Controls in Systems With Random Properties," by N. N. Krasovskiy and E. A. Lidskiy, Vol 22, Nos 9, 10, 11, 1961) are developed for a finite interval of time. Terminology and nomenclature are those introduced in the second of the above-cited references.

67. Compound Link Coefficients of Combined Automatic Control Systems

"Choice of Compound Link Coefficients of Combined Automatic Control Systems," by I. D. Kochubiyevskyy; Kiev, Avtomatika, No 6, 1962, pp 3-9

O. G. Ivakhnenko ("The Relation Between Conditions of Nonabsolute Invariance and Works on the Synthesis of Systems of High Accuracy," Avtomatika, No 1, 1960; and "The Relation Between the Theory of Invariance and the Theory of Stability of Measuring Systems," ibid., No 5, 1960) has proven that automatic control systems with internal feedback links have, in spite of their theoretically unlimited accuracy, a practical limit which is determined by the fluctuations of the element characteristics. It is therefore advisable to resolve the attainable accuracy into internal feedback and compound links.

In accordance with this, the article presents a method of determining compound link coefficients of combined automatic control systems for defined and steady-state random influences. -- Submitted 27 March 1961.

68. Variational Problems in Optimal Control

"Variational Problems in Optimization of Control Processes With Functionals Depending on Intermediate Values of the Coordinates," by V. A. Troitskiy; Prikladnaya Matematika i Mekhanika, Vol 26, No 6, Nov-Dec 62, pp 1003-1011

In the study of optimal processes problems are frequently encountered whose variational formulation leads to related problems of Lagrange, Mayer, and Bolza in the calculus of variations (Lectures on the Calculus of Variations, by G. A. Bliss, II, 1951; and others). Their functionals can depend on the values of the coordinates at the end of the interval of time under investigation.

In this paper the author studies variational problems of optimization of control processes whose functionals depend on the values of the coordinates at certain interior points of this interval.

69. Definition of Controlled Pulse Systems

"Defining the Status of a Controlled, Nonlinear Pulse System in Phase Space," by Ya. N. Roytenberg; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26, No 6, Nov-Dec, pp 1136-1140

In two previous papers ("Certain Indirect Methods for Obtaining Information on the Status of Controlled Systems in Phase Space," PM, Vol 25, No 3, 1961; and "Defining the Status of a Controlled, Nonlinear System in Phase Space," DAN SSSR, Vol 144, No 6, 1952, pp 1225-1228) the author has investigated a possible indirect method for obtaining information on the status of continuous-action, linear, and nonlinear controlled systems in phase space. Here he discusses this method in detail for a controlled pulse system.

70. Effect of Dry Friction and Backlash on Reversing Error of Servos

Influence of Dry Friction and Backlash on the Reversing Error in Servo Systems, " by B. I. Andreychikov; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 3-13 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-195 shch)

Those errors in the operation of servo systems are considered which are caused by dry friction; recommendations are made for their elimination. Formulas are derived (derivations not given) for errors produced by friction for the cases of a harmonic input action, a motion from a null position and from a non-null position, reversing with slowly changing input functions, and motion after a period of stopping. Formulas are also derived for errors resulting from backlashes during reversing for a harmonic and an arbitrary input action, and for a combination of backlash and dry friction. Four correction circuits are given for drives with electromotive forces which will reduce the error. The advantages of using tachometric feedback in these circuits are enumerated. The effectiveness of these circuits is confirmed by tabulated experimental data obtained with the servo drive of a machine tool with programmed control.

71. Optimum Transfer Function of Linear System

"Some Problems of the Statistical Dynamics of an Automatic Control System," by Ye. I. Filippovich, Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation, State Planning Committee Ukrainian SSR), No 2, 1961, pp 31-41 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-85 p)

The problem involves finding the optimum transfer function of a linear system $k(t)$, fed at input with a control signal $y(t) = g(t) + m(t)$ and a perturbation effect $n(t)$, where $m(t)$ and $n(t)$ are stationary random functions, and $g(t)$ is a given nonrandom function. The criterion of the optimum is the minimum mean square error. Furthermore,

$$x(t) = \hat{H} y(t) = \int_{-\infty}^{\infty} H(t-\tau) y(\tau) d\tau, \quad (1)$$

where $x(t)$ is the output signal; $\hat{H}$ is a given linear operator of the transformation $y(t)$; and $H(t-\tau)$ is the kernel of this operator. The literature gives a solution of this problem for the case where $g(t)$ and the Fourier transform $H(w)$ of the kernel $H(t-\tau)$ are polynomials with respect to t and w . A solution is given here for the case of arbitrary functions $g(t)$ and $H(t)$ having a Fourier transform in the general sense or in the sense of generalized functions. The expression for $k(\tau)$ is derived from equation (1) above and contains the constant A , the value of which, for an optimum system, is found from the mean square error condition. A concrete example is given of a computation of an optimum transfer function.

72. Ratios for Computing Magnetic Logic Elements in Automation Equipment

"Contactless Magnetic Logic Elements for Automation Equipment (a Transformer Circuit)," by L. V. Shopen, Trudy Moskovskogo Energeticheskogo Instituta (Proceedings of the Moscow Power Engineering Institute), No 38, 1962, pp 329-348 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-11 kh)

A method was developed for determining the computing ratios for the magnetic logic elements used in automatic and telemechanical equipment. These elements can be designed on the basis of two-cycle shift registers according to a transformer circuit in which the structural unit is the relaying element, i.e., core with material having a square hysteresis loop. A comparison of the main experimental and theoretical data obtained with the obtained computing ratios is given in tables.

73. Stationary Filter With Finite Memory for Random Time Interval

"Designing an Optimum Stationary Filter With Finite Memory For a Random Time Interval," by I. B. Chelpanov, Leningrad; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 47-52

The problem treated is that of determining the pulsed transient function of a stationary filter which, with respect to the minimum mean square error, produces the best separation of the signal from the background noise, when the observation time is not rigorously fixed, but is described by either a continuously changing or random value. The method used here applies to two different groups of conditions:

1. Once the filter has been made operative, it must guarantee, from a certain moment of time $t = t_0$ on, an improvement of filtration, whereby the error should decrease without limit, (if the useful signal includes only the determined components) or tend toward a certain limit corresponding to an infinite "memory," (if the useful signal includes undetermined time functions).
2. The filter should guarantee a minimum error at a finite moment of time which is not previously known, but represents a random value.

74. Synthesis of NOT and NOR Logic Circuits

"On the Synthesis of One-Operation Potential Logic Circuits," by V. M. Ozerney, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 104-108

An algebraic method is given for synthesizing potential logic circuits from standardized components which provide a negation of disjunction and a method of selecting components which will provide a negation of disjunction and conjunction.

It is assumed that (a) any function which is not identically true can be written as an "ideal conjunctive normal form"; and that (b) any logical function which is not identically false can be represented as an "ideal disjunctive normal form." The synthesis involves logical circuits based on a standardized component which realizes a Webb function of n variables.

75. Designing Circuits for Monotone Boolean Functions

"On Designing Circuits for Monotone Boolean Functions,"
by L. N. Tolkacheva; Uchenyye Zapiski, Latvyskiy
Universitet (Scientific Reports. The Latvian University),
Vol 41, 1961, pp 79-84 (from Referativnyy Zhurnal --
Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-22
shch)

Since any Boolean function has a corresponding two-pole switching circuit, and one and the same function can be simulated by more than one circuit, any monotone Boolean function can be simulated by a class of circuits made up of switching contacts, even though this type of simulation is not always best from the point of view of the number of contacts in the circuit. Using the designation "A" for that class of circuits having both closing and opening contacts and "B" for the class of circuits having closing contacts only, it is shown that there exist sequences of monotone Boolean functions, the simulation of which in the case of class "A" circuits requires many times fewer contacts than in the case of class "B".

76. "Hyperstability" - One Notch Above "Absolute Stability"

"The Solution of a Novel Problem of the Stability of Control Systems," by V. M. Popov, Bucharest; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 7-26

A new concept of stability, called by the author "hyperstability," is presented as a natural generalization of the notion of absolute stability, but differing in its less rigorous requirements with respect to the nonlinear function. The necessary and sufficient conditions are established (for guaranteeing hyperstability of nondegenerate systems completely described by their transfer functions) in accordance with a method developed in earlier works by the author (Avtomatika i Telemekhanika, Vol 22, No 8, Aug 1961; Ibid, Vol 23, No 1, Jan 1962) and expanded here. Although they have the same form as in the earlier works, these criteria are here supplemented by the establishment of the fact that their realization guarantees more than absolute stability, namely hyperstability. Thus a stability condition is established even in the case where nonlinear characteristics contain ambiguities.

77. Transients in Linear and High-Speed Automatic Control Systems

"The Dynamic Properties of Nonlinear High-Speed Control Devices," by G. D. Shirankov; Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation, State Planning Committee Ukrainian SSR), No 2, 1961, pp 42-49 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-93 shch)

A comparative analysis is given of the quality of transient processes in linear and high-speed automatic control systems for various forms of perturbation. It is shown that nonlinear high-speed controllers which handle close to optimum transient processes represent effective means of automation, particularly in those cases where the controlled objects have unfavorable dynamic properties. Graphics are plotted for the transient processes in the case of intermittent and linearly changing perturbations in linear and high-speed systems. It is shown that, in the case of the intermittent perturbation, the amplitude gain produced by the high-speed controller, by comparison with linear controllers, is considerably less than the gain in the duration of the transient process. In the case of a linear perturbation the high-speed controller guarantees considerably greater gain in amplitude than in the case of intermittent perturbation. If the forms of the real perturbations differ from those considered, then, once they have been represented in the form of a sequence of linear perturbations, the results of the comparison of transient processes obtained for this form of perturbation can be used. The principal diagram and a detailed description are given of the operation of an optimum high-speed controller which functions in a manner analogous to a discrete controller.

78. The Diode-Capacitor DKOZU Memory for the Kiev Computer

"The Experimental Diode-Capacitor Operational Memory (DKOZU)," by A. I. Kondalev and A. Ya. Zubatenko; Kiev, Zbirnyk Prats' z Odchyslyval'noi Matematiky i Tekhniky (Collection of Articles on Computer Mathematics and Engineering), Vol 2, 1961, pp 105-110 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-85 y)

Some results are given of a study of a memory (the DKOZU) based on linear capacitors and diodes devised as an operative storage for the "Kiev" computer. The basic control circuits of the DKOZU are given along with a brief description of the structural diagram. Tests showed

that the D1V diode has the necessary characteristics. The storage time, to a considerable degree, depends not only on the back resistance of the diode, but also on the capacitance of the capacitor. A study of the computing signal level in the range 10-1,000 kilocycles showed that the level rises with increased regeneration frequency. The maximum content of the memory for a given type of diode and a regeneration frequency of 100-300 kilocycles is equal to 128 to 250 codes. The influence of temperature on the characteristics of the DKOZU was also studied, and the conversion-pulse-forming circuits and the computer amplifying circuits are described and illustrated.

79. Computing Reliability of Electronic Computers

"On the Question of Increasing the Reliability of Electronic Computers," by L. N. Dashevs'kiy; Kiev, Zbirnyk Prats' z Odchyslyval'noi Matematyky i Tekhniky (Collection of Articles on Computer Mathematics and Engineering), Vol 2, 1961, pp 87-95 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-165 a)

Since the introduction of computers for the control of technological processes has necessitated an increase in computer reliability, two forms of computer breakdown are considered here: (1) complete breakdown of operation resulting from the failure of any part; and (2) a single random disruption from interferences, impairment of element characteristics, and the like. The second type of breakdown can be prevented by the proper choice of components and by computing their maximum reliability; such computations are given for potential inverters and cathode followers.

80. Memory Circuit Based on Cathode Followers

"Memory Circuits Based on Magnetic Logic Elements," by N. L. Prokhorov; Moscow (Academy of Sciences USSR), Avtomaticheskoye Regulirovaniye i Ypravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 335-341 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-11 s)

An analysis is made of the shortcomings of memory circuits based on magnetic amplifiers, and a circuit is suggested for a memory element based on cathod followers.

81. Absolute Stability of Nonlinear Automatic Systems

"Concerning Certain Properties of Nonlinear Pulse Automatic Systems with Absolute Stability," by Ya. Z. Tsypkin; Moscow, Avtomatika i Telemekhanika, No 12, Dec 62, pp 1565-570

When the nonlinear pulse automatic systems become very complicated, analytical methods become very cumbersome, so that a need arises for graphic-analytical or mathematical methods to solve the problems concerned with absolute stability.

This work establishes certain properties of frequency and time characteristics for the pulse linear part of an absolutely stable nonlinear pulse automatic system. Criteria for absolute stability of a nonlinear pulse automatic system are formulated, concerning characteristics of open and closed pulse linear parts. On the basis of the results obtained, suggestions are made for further study of absolute stability with the aid of analytical and graphical methods, as well as for the mathematical simulation of open and closed linear pulse systems.

82. Automatic Control for Flying Shears of Jobbing Mill

"Study of an Optimum System of Controlling the Flying Shears of a Jobbing Mill," by B. B. Buyanov; Moscow (Academy of Sciences USSR), Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 28-35 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-174 p)

An automatic control device is considered which guarantees an accurate cut of the discarded front end of a strip rolled on a jobbing mill. The control system is optimum at high speed and solves the following problems of actuating the flying shear: the determination of the system mismatch with respect to the moment of egression of the front end of the semifinished strip from the rollers of the stand; the feeding of the controlling action into the circuit of the flying shear; the determination of the moment of a change of sign of the controlling action; and the cutting-off of the control action at the end of a transitional period. In experimental tests of the system, the average spread in the length of the front end amounted to plus-minus 120 millimeters.

83. Direct-Action Extremum Controller for Regulation of Blast in Cupola

"Extremal Control of the Blast of a Cupola," by O. M. Kryzhanovskiy, V. I. Vryblevskiy, and V. Ya. Soltyk; Moscow (Academy of Sciences USSR), Avtomatizatsiya Pro-tessov Mashinostroyeniya (Automating the Processes of Machine-building -- a collection of articles), Vol 2, 1962, pp 30-35 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-173 u)

Earlier recommended methods of controlling the blast of a cupola by maintaining a constant weight or volume-consumption of air or maintaining a constant CO₂ content in the combustion products cannot guarantee uniform quality of the melted pig iron, nor a uniform melting regime. On the other hand, higher temperatures provide finer grain structure in the cast iron, shorter annealing times, greater uniformity and strength of the castings, fewer rejects, better mechanical properties, etc. Other conditions being equal, the temperature of the molten pig iron is a function of the amount of blast with clearly defined extremum. It is suggested that extremum control be employed to maintain that amount of blast which, under given conditions, will guarantee the maximum temperature of the bath.

A principal circuit diagram is given of a suggested extremum-control device for regulating the blast; the device consists of metering element, elements for determining the sign of the temperature change, for multiplying the signs of the temperature change and blast change, and an excessory element for controlling the blast. Because of the high inertia of the process (time constant 4-6 minutes) a direct-action controller was chosen, the circuit of which was designed according to research done at the Institute of Electrical Engineering Academy of Sciences Ukrainian SSR.

84. Automatic Control of Mine Dust Arrester

"An Automatic Switching Device," by S. V. Tsoy, P. P. Ivanov, B. P. Solonitsyn, and V. I. Semenov; Trudy Instituta Gornogo Dela AN KazSSR (Proceedings of the Institute of Mining, Academy of Sciences Kazakh SSR), No 8, 1961, pp 184-186 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-183 a)

An institute-designed laboratory model of a switching device was tested with a dust-arresting installation. The control-switching device consists of three TTM-type polarized relays, one RPN-type telephone relay, power transformer, selenium rectifier and reclosing telephone switch. The timer is started and stopped by electromagnet. The switching device has been operating satisfactorily for several months under conditions of high humidity and high dust content of the air.

85. Automation Frees 300 Foundry Hands at Podol'sk

"Automation of the Production of a Small Casting at the Podol'sk Machine-Building Plant imeni M. I. Kalinin," by Ya. Dodin; Moscow, Mekhanizatsiya i Avtomatizatsiya Proizvodstva Na Predpriyatiyakh Mosoblssovnarkhoza (Mechanization and Automation of Production at the Enterprises of the Moscow Oblast Council of the National Economy), 1962, pp 31-39 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-190 f)

An automatic line for mold casting and flask casting was designed and tested at the Podol'sk Machine Building Plant. The results of the tests indicated the feasibility of installing at the plant eight automated lines, which would increase the productivity of the foundry hands by a factor of 3.3 and reduce the required working force by no less than 300 men.

86. Automated Assembly Lines for Roller Bearings, Flows, and Nuts-and-Bolts

"Drive and Control in Automated Lines," by A. P. Nikol'skiy; Moscow, Avtomatizatsiya Protsessov Mashinostroyeniya (Automating the Processes of Machine-Building -- a collection of articles), Vol 1, 1962, pp 343-354 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 63, 11-2-192 n)

Reports on activities of Special Design Office No 6, Moscow City Council of the National Economy (Mosgorsovnarkhoz), including work on a complex automated plant for the production of roller bearings, a complex automated plant with one line for the production of plowshares and a second line for producing plow moldboards, a series of lines for producing nuts and bolts. The special feature of these lines is that they include all operations, starting from the semifinished work and ending with the lubricated and packaged product. The lines are driven by a squirrel-cage motor. The main operations of the lines are discussed.

87. Extremum Control for Rectification of Liquids

"A Three-Channel Optimizer," by Ye. A. Fateyeva; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control), 1962, pp 167-175 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-180 k)

An extremum control is considered, which, in the process of rectification of liquids, will maintain on the basis of two or three parameters a minimum ratio of steam expenditure to unit of product. The minimum is scanned by the gradient principle. The plant is fed a test perturbation (signal) which changes the minimized value; the changes are integrated and fed to each of the three sections of the memory; after the control parameter values have been computed, an appropriate command is fed to the actuator. The scanning is

continued until the extremum point is reached, after which self-oscillations are initiated which have frequencies depending on the values of the test perturbations. The scanning cycle lasts 125 minutes. The test integration with respect to time increases both the stability against interference and the operational precision of the controller. The entire control apparatus consists of the reset mechanism based on stepwise scanning, the relay section, the computer with compensating servo, the integrator based on an isochronous controller, the memory with electromechanical servo, the actuator with an electronic BMD-232 device, and the power supply.

88. Automation Efforts of Ukrainian Gosplan Institute

"On Certain Questions of Theory in Connection With Problems of the Automation of Production," by P. M. Mel'nik, Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation, State Planning Committee Ukrainian SSR), No 2, 1961, pp 3-9 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-175 ya)

The survey covers the basic trends in theoretical work in automatic control and particularly, the work done by the Institute of Automation, State Planning Committee Ukrainian SSR, on the development of the complex automation of production. One example is the work done by the institute on an automatic system for optimum operation of a boiler installation through a reduction of firing time and a saving of fuel. On the basis of a study of the controlled plant, a mathematical description of the process was produced in the form of differential equations of heat balance; the transfer functions for the boiler drum were derived; a structural circuit of the controlling unit was designed; and an analog of the system was devised. The resultant variational problem was solved by methods of blind search and search plus analysis of the intermediate result. A search algorithm was compiled and tested on the electronic analog. The optimum graph obtained made it possible to reduce the firing time from 3 to 1 1/2 hours. The results of the investigation were tested on an operating complex at the Kiev Hydroelectric Station (GES-2) and at the Staro-Beshevskiy State Regional Power Plant (GRES). The most widespread methods of investigating nonlinear automatic control systems were recalculated. The problems of extremum control, which are associate with the problems of the theory of self-adjusting systems, were considered in a model (developed at the Institute of Automation) of an extremum control system for heating furnaces, which is undergoing tests at the "Zaporozhstal" slabbing mill. Also recalculated were the problems which are solved by the methods of statistical dynamics (automatic control systems). In variance principles, controls with perturbation compensation are applied to complex multicircuit automatic control systems with several degrees of freedom, if the system can be divided into not more than two parallel networks. For purposes of complex automation, digital computers are more and more coming into use, necessitating further work in the theory

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of algorithms. The Institute of Automation has constructed algorithms for dispatcher operations in blast and open hearth furnaces of metallurgical plants and power networks and algorithms for the planning of the technological processes of metal working for machine tools with programmed control, and has also developed computer engineering devices.

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89. Influence of Viscosity in Hydraulic Lines in Control Systems

"On the Influence of the Viscosity of the Fluid in a Hydraulic Line on Its Dynamic Properties," by G. S. Babenko and A. M. Smirnov, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 112-115.

Some results are given of experimental studies of the influence of fluid viscosity on the dynamic properties of the line, and values are obtained for the sonic velocity in the line and the amplitude frequency characteristic of the line. The lines considered are those used in automatic control systems for regulating motors and turbines, and the fluids considered are kerosene, transformer oil, oil MS-20, and three blends of transformer oil and MS-20.

It is shown that, as the viscosity of the fluid is increased, the speed of sound in the hydraulic line is reduced, and the pressure losses as a result of friction are increased. Consequently, the amplitude frequency characteristic of the line and the frequency of the first resonance maximum are reduced considerably.

90. Optimum Coding of Master Metering Element in Gas-Well-Discharge Telemetry

"On the Effectiveness of Using an Optimum Coding of the Scale of the Master Metering Element in Pulse-Code Telemetry," by G. M. Butayev, Kiev; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 92-96.

The problem discussed is encountered in the telemetering of the output of gas at gas wells and other instances where it is important to obtain a small value for the integral of the teletransmission error.

It is shown that, when the output is telemetered by a pulse-code method, the use of an optimum coding of the master metering element can lead to a considerable reduction of the above integral. A rule is established for the optimum distribution of code combinations along the scale of the master metering element as a function of the distribution of probabilities of the occurrence of indications at the master. An expression is given for the minimum admissible teletransmission error for a given distribution of such probabilities. Some information is given on the designing of circuits for this type of coding.

91. Use of Address Transfer in Statistical Coding for Multiplant Control System

"Statistical Coding in Telemechanics," by R. R. Vasil'yev and G. A. Shastova, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 82-91

It is shown that an address transfer of information can be used for statistical coding in control system with more than one controlled plant. As in the case of "fast action, address transfer provides considerably increased effectiveness and interference stability of the transfer by comparison with multichannel transfers.

The use of part of the possible combinations in the codes for increasing noise stability is possible not only in address transfer, but in any kind of code transfer. Here, however, the noise stability is improved at the expense of effectiveness of transfer, which is not the case when the shift is made from multichannel transfer to address transfer, since the latter simultaneously improves both noise stability and effectiveness of transfer. Statistical coding increases both factors by providing redundancy in both directions.

In the case of an admissible probability of delay of information transfer and a given randomness of the information, it is possible to determine the maximum number of controlled objects which can be served by one system with address transfer. If the dependence of losses on information delay is known, it is possible to determine the optimum division into groups of controlled objects served by address transfer.

92. Required Rate of Measuring a Continuous Signal

"On the Question of Determining the Necessary Rate of Periodic Measurements of a Continuous Signal," by M. V. Rybashov, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 75-81

An estimate is given of the maximum rate at which measurements must be made periodically of a signal which is continuously limited in modulus and which reacts with a lag-encumbered object in accordance with known characteristics of the object and a given functional.

E. L. Itskovich and S. M. Mandel'shtam (Avtomatika i Telemekhanika, Vol 22, No 2, 1961) considered the problem where the absolute or mean square increment of the signal between two successive measurements would not exceed a given number. It is shown here that a method exists which involves the same approach to the problem but has no connection with any indirect signal characteristics.

The method of determining the necessary rate of periodic measurements of a signal on the basis of a maximizing function can be recommended for those cases where this function is not strongly dependent on the length of the processed interval.

The method of majority functions, depending on the characteristics of the object, affords the possibility of determining the rate of measurements with a rigorous guarantee of fulfilling the conditions of quantization (given error). When the maximizing and majority functions coincide, the method of majority functions leads to the necessary and sufficient conditions for selecting the frequency of the periodic measurements.

93. Improved Operation of Optimum System in Steady-State Regime

"An Optimum Transfer Function in the Case of Effects With Periodic Mathematical Expectations," by A. N. Sklyarevich, Riga; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 53-63

In an earlier work ("An Algebraic Method of Determining the Optimum Transfer Function," Avtomatika i Telemekhanika, Vol 23, No 9, 1962), the author showed that, when the steady-state processes of change of controlling and perturbation moments are stationary, the determination of a physically feasible dynamic system which is optimum when the second-order steady-state moment of the reproduction error is minimum can be reduced to a solution of algebraic equations. In practice, this problem arises when random processes with mathematical expectations which are periodic with respect to time are fed at the input of a system.

It is shown here that the method used in the earlier work to determine the optimum transfer function can be used in practice and guarantees not only a simplification of computations but also more precise operation of the optimum system in the steady-state regime.

The unknowns computed here are the mathematic expectation $m_{\alpha}(t)$ and the correlation function $K_{\alpha}(t, t_1)$ of the controlling action $\alpha(t)$; the mathematic expectation $m_{\beta}(t)$ and the correlation function $K_{\beta}(t, t_1)$ of the perturbation effect $\beta(t)$; the reciprocal correlation function $K_{\alpha\beta}(t, t_1)$ of the controlling and perturbation effects; and the expansions of the functions $m_{\alpha}(t)$ $m_{\beta}(t)$ in accordance with harmonic components.

94. Inertial Section to Replace Differentiating Device in Automatic Control System

"On the Question of Using Inertial Components in Designing One Class of Systems of Automatic Control With Variable Structure. I.," by S. V. Yemel'yanov and V. A. Taran, Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 33-46

In a number of cases, designing automatic control systems with high dynamic and static precision requires increasing the general transfer factor and introducing effects in accordance with derivatives of the control values; this, however, leads to a crowding of the linear range of system elements and requires an accounting of the effects of "small" time constants, which are ordinarily neglected. The attempt to avoid these difficulties lead to nonlinear correction and, particularly, to the designing of automatic control systems with variable structure, i.e., systems in which the dynamics are improved by the switching of correction circuits (parallel, series, or feedback), depending on system coordinates.

Using the example of a system of controlling a neutral plant by means of an astatic controller (or of a neutral second-order plant by means of an inflexible controller), this Part I of the work shows the possibility of replacing the differentiating device with inertial components for the purpose of stabilization; the study also considers the behavior of such a system on the basis of a representation of its motion in a three-dimensional phase space $x, \dot{x}, \ddot{x}$, and projecting it on the planes xx and $x, \ddot{x}$ (where $\ddot{x}$ is the output signal of the inertial section).

Part II will treat the influence of the parameters of the inertial section on the Q-factor of the transfer process and the selection of parameters.

95. Variable Automatic Control System for Second-Order Linear Static Plant

"The Use of Automatic Control Systems With Variable Structure for the Regulation of One Class of Linear Static Plants," by Ye. A. Barbashin, I. N. Pechorina and R. M. Eydinov, Sverdlovsk; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 27-32.

When, in controlling static plants by means of linear static controllers, the increase of the amplification factor necessitated by the improvement of static stability is limited by the dynamic properties

of the controlled plants, one possibility of increasing the amplification factor of a controller without impairing the dynamic properties of the system is by introducing derivatives into the law of control. But obtaining "pure" undistorted derivatives with large operating coefficients is a tough engineering problem which considerably reduces the possibility of improving the static and dynamic properties of the system.

This work investigates the possibility of using a law of control presented earlier (S. V. Yemel'yanov, *Avtomatika i Telemekhanika*, Vol 20, No 7, 1959) for static plants, where the static error is principally required to compensate the perturbation effects, the plant parameters varying within sufficiently wide limits.

S. V. Yemel'yanov was consulted in the work.

96. Synthesis of Primitive Circuits for Automatic Control of Space-Oriented Plants

"Synthesis of Structural P-Circuits of Automatic Machines,"
by V. S. Gusarev; *Nauchnyye Zapiski. Odesskiy Politekhnikheskiy Universitet* (Scientific Reports. The Odessa Polytechnic University), Vol 35, 1961, pp 112-122 (from *Referativnyy Zhurnal-Avtomatika i Radioelektronika*, No 11, Nov 62, 11-2-126 s)

A study was made of the properties of the primitive structural circuits of automatic machines which reprocess controlled plants having dimensions with strict orientation in space. These controlled plants represent such devices as automatic machine tools, automated and production lines, and the like. The discussion treats the reprocessing in an automatic machine of a certain property Δ_0 of an element a into the property Δ_1 when the plant is acted upon by the operator A . $A: \Delta_0$ implies that Δ_0 is never revised by the operator A ; $A: \Delta_0 \vdash \Delta_1$ implies that the operator A converts Δ_0 into Δ_1 , but $A: \Delta_0 \vdash \Delta_1$ also implies that A ultimately converts Δ_0 into Δ_1 , that is that Δ_0 is converted into Δ_1 after the first step of the utilization of A and then stops. If a subsequent change of the properties of the plant is obtained by a repeated usage of the operator A , then this is written: $A: \Delta_0 \vdash \Delta_1 \vdash \Delta_2 \vdash \dots \vdash \Delta_{n-1} \vdash \Delta_n$, or, more briefly, $A: \Delta_{i-1} \vdash \Delta_i$ ($0 < i < n$), and, if different operators are used in each step, then $A_i: \Delta_{i-1} \vdash \Delta_i$ ($0 < i < n$). In the general case, the result of the reprocessing of the plant T with the set of properties $\Delta_0, \Delta_1, \dots, \Delta_n$ in the machine M with the set of operators $A_1, \dots, A_n$ implies $A_1: \Delta_{i-1} \vdash \Delta_i$ or $A: \Delta_1 = A_1(\Delta_1), A_2(\Delta_2), \dots, A_n(\Delta_n)$. Besides the reprocessing operators A , the operator U for the introduction of the controlled plant into the machine is also required, that is, $U: \Delta_0 \vdash \Delta_0$, as are the readdress operators p and q , which do not change the property of the plant but convert the plant or operator from one point in space to another. Graphical representations of the structures

are given. A structure is composed of moving elements, which guarantee three basic types of transfer motion: (1) rectilinear through the controlled plant or operator; (2) rotary around an axis passing through the controlled object or operator; and (3) orbital around an arbitrarily selected axis. The operator formula of a structural circuit of the machine in which operations are carried out in sequence is written as the conjunction $U \cdot A_1 \cdot A_2, \dots, A_n (P_1 \cdot P_2 \dots q_1 \cdot q_2)$, but when the operations are simultaneous it is written as the disjunction $U \vee A_1 \vee A_2 \vee, \dots \vee A_n \vee P_1 \vee P_2 \vee \dots \vee q_1 \vee q_2 \vee \dots$.

Structural circuits are given for various operator functions. A rule is given for the conversion of the operator functions, and a rule for conversion from one form of machine to another: $U \cdot A \dots = U_p \vee A_p \vee \dots$. It is shown that one and the same controlled plant can be reprocessed in a machine with different structural circuits.

97. Refined Graphic-Analysis Method of Computing Nonlinear Autocorrelation System

"The Study of a Nonlinear Static Autocorrelation System," by I. I. Krinetskiy, Ye. N. Kotov, and A. D. Orzhel'; Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation, State Planning Committee Ukrainian SSR), No 2, 1961, pp 10-24 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-93 n)

For the computation of the nonlinear static autocorrelation system, an approximation method from graphic analysis is used, which represents a certain refinement of the method of harmonic balance and small parameter so widely used in practical research on the control sensitivity in nonlinear systems. This method essentially involves the substitution of the initial differential equations describing the control process in the nonlinear static system by linearized equations which are then reduced to one differential equation. Once this equation is solved, the formula is obtained for computing the nonlinear static autocorrelation system, and a generalized curve can be plotted for the quality of the control. A representation is given in graphic form for the results of an estimate arrived at with the recommended graphic-analysis method. The estimate was obtained by a precise mathematical method and experimentally checked by electronic analog. The graphics show that the approximation method affords practically reliable results. For the cases where the formulas of the harmonic linearization give large errors, empirical formulas were derived and used to obtain results which were well suited to experimental confirmation on the electronic analog.

98. Operation of Magnetic Amplifier on Counter-emf and Nonlinear Load

"Analysis of the Operation of a Magnetic Amplifier on Counter Electromotive Force," by M. A. Boyarchenkov; Moscow (Academy of Sciences USSR), Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 297-302 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-19 i)

With certain limiting assumptions, an investigation is made of the operation of a magnetic amplifier from a DC-voltage source. Expressions are derived for the change of induction, of field voltage in the core, and operating current value of the winding in relation to the position of the working point on the hysteresis loop. The dependence of the angle of saturation of the core on the counter-emf is computed for various signals at the magnetic amplifier input. A description is given of the operation of a full-wave magnetic amplifier with DC output and a high-impedance control network, and the factors which characterize its operation are derived.

"Computing a Magnetic Amplifier Which Operates on a Non-linear Load," by V. S. Matorina; Moscow (Academy of Sciences USSR), Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 329-334 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-19 p)

A magnetic amplifier with a DC-electromagnet short-circuited at output is computed. Two ways of improving the operation of the electromagnet and the amplifier are suggested: (1) designing the magnetic amplifier with high efficiency; and (2) connecting up in series with a load impedance equal in value to the sum of the inductive impedances of a saturated amplifier and the electromagnet. The characteristics are given for a magnetic amplifier operating from a logic element.

99. Graphic Method of Determining External Effects On Trigger Circuit

"Graphic Analysis Method of Computing a Trigger Circuit," by N. I. Ardatskiy, Trudy Moskovskogo Instituta Inzhenerov Zheleznodorozhnogo Transporta (Proceedings of the Moscow Institute of Engineers of Railroad Transportation), No 135, 1961, pp 180-188 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-13 d)

A method is described for computing a static trigger without bias, based on a junction transistor. The main parameters of the trigger are computed on the basis of general analytical ratios. On the basis of the computed results, a diagram is plotted which is used to determine the values of the external effects which bring the trigger to the threshold of phase reversal.

100. Automatic Tuning of Oscillator With Fluctuating EMF

"An Automatic Tuning System for an Oscillator With Fluctuating emf," by V. G. Sholokhov; Trudy Moskovskogo Fiziko-tekhnicheskogo Instituta, (Proceedings of the Moscow Physico-technical Institute), No 8, 1962, pp 33-37 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-53 ch)

A block diagram and description are given of an apparatus devised at the institute for producing a fluctuating emf with a required autocorrelation function, the latter being obtained by passing the emf of the master oscillator through a system of filters, the parameters of which vary until the required autocorrelation function of the output process is obtained. A description is given of the filter tuning system, which is a special computer control made up of a correllograph, memory, comparator, square law function generator, integrator, automatic optimizer and coordinator. If the emf does not have the required autocorrelation function, the optimizer varies the parameters of the filters, using a scanning method. The model uses an infrasonic (0.01-100cps) oscillator, but the spectrum is produced by controlled resonance filters.

101. Mild Dispute Over Statistical Approach to Extremely Slow Control Processes

"Some Remarks and Supplementary Information Regarding the Article by Yu. M. Bykov, 'Fluctuating Noise Generator For Studying Ultra low-Frequency Controlled Plants, in (a letter to the editors), by V. F. Nesteruk, N. N. Porfir'yeva and B. A. Finagin; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 116-117; "Answer to the Letter of V. F. Nesteruk, N. N. Porfir'yeva, and B. A. Finagin," (a letter to the editors), by Yu. M. Bykov; Moscow, Ibid, pp 116-118)

Bykov's original article 62, considered the problems involved in obtaining an approximately normal fluctuating process in the range of ultra-low frequencies by the transformation (with a narrow-band filter), of a compound telegraph signal obtained from an oscillator which uses a radioactive decay as the assigned physical process. The authors of the letter consider too general Bykov's assumption that the stationary property of the noise signal is a natural result of the properties of radioactive decay, and stipulate the limiting conditions when the process would be approximately stationary. Bykov replies that, from the expression for the rate of decay, its variation with time is obtained as a monotonous, nonrandom value, and is thus subject to refinement and correction (use of a ferroresonant stabilizer is feasible); the primary noise signal is thus assumed to be stationary.

The authors of the letter insist that a particular coefficient must be included in considering the spectral density of the compound telegraph signal, but Bykov shows that it can be disregarded within the framework of his problem.

The authors of the letter suggest that an ordinary incandescent lamp could be used in place of the radioactive decay as the generating source, but Bykov points out the difficulty in obtaining a stationary property for the random process.

Bykov finally states that a great number of articles dealing with the problems of the statistical approach to extremely slow control processes indicate the feasibility of his research methods.

102. Maintaining Stability of Automatic Control System Under Heavy Interference

"On the Preservation of the Stability of One Class of Non-linear Systems in the Case of Considerable Interferences," by R. Yu. Mamedov, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 24, No 1, Jan 63, pp 109-111

The stability condition is considered for a system of automatic control with a slave motor, the speed characteristic of which has nonlinearity of the saturation type.

It is shown that, by introducing nonlinear feedback, it is possible to widen the stability range with respect to the initial conditions, whereby the properties of a linear system are retained for small perturbations.

103. Hysteresis Loops in Single-Domain Ferromagnetic Film in External Field

"The Hysteresis Loops of Monaxial Ferromagnetic Films," by V. V. Kobelev; Moscow, Magnitnyye Elementy Ustroystv Vychislitel'nogo Tekhnika (The Magnetic Elements of Computer Engineering Devices -- a collection of articles), 1961, pp 56-84 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-113 i)

A theoretical and experimental study was made of the behavior of an ideal single-domain film in external fields. The entire divergence of form of hysteresis loops is described on the basis of a model. Equations are derived for all the classes of hysteresis loops considered here. The closest coincidence of theory and experiment for boundary shifts and rotations was found in specimens with approximately the same H_0 (coercive force) values. An experimental study of the processes of boundary shifting was made according to the magnetization hodograph. In all cases, magnetic reversal in monaxial film specimens was accompanied by domain formation; no specimen showed a rotation of magnetic moment when the magnetic reversal was precisely in the direction of maximum and minimum susceptibility.

104. Georgian Institute Efforts in Russian-to-Georgian Machine Translation

"On a Method of Designing Synthetic Circuits in Machine Translation," by M. Ye. Dameniya; Trudy Instituta Elektroniki, Avtomatiki i Telemekhaniki AN GruzSSR (Proceedings of the Institute of Electronics Automation and Telemechanics, Academy of Sciences Georgian SSR), Vol 2, 1961, pp 43-50 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-48 Zh)

A description is given of a method of designing synthetic circuits for machine translation from Russian to Georgian by establishing a conformity of grammatical meanings beginning with the Georgian language itself, without the coestablishment of formal elements. The study indicates the possibility of applying the method to other languages, to which affixation is inherent and in which the connection between words is expressed by formal elements of grammatical meaning. The use of the method reduces the number of search instructions and simplifies analysis. The method affords the possibility of surmounting the existing differences in the conformity of similar meanings in different languages, in the value of grammatical entities and in the methods of expressing similar grammatical categories.

"On the Synthesis of Circuits for the Machine Translation of Conjunctions and Particles in the Georgian Language," by M. D. Pirtskhalava; Trudy Instituta Elektroniki, Avtomatiki i Telemekhaniki AN GruzSSR (Proceedings of the Institute of Electronics, Automation and Telemechanics, Academy of Sciences Georgian SSR), Vol 2, 1961, pp 113-115 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-48 s)

In a treatment of the conformities of Russian and Georgian particles and conjunctions, the construction of an algorithm for translating particles is facilitated by the fact that the Georgian equivalents have independent lexical meanings. Certain particles have corresponding fixed meanings, thus the Georgian equivalents are given directly in the dictionary. Since particles are connected with conjunctions according to origin, the two algorithms are combined into one.

"On a Method of Discriminating Homonemic (Homonematic) Forms in the Synthesis of Machine Translation," by M. Ye. Damentiya, Trudy Instituta Elektroniki, Avtomatiki Telemekhaniki AN Gruz SSR (Proceedings of the Institute of Electronics, Automation, and Telemekhanics, Georgian SSR), Vol 2, 1961, pp 51-54 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 11, Nov 62, 11-1-48 ts)

A method is considered for discriminating the meanings of homonemic (homonematic) forms in the case where grammatical homonemes exist as extended homonematic forms containing the meaning-recognition symbols. The recognition symbol is the qualifying symbol of the grammatical meaning which affords the possibility of discriminating the homonematic forms. The use of the recognition symbols affords the possibility of an unequivocal translation of the content of certain information, which, in turn, affords the possibility of discriminating the homonematic forms.

105. New Electronic Type-Setter

"Optics, Electronics, Automation"; Leningradskaya Pravda, 16 Feb 63, p 1

"A disk with printed characters on it rotates at a rate of 415 revolutions per minute. A signal from the electronic "brain" -- and in a matter of two millionths of a second a letter or digit is put onto a photographic film. A portion of text is chemically processed and prepared in printed form. No linotypists, no frames. No expensive lead-antimony alloy is needed from which to cast the type. And the type-setting process is twice as fast as is ordinarily the case.

"Such are the advantages of the new electronic photo type-setting automat. A state commission has accepted the first industrial model at the polygraphic machine plant. It has been decided to equip the newest and largest printing establishments with such machines.

"The electronic automatic type-setter incorporates the latest techniques of science -- automation, electronics, precision mechanics, and optics.

"How does this machine work? The text is first translated into machine language. This is done simply: An operator, pushing a key -- just like on a typewriter -- prepares a punched tape. It is carefully verified and corrected, after which it goes into the photo type-setting equipment. On a glass disk, which takes the place of brass

frames, are 400 printed characters. Special optical equipment, increasing or decreasing their size, can reproduce each in five different sizes. Consequently, a small glass disk takes the place of 2,000 frames. Special equipment notes and 'remembers' the width of the space between characters. Mistakes in type-setting have been eliminated. One operator can handle up to four machines."

106. New Electronic Computer

Moscow, Sovetskaya Rossiya, 9 Jan 63, p 1

The control panel and several cabinets of a computer are shown in a photograph. The relevant part of the caption reads as follows:

"This is the electronic computer ERA, which operates in the Moscow Automobile Factory imeni Likhachev. Accuracy, speed, and versatility -- these are the basic characteristics of this modern machine. The application of electronics is broadening day by day. The interesting work is being carried on in the Department of Computer Engineering of the Ural Polytechnic Institute. In the picture is the young specialist A. Goryayeva. Together with her comrades, she is taking an active part in the automation of industrial operations at the Nizhne-Tagil'sk Metallurgical Combine."

107. Further Use of Electronic Computers

"Electronic Planner"; Moscow, Leninskoye Znamya, 9 Jan 63, p 2

Planners at the Giprotransmost (State Institute for the Planning of Bridge Transportation) enlisted the aid of high-speed electronic computers in planning for a new bridge across the Moscow River at Fili.) They were able to determine the best design in a short time although many variables and complicated calculations were involved.

The use of electronic computers resulted in a saving of 7% in the weight of a 100-meter trestle in the construction of the Bratskaya hydroelectric power plant.

The high-speed electronic computer BESM-2M, the EMSS-7 mathematical simulator, and other types of computers may be seen in operation in the pavilion of "Mechanization of Engineering Design and Construction." This pavilion is itself a sort of computing center, serving the needs of many project and research institutes of the Gosstroy (State Committee on Construction of the Council of Ministers of the USSR).

108. Standardization and Automation of Machine Building.

"The Key Position," by M. Ye. Rakovskiy, Deputy Director, State Committee for Automation and Machine Building, Council of Ministers USSR; Moscow, Krasnaya Zvezda, 18 Dec 62, p 3

The article contains the following passages:

"An important measure to speed up technical progress was the formation of industrial committees, such as the State Committee for Automation and Machine Building, Council of Ministers USSR. This committee is responsible for the progress of machine building technology. To better understand the volume of work that has to be carried by the committee, it is appropriate to mention that machine building is an extensive field of industry, responsible for 30% of the total production of the USSR national economy. The number of basic sizes of machines and mechanisms now produced in the USSR is more than 125,000.

"Since the organization of the committee, extensive work has been carried out to standardize types of machines, subassemblies, and parts produced by the machine building industry. As is well known, during the period when industries were under the jurisdiction of ministries, the design bureaus of enterprises, in many cases, designed their own prototypes. This led to an unavoidable multiplicity of machines and machine tools for identical applications, but of different design, quality, and cost.

"During 1960, 1961, and 9 months of 1962, standard series for 360 types of machines and other products, comprising 28,273 types and sizes, were developed.

"Many Sovmarkhozes, having under their supervision the planning and design organizations, began to align them only for local needs, overlooking the interests of the unified technical policy of the nation. The scientific-research and planning-design work was carried out without proper coordination. For instance, in the field of machine building, the planning and designing were carried out by about 400 scientific-research and design institutes and more than 1,000 independent design bureaus. But only 7% of these institutions were under the control of the State Committee for Automation and Machine Building. Obviously, this has resulted in undesirable duplication of work, hindered the introduction of standardized equipment, and led to duplication in machine design and the development of technological processes."

Combustion

109. Hungarian Tests of Acoustic Burner Attachment

"The Influence of Sound on the Process of Combustion," by P. Greguss, Budapest; Moscow, Akusticheskiy Zhurnal, Vol 8, No 4, Oct-Dec 62, pp 421-425

Photographs, drawings, and a description are given of an "acoustic combustion attachment" used in tests of the effect of sound on the combustion process of a liquid fuel.

It was found that the effect of the acoustic energy increased the degree of atomization of the fuel and that the greater stability of the flame front effected a more complete combustion of the fuel droplets; since the energy was produced within the flame itself, rather than from outside the flame, more favorable chemicoacoustic conditions can be established; the probability of a collision of fuel particles and oxidizing molecules is increased as a result of the acoustic energy, making stoichiometric relationships more readily observable; the attachment also provides a more uniform distribution of temperature.

Industrial and Power Engineering

110. Infrared Gas Heating in Industry

"Application of Infrared Gas Radiators in Heating Industrial Buildings," by T. P. Drobot; Moscow, Promyshlennoye Stroitel'stvo, No 1, Jan 63, pp 50-55

Although at present no industrial buildings in the USSR are heated with infrared radiators, the significance of such heating is fully appreciated, and a number of scientific-research institutes, such as the Saratov GiproNIIgas, the Kiev Institute for Gas Utilization of the Academy of Sciences Ukrainian SSR, and the Scientific-Research Institute of Sanitation Engineering of the Academy of Construction and Architecture, are conducting experiments in this field. At present, gas-heated infrared radiators are considered to be most practical for the conditions existing now in the Soviet Union.

111. Solar Power Installations in Uzbek SSR

"Uzbekistan Astounds Experts"; Tashkent, Narodnoye Khozyaystvo Uzbekistana, No 11, Nov 62, p 80

A short caption reads as follows:

"Solution of the problem of utilizing solar power for the needs of national economy is now being attempted by the collective of the Helio-Laboratory of the Physicotechnical Institute, Academy of Sciences Uzbek SSR. The laboratory has developed a number of prototype installations for utilization of solar power.

112. Replacement of Conventional Ship Locks by Inclined Elevators

"A Jump Across the Dam," by B. Malevanchik and Ya. Natarius; Moscow, Znaniye-Sila, No 1, Jan 63, pp 33-36

The article discusses the drawbacks of conventional ship locks on canals. For instance, it was calculated that it will take 3 hours for a ship to travel ten locks around the Bratsk(aya) Dam on the Angara river. The travel time around the Bratskaya Dam could be reduced to only one hour if the conventional locks were replaced by an inclined ship elevator. Such fast-moving inclined ship elevators have many other advantages over the conventional locks.

113a. Construction of Krasnoyarskaya Hydroelectric Power Plant

"Before attacking the Yenisey River," by I. Artomonov;
Moscow, Pravda, 7 Feb 63, p 1

The article contains the following passages:

"Winter rest of the Yenisey river is being disturbed at the Shumikhovskoye Suzheniye [gorge] by the construction of the world's largest -- the Krasnoyarskaya hydroelectric power plant.

"The peak period has arrived for this priority construction project of the Seven Year Plan. The impending final damming of the giant river will enter historical records as an outstanding labor achievement. The minds of machine operators, rock-blasters, concrete-placement workers, reinforcing fitters, and erection workers are occupied only by thoughts of preparation for final damming of the turbulent Yenisey stream.

"Although the Chief of the First Section, V. I. Gladun, has many years of comprehensive experience in taming rivers, the forthcoming attack on the Yenisey worries him because it will be the first time that the complex problem of damming the Yenisey river under severe winter conditions will be attempted. Although the builders are backed by precise calculations and powerful equipment, no one yet knows how the Yenisey river will behave."

113b. Inclined Ship Elevator for Krasnoyarskaya Dam

"Selection of Electric Power System for Inclined Ship Elevator," by A. I. Bychkov, Leningrad Electrical Engineering Institute; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 12, Dec 62, pp 33-40

Preparatory work is now progress for the construction of the Krasnoyarskaya Dam inclined ship elevator. This ship-lifting installation consists of a water-filled metal tank with a surface area of 18 x 100 m and a depth of 3.65 m. This tank is supported by 11 carriages having a total of 176 drive wheels. The tank, when fully loaded, will weigh about 9,500 tons and will be transported for a distance of 2 km at an incline of 1/20. The carriages will be driven by 88 dc motors having a total capacity of 5,280 kw. The dc power will be secured from four operating and one reserve rectifiers on the tank.

Such inclined elevator permit interruption of power supply for several hours; however, during emergency stops the motors have to be supplied with power for at least 50 seconds to ensure smooth stopping. During the ship-lowering operation, braking is accomplished by regenerative electric means, and only at the lower end of the incline are mechanical brakes applied.

The normal speed for raising and lowering of the ship is 0.67 m/sec; maximum speed during lowering is 0.77 m/sec.

The two-feeder power supply system was shown to be superior to a single-feeder system.

114. High-Voltage Disconnecting Switches

"Soviet Scientists...."; Moscow, Izvestiya, 19 Jan 63, p 3

A short caption under a photograph reads as follows: Soviet scientists are working strenuously over the solution of important problems in the national economy. Disconnecting switches for 500,000-v electric power lines were designed at the High-Voltage Department of the All-Union Electrical Engineering Institute imeni V. I. Lenin.

115. Electric Motors With Printed Circuit Armature

"Printed Armature,"; Moscow, Nauka i Zhizn, No 1, Jan 63, p 32

The All-Union Scientific-Research Institute for Electromechanics (VNI-IEM) has designed an electric motor with a printed-circuit armature. The motor armature is made of a thin fiberglass plate coated on both sides with copper foil on which is printed the desired circuit. After proper etching and electrolytic deposition, the armature acquires a "winding" of proper cross section. Such an armature with printed "winding" has thickness of about one millimeter and weighs only one eighth of a conventional armature.

In this type of motor, the current is supplied through the brushes directly to the printed conductors, thus eliminating the need for expensive commutators.

Printed armature motors have the following advantages: sparkless commutation, small angular momentum (fast pick-up), uniformity of rotation, stability at low speeds, good starting characteristics.

The institute has also developed a 350-volt-ampere, single-phase synchronous generator with a printed circuit armature.

116. Experimental "One Wire--Ground" Transmission Line

"10-KV, One Wire -- Ground Electric Power Transmission Line,"
F. V. Krasnik; Moscow, Stroitel'stvo Truboprovodov, No 1,
Jan 63, p 5

For the first time in the practice of pipeline construction, the 2,000-km gas pipeline between Bukhara and the Urals will be equipped with a radio-relay communication line in conjunction with a 10-kv, "one wire--ground" electric power line running parallel to the gas pipeline and at a distance of from 15 to 30 m from it. This 10-kv, "one wire--ground" overhead power line will supply power to radio-relay stations, electric equipment along the line, and the cathodic protection stations. This single-phase, "one wire--ground" power line aluminum windings. Although such 3-phase transformers, when connected for single-phase operation, will operate at only about 60% of rated power, their use was necessitated by the fact that Soviet industry does not at present manufacture single-phase transformers above 10,000-v at 10 kv. This "one wire--ground" overhead line will use 13-m concrete poles. Steel cable PS-50 will be used on the greater part of the route, except for the section along the Aral Sea, where anticorrosion cables will be used.

The electromagnetic effect of this type of power line on the gas pipeline has yet to be determined.

117. Power-Line Construction Exhibit

"Construction of Electrical Transmission Lines and Substations," by S. O. Kholevskaya, Director of the Pavilion;
Moscow, VSNKh SSSR, No 1, Jan 63, pp 23-25

The "Power-Engineering Construction" pavilion of the National Economy Achievements Exhibition opened a new exhibition hall named "Construction of Electrical Transmission Lines and Substations." The new exhibit hall has the following sections: Standardization of power towers and their foundations, industrial methods of power line erection, modern equipment for power line construction, DC power line construction substations from prefabricated concrete, and continuousflow method of power-line construction.

The power-tower standardization section shows how 300 types of 110-to 330-kv steel tower were reduced to only 32 types and 147 types of reinforced concrete foundations for these towers were reduced to 32 types, which now require only 19 types of concrete forms.

Investigation is now being conducted on the use of screw-type foundation piles. The use of such screw piles will eliminate all ground excavations for foundations.

118. New Method Used in Damming Vakhsh River

"At the Hydraulic Engineering Constructions"; Moscow, Gidrotekhnicheskoye Stroitel'stvo, No 1, Jan 63, p 44

On 5 October 1962, the construction pit of the Golovnaya Hydroelectric Power Plant on the Vakhsh River was flooded, at first from the downstream and, an hour later, from the upstream end, after which part of the flow proceeded through the construction. On 7 October, at 1600 hours local time, the channel of the Vakhsh River was dammed by blasting and caving of a specially erected concrete wall on the right bank of the river. Final damming of the Vakhsh River was accomplished at a total flow of about 300 m³/sec and a head of 2.08 m.

119. Reliability of Gas Turbines

"Certain Problems of Gas Turbine Installation Reliability," by S. Ya. Osherov; Leningrad, Energomashinostroyeniye, No 1, Jan 63, pp 35-37

The two-stage gas turbine GTU-6 was tested at the "Ekonomayzer" Plant in Leningrad. The initial gas temperature at the wheel was about 800°C and the rated rotor speed 12,000 rpm.

The turbine developed excessive vibrations when brought to full speed on the test stand. Such vibrations caused wear of bearings and damage to certain parts.

Considerable time and effort were spent in the attempt to find the cause of such excessive vibrations. Careful balancing of the rotor did not eliminate them.

During one of the tests of the GTU-6 gas turbine, all of the working vanes of the first stage were severely burnt and the thrust bearing damaged.

120. Communtatorless DC Motors

"Communtatorless DC Motors," by V. V. Tsokanov and O. A. Kossov: Moscow, Elektrichestvo, No 1, Jan 63, pp 22-26

The article discusses the construction and performance of a commutatorless dc motor similar to a conventional three-phase synchronous motor with electromagnetic excitation or excitation from permanent magnets and a three-phase inverter synchronized with the rotor by position data-units through contactless auxiliary relays. The position data-units were built with VT-5 ferrite cores 7 mm in diameter. P15 and P202 transistors were used for commutation. The bridge inverter was assembled with P210 transistors and D305 and D7 diodes. Such motors have a capacity of several hundred watts.

Starting characteristics of these motors are good, and the danger of falling out of synchronism during overloading is small. Speed control is achieved by changing voltage at the inverter input.

Such a commutatorless dc drive should find application where contactless motors of several hundred watts capacity are needed with a wide range of speed control.

121. Ultrasonic Inspection of Boiler Tubes

"Ultrasonic Flaw Detection in Tubes," by Ye. Ya. Veksler and V. P. Krivusha; Moscow, Energetik, No 1, Jan 63, pp 10-11

Boiler tube failures due to corrosion fatigue of metal were recently observed at the Kievenergo power plants. These cracks were either of annular or longitudinal type.

A method of ultrasonic inspection was introduced by the Metal Laboratory of Kievenergo to detect tubes susceptible to corrosion fatigue. The UZD-7N flaw detector operating at a frequency of 2.5 Mc and having a 40° inclined probe were used in this investigation. To ensure proper acoustic contact, the inspected surfaces were coated with oil.

This method of inspection is able to detect minute corrosion flaws in the form of individual pits only one mm deep. Since this method of flaw detection is extremely sensitive, its general application requires further studies.

122. Stone Casting Industry in USSR

"Volnavakha River Basalt Suitable As Raw Material for Stone Casting," by I. Ye. Kipovskiy and V. A. Dorofeyev; Moscow, Steklo i Keramika, No 1, Jan 63, pp 14-15

Stone castings were introduced rather recently to the national economy of the USSR. Such stone castings possess high resistance to mechanical abrasion and chemical corrosion. The raw materials for stone castings are either natural rock, such as basalt or diabase, or such industrial waste as metallurgical slag and furnace ash. However, the best raw material for stone casting is basalt rock of proper composition, which produces high-quality articles at relatively low cost.

The Moscow Plant for Stone Casting depends on Rovenskiy [Rovno?] basalt from the Ukrainian SSR. The Donetsk Stone Casting Plant, which was operating previously on furnace ashes, has switched to basalt from the basin of the river Volnokhovka (Donbass). These basalts were studied by V. I. Luchitskiy, I. I. Ginzburg, A. A. Ivanov, G. M. Korovnichenko, and I. Ye. Usenko.

It takes about .15 hours to melt basalt rock in an industrial furnace at about 1,400°C. Finished cast stone articles have the following composition: SiO_2 -- 47%, MgO -- 7%, CaO -- 8%, Fe_2O_3 -- 14%, and Al_2O_3 -- 20%. Abrasion losses (Baushinger) are about 0.03 g/cm², and resistance to sulfuric acid about 99.6%.

Mechanical Engineering123. Signaling System for Fatigue Cracks in Helicopter Blades

"System for Signaling the Occurrence of Fatigue Cracks in the Longerons of the Main Rotor Blades of Helicopters," by A. P. Porshchevskiy, USSR Patent, Class 62b, 2503, No 151936 (751137/40-23, 9 Nov 61); Moscow, Byulleten' Izobreteniy, No 22, Nov 62, p 62

A system is described for signaling the occurrence of fatigue cracks in the longerons of the main rotor blades of helicopters. The longerons are hermetically sealed and filled with air under a pressure greater than atmospheric and contain transducers which are connected to signal instruments in the pilot's cockpit. The transducers react to a drop in air pressure in the event of the occurrence of through cracks in the blades.

124. Dry Friction in the Supporting Bearing of a Gyrocompass

"The Influence of Dry Friction in the Suspension Bearings of the Sensing Element of a Single-Rotor Gyrocompass," by V. Ya. Khodyrev, Trudy Tsentral'nogo Nauchno-issledovatel'skogo Instituta Morskogo Flota, (Proceedings of the Central Scientific-Research Institute of the Maritime Fleet), No 39, 1961, pp 93-112 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 11, Nov 62, 11-2-215 shch)

A method is given for determining the physical values of the moments of the friction forces in the bearings on the basis of the results of a processing of the vibration curves obtained for the axis of a gyrocompass mounted on a fixed foundation. It is shown that the effect of dry friction in the vertical part of the bearing is different from that in the horizontal and this difference can be determined quantitatively. The method suggested can also be used to solve the inverse problem, that of determine the admissible values for the moments of the friction forces in the bearings for given gyroparameters.

125. Modification of the Newton Law

"One Week Ago...."; Moscow, Moskovskaya Pravda, 20 Jan 63,
p 4

A caption under photograph of Ye. V. Aleksandrov reads as follows:

One week ago, our newspaper reported on the great discovery in the field of mechanics which will serve as a valuable addition to the Newton Laws. It was formulated by the director of the Drilling Laboratory of the Mining Institute imeni A. A. Skochinskiy, the Candidate of Technical Sciences Yevgeniy Vsevolodovich Aleksandrov. The new concept "critical mass," as introduced by the Soviet scientists in defining an impact, has considerably changed evaluation of the consequence of impact. Ye. V. Aleksandrov has shown that such impact parameters as the energy transfer factor, the recoil coefficient, and the velocity restitution factor are determined mainly by the nature (shape) of the colliding bodies, a fact that leads to the possibility of artificially controlling fundamental after effects of an impact.

Photography126. Contrast Values of Microlenses and Limit of Use With Certain Emulsions

"The Contrast of an Image Formed by Micro-objectives," by A. T. Ashchen'lov, T. A. Pavlichuk, and M. D. Khukhrina, State Optical Institute imeni S. I. Vavilov; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 8, No 1, Jan/Feb 63, pp 64-67

Detailed graphics are plotted which indicate the limits of apollibility of each of six microlenses (microplanar, $f' = 23.9$ mm, $A = 0.10$; achromatic Plan, $f' = 40$ mm, $A = 0.10$ achromatic Plan, $f' = 25$ mm, $A = 0.20$; achromatic 8×0.20 , $f' = 18.2$ mm achromatic 10×0.30 , $f' = 16.1$ mm; and apochromatic 15×0.30 for infinity) for the designing of a resolvometer. According to the admissible reduction of contrast in the optical image in the center of the field of view (not over 20 percent) and along the field (10 percent of the center), it is possible to determine with the graphs the working field and the frequency for the use of a particular objective. For example, the Plan achromatic lens with $f' = 40$ mm and $f' = 25$ mm can be used with emulsions having a resolving power of about $1/100$ mm.

127. Informational Indexes in the Interpretation of Aerial Photos

"On the Measurement of the Volume of Information in the Interpretation of Aerial Photographs," by G. B. Gonin, Laboratory of Aeromethods, Academy of Sciences USSR; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 8, No 1, Jan/Feb 63, pp 21-28

It is shown that the connection between interpretation indexes and objects in aerial photography can be estimated on the basis of the general notions of information theory and that, consequently, it is possible to ascertain the amount of information obtained in the interpretation of aerial photos on the basis of such indexes. Therefore, the indexes here are not considered with regard to their straightness, obliquity, or other geometric property, but each index is characterized by a certain probability of interpreting a corresponding object. One index may characterize more than one object, each with a different degree of probability; on the other hand, one object may have more than one index, each again with different degree of probability.

Some of the indexes (growth of ice cover) were computed in 1960 by the laboratory on the basis of aerial photography data obtained by the Arctic and Antarctic Scientific-Research Institute. Numerical probability indexes are given in tables compiled on the basis of an equation of unconditional entropy of interpretation.

128. High-Speed Camera Developed at Institute of Chemical Physics

"The High-Speed Triggered Time-Magnifier ZhLV-1," by G. L. Shnirman, A. S. Dubovik, P. V. Kevlishvili, A. B. Granigg, and I. A. Korolev, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 8, No 1, Jan/Feb 63, pp 50-56

A photograph, illustrative drawings, tables, and a description are given of the ZhLV-1 camera (time magnifier), which combines a system of rotating mirrors and a slit recorder and operates in a wide-speed range from tens of thousands to several million frames per second; the focal distance can be varied from 50 to 450 millimeters. The base of the camera houses electronic equipment used for automatic control.

G. P. Ilyushin contributed to the electronic equipment; the mechanical parts were designed by D. A. Gussak, assisted by B. G. Belov.

Miscellaneous

129. GDR Geodetic Instruments Described

"Modern GDR Geodetic Instruments," by Yu. G. Batrakov, Candidate of Technical Sciences; Moscow, Gidrotekhnika i Melioratsiya, No 10, Oct 62, pp 43-50

A description accompanies a picture of each of the principal geodetic instruments manufactured by the Carl Zeiss People's Enterprise, Jena, German Democratic Republic. These are the same instruments displayed at the Carl Zeiss exhibition held in the Polytechnic Museum in Moscow, in June 1960.

The following instruments are described: Ni-060 level; Ni-030 level with horizontal circle; Ni-030 level with a micrometer having a plane-parallel plate; Ni-004 level; Koni-007 level with self-adjusting sighting lines; Theo-030 theodolite; Theo-010 one-second theodolite; Dahlta-020 reducing tacheometer; Redta-002 reducing tacheometer; Lotakeil-004 logarithm tacheometer prism on the Theo-030 theodolite telescope; cartographic table for use with the Dahlta-020 tacheometer; Teletop range finder with hand grip; Theo-030 theodolite with the Dimesskeil-002 range finder attachment; Bala subtense bar; and measuring bar for use with the Dimesskeil-002 range finder.

130. Photograph of Geological Expedition

Photograph caption; Moscow, Izvestiya, 26 Jan 63, p 4

A photograph in the source above shows a group of heavily clothed persons standing around in a snow-covered area. Two tracked vehicles, resembling converted tanks, appear in the background. The caption identifies the group as geologists and builders. They are members of an expedition which is working deep within the Khibiny Mountains. They are now engaged in building the central pit of a new mine on the Rasvumchorr plateau, at an altitude of 1,040 meters.

131. New Instrument Uses Cosmic Rays for Geological Prospecting

"How Much Does the Moskva Weigh?", by Yu. Sinyakov; Moscow, Moskovskaya Pravda, 23 Jan 63, p 3

Work on employing cosmic rays in geological prospecting is being conducted at the Moscow Geological Prospecting Institute under Prof A. G. Tarkhov. A visit to the institute, during which he interviewed the professor and witnessed a demonstration of the "Cosmic Prospector," is described by the author, a reporter for Moskovskaya Pravda. The demonstrations took place in the Manezhnaya Ploshchad' near the Institute and in the foyer of the Moskva Hotel. Hence, the title. The first experiment was used to demonstrate the reception of cosmic rays, exclusive of other rays, and to establish a counting rate for the incoming particles. The second experiment in the hotel foyer showed the decrease in the number of particles reaching the instrument because of the intervening mass of the hotel. The difference in readings was used in computing the weight of the building.

Professor Tarkhov explained that the intensity of cosmic rays increases or decreases according to a strictly defined law. The density of intervening matter corresponds to this law. And knowing the density, the mass can be easily determined.

The new instrument was tested in Central Asia last year and fully proved itself and the method of its use. It is planned to use this method in mines to define overlying bodies of ore.

Associates of the Chair of Geological Prospecting are now building miniature devices which can be lowered into boreholes and will transmit their signals to the surface. These will be tested this coming summer.

132. Plastic Spare Parts for Motion-Picture Projectors

"Spare Parts From Plastic Materials," by V. Korovkin;
Moscow, Kino-Mekhanik, No 1, Jan 63, p 46

A shortage of spare parts for stationary type motion-picture projectors, manufactured primarily in the USSR at the Leningrad State Optical Equipment Plant (GOMZ), necessitates the organization of spare-part production from plastic materials. In 1962, an experimental batch of spare parts for motion-picture projectors KPT and "Ukraina" was manufactured from amino-plastics. Such plastic parts proved to be heat- and wear-resistant.

The Technical Council at the Kriov Regional Cultural Administration, after careful study of laboratory and operating tests, has recommended such motion-picture spare parts from plastic materials for mass production.

133. Soviet Jet Engines

"One More 'TU' on Air Routes"; Riga, Nauka i Tekhnika, No 1,
No 1, Jan 63, p 16

Recently the new jet passenger plane TU-124, designed by A. N. Tupolev, made its maiden trip with passengers on the route Moscow-Gor'kiy-UL'yanovsk-Krasnodar. The new plane has a cruising speed of 800-900 km and requires about a 1,000-m landing strip.

The TU-124 resembles the TU-104, but is smaller, has one half the take-off weight, and is designed for about 60 passengers.

Instead of the turbojet engines of the TU-104, the new plane has two highly efficient dual-flow (dvukhkонтурный) engines. Such engines are 15-20% more economical on fuel than the turbojet engines.

III. CONFERENCES

134. Recent Soviet Conferences in Engineering and Geophysics

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. Unless otherwise indicated, it is assumed that there was no non-Soviet participation in the conferences.

a. Fourth All-Union Conference on the Theory of Plates and Shells; 24-31 October 1962, Yerevan; sponsored by the Scientific Council of the Academy of Sciences USSR on the Problem "Scientific Bases of Strength and Plasticity" and the Presidium of the Academy of Sciences Armenian SSR. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 123)

b. Annual Conference on the Theory of Friction and Wear; 23-26 June 1962, Riga; sponsored by the Institute of Automatics and Mechanics of the Academy of Sciences Latvian SSR; 1963 conference will be on the theory of adhesion. (Izvestiya Akademii Nauk Latvyskoy SSR, No 11 (184), 1962, p 124)

c. All-Union Seminar on Radio Isotope Measuring Technique; 16-20 October 1962, Tbilisi; sponsored by the Scientific Council on the Problem "Scientific Bases of the Design of Automatic Measuring Devices Using Radioactive Isotopes and Nuclear Radiations" under the Department of Technical Sciences of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 112)

d. Third Annual All-Union Conference on Problems of the Theory and Methods of Mathematical Modeling -- on the Theory and Methods of Using Computers for Control Purposes; 30 October-3 November 1962, Moscow; sponsored by the Institute of Automatics and Telemechanics of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 121)

e. Scientific-Technical Conference on Magnetic Elements of Automation, Telemechanics, Measurement, and Computer Technology; 10-16 September 1962, L'vov. (Vestnik Akademii Nauk SSSR, No 12, Dec 62, p 111)

f. Conference on the Use of Mathematical Methods and Electronic Computers for Planning in the Machine Building Industry; 7-25 January 1963, Moscow; representatives from GDR, Poland, Czechoslovakia, Hungary, and Bulgaria. (Moskovskaya Pravda, 25 Jan 63, p 3)

g. Ukrainian Republic Scientific-Technical Conference on Instruments of Industrial Control and Means of Automation; 15-18 May 1962, Kiev; sponsored by the Exhibition of Advanced Achievements of the Economy of

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the Ukrainian SSR, the Institute of Automatics of Gosplan Ukrainian SSR, and the Ukrainian Republic and Kiev Oblast Boards of the Scientific-Technical Society of the Instrument Building Industry. (Avtomatika i Telemekhanika, Vol 23, No 10, Oct 62, p 1399)

h. All-Union Scientific-Technical Conference on Remote and Program Control in the Forging-Stamping Industry; June 1962, Moscow, sponsored by the Section on Pressure Working of Metals of the Central Board of the Scientific-Technical Society of the Machine Building Industry, the State Committee of the Council of Ministers USSR on Automation and Machine Building, and the Moscow House of Scientific-Technical Propaganda imeni F. E. Dzerzhinskiy; representatives from five Bloc countries. (Kuznechno-Shtampovochnoye Proizvodstvo, No 1, 1963, p 47)

i. Scientific-Technical Conference on Experience in the Design and Exploitation of Automatic Lines in the Forging-Stamping Industry; October 1962, Moscow; sponsored by the State Committee of the Council of Ministers USSR on Automation and Machine Building. (Kuznechno-Shtampovochnoye Proizvodstvo, No 1, Jan 63, p 48)

j. Seminar on Automation of Production Processes in Mines; September 1962, Degt'yarsk. (Gornyy Zhurnal, No 1, Jan 63, p 78)

k. Joint Session of the Departments of Technical Sciences of the Academy of Sciences USSR and the Academy of Sciences Ukrainian SSR for a Discussion of the Scientific Problems of New Technology; 29 October-1 November 1962, Kiev. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 114)

l. Annual Branch Conference of Power Machine Builders; 1962; sponsored by the State Committee of the Council of Ministers USSR on Automation and Machine Building. (Teploenergetika, No 12, Dec 62, p 83)

m. 16th Scientific-Technical Session of the Commission on Gas Turbines of the Academy of Sciences USSR and the Central Scientific-Research Institute of Heavy Machine Building on the Problem of Metals for Gas Turbine Equipment; 13-17 November 1962, Moscow. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 126)

n. Coordination Conference on Problems of the Hydrotechnical Construction Industry; end of June 1962, Kiev; sponsored by the All-Union Scientific-Research Institute of Hydraulic Engineering imeni B. Ye. Bedeneyev and the Academy of Construction and Architecture Ukrainian SSR. (Gidrotekhnicheskoye Stroitel'stvo, No 1, Jan 63, p 57)

o. Scientific-Technical Conference on Problems of Drying and Grinding of Fuels in Electric Power Plants; June 1962, Moscow; sponsored by the State Committee of the Council of Ministers USSR for Coordination of Scientific Research Work. (Teploenergetika, No 12, Dec 62, p 85)

p. Third All-Union Conference on Thermography; 19-22 September 1962, Riga. (Vestnik Akademii Nauk SSSR, No 12, Dec 62, p 101)

q. Conference on the Quality of Products Manufactured for the Motion-Picture Industry; 22-24 October 1962; sponsored by the Ministry of Culture USSR, and the Section on Precision Mechanics and Optics of the Exhibition of Achievements of the National Economy. (Kino-Mekhanik, No 1, Jan 63, p 38)

r. Third All-Union Conference on Natural Laws Governing the Formation and Distribution of Endogenic Ore Deposits; 18-22 September 1962, Baku; sponsored by the Academy of Sciences Azerbaydzhan SSR; next conference in Leningrad, spring 1964. (Vestnik Akademii Nauk SSSR, No 1, Jan 63, p 119; Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, No 1, Jan 63, p 126)

s. Second All-Union Tectonics Conference; end of August 1962, Dushanbe; sponsored by the Department of Geological-Geographical Sciences of the Academy of Sciences USSR, the Ministry of Geology and Mineral Conservation USSR, the Ministry of Higher and Secondary Special Education USSR, the Academy of Sciences Tadzhik SSR, and the Administration of Geology and Mineral Conservation under the Council of Ministers Tadzhik SSR. (Vestnik Akademii Nauk SSSR, No 12, Dec 62, p 102)

t. Scientific Session on Problems of Seismology and Earthquake-proof Construction; 15-20 October 1962, Dushanbe; sponsored by the Council on Seismology of the Academy of Sciences USSR, the Scientific Council of the Institute of Earthquakeproof Construction and Seismology of the Academy of Sciences Tadzhik SSR, and the National Commission on Earthquakeproof Construction under the Academy of Construction and Architecture USSR. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 118)

u. Conference on Applied Karst Studies; 23-25 April 1962, Moscow; sponsored by the Geography Section of the Moscow Society of Naturalists. (Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, No 1, Jan 63, p 124)

v. Conference of Chief Engineers of Cartographic Enterprises of the Main Administration of Geodesy and Cartography; 23-25 October 1962. (Geodeziya i Kartografiya, No 12, Dec 62, p 68)

w. Expanded Session of the Scientific-Technical Council of the Main Administration of the Hydrometeorological Service; 20-21 December 1962. (Meteorologiya i Gidrologiya, No 2, Feb 63, p 61)

x. All-Union Conference on the Problem of Snow Slides (announcement); 3d quarter 1963; sponsored by the Central Asiatic Scientific-Research Hydrometeorological Institute. (Meteorologiya i Gidrologiya, No 2, Feb 63, p 62)

y. Conference on the Study of Snow Cover (announcement); 1964; sponsored by the Central Asiatic Scientific-Research Hydrometeorological Institute. (Meteorologiya i Gidrologiya, No 2, Feb 63, p 62)

z. Conference on the Climatic Study of Wind; end of October 1962; sponsored by the Scientific-Research Institute of Aeroclimatology. (Meteorologiya i Gidrologiya, No 2, Feb 63, p 62)

aa. City-Wide Seminar on the Application of Statistical Methods for the Solution of Meteorological Problems; 1962, Leningrad; probably sponsored by the Main Administration of the Hydrometeorological Service. (Meteorologiya i Gidrologiya, No 1, Jan 63, p 61)

bb. Second Conference of Geographers of Siberia and the Far East; 5-13 September 1962, Vladivostok; sponsored by the Siberian Branch of the Academy of Sciences USSR, the Institute of Geography of Siberia and the Far East, the Primorskiy Affiliate of the Geographic Society USSR, and the Far Eastern Affiliate of the Siberian Branch of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 123; Vestnik Moskovskogo Universiteta, Seriya 5, Geografiya, No 1, Jan/Feb 63, p 70)

cc. Conference on the Problem of the Complex Utilization of the Land and Water Resources of the Republics of Central Asia and Southern Kazakhstan; May 1962, Tashkent; sponsored by the Academy of Sciences USSR. (Gidrotehnika i Melioratsiya, No 10, Oct 62, p 51)

dd. Scientific Conference on Atlantic Ocean Research; 18-24 October 1962, Kaliningrad; sponsored by the Oceanographic Commission of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 121)

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ee. Conference for a Discussion of Results of the Study of the Mediterranean Sea; 1-9 October 1962, Gelendzhik; sponsored by the Chernomorskaya Experimental Scientific-Research Station of the Institute of Oceanology of the Academy of Sciences USSR. (Vestnik Akademii Nauk SSSR, No 2, Feb 63, p 122)

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135. Forthcoming All-Union Conference on Snowslides

Moscow, Meteorologiya i Gidrologiya, No 2, Feb 63, pp 61-62

The Central Asiatic Scientific-Research Hydrometeorological Institute will conduct an All-Union Conference on the Problem of Snowslides in the third quarter of 1962. The institute is located in Tashkent and is subordinate to the Main Administration of the Hydrometeorological Service under the Council of Ministers USSR.

A Conference on the Study of Snow Cover will be held in 1964.

136. Tenth Annual Conference of Electrical Engineers

"Weimar-Meeting 1963"; Leipzig, Elektro-Praktiker, No 2, Feb 63, p 47

The article states that the Tenth Annual Conference of Electrical Engineers is scheduled to take place on 4-14 June 1963 at Weimar. The conference, which is to be international in character, will present 60 specialized reports covering new developments and more than 20 general papers.

The lectures are to be arranged in specialized groups to include the following three major topics: high-voltage technology; telecommunications; and general problems.

The topics to be discussed are further broken down under the above categories as follows:

Category 1: "Questions of Safeguards in High-Voltage Networks"; "High-Voltage Switches and Installations"; "Creation of Industrial Power Networks"; "Low-Voltage Switchgear"; "Developmental Problems of Electrical Machines"; "Oscillations and Noise Noted in Electrical Machinery"; "Electrical Installation in Industry and Residential Structures"; and "Significance of the Outlook for Induction Heating."

Category 2: "Theoretical Foundations of Telecommunications Technology"; "Reliability of Component Parts"; "Status and Outlook Pertaining to Oscillograph Tubes"; "Directional Radio Technology"; "Developmental Problems of Large Transmission Facilities"; and "Technology of Telecommunications, Radio Broadcasting, and Television Transmission."

Category 3: "Special Metallic Work Materials"; "Electrical Insulation Materials"; "Switching Symbols in Electrical Engineering"; "Problems of Climate Protection"; "Packaging of Electronic Parts"; "Semiconductor Rectifier Diodes for High-Voltage Technology"; "Electrical Measuring Instruments"; "Developmental Trends in Relay Technology"; and "Digital Measuring Technology and Data Processing Equipment."

The article informs readers that inquiries and registration pertaining to attendance at the conference should be addressed to the secretariat of the Association for Electrotechnology under the heading of "Weimar Tagung," Berlin W8, Clara-Zetkin-Strasse 115-117.

137. Forthcoming Conference on Endogenic Ore Deposits

"Ore Belts of the Caucasus," by Academician V. I. Smirnov; Moscow, Vestnik Akademii Nauk SSSR, No 1, Jan 63, pp 119-121

The Third All-Union Conference on Natural Laws Governing the Formation and Distribution of Endogenic Ore Deposits was held on 18-22 September 1962 in Baku and was sponsored by the Academy of Sciences Azerbaydzhan SSR. The first conference was held in Alma-Ata in 1958; and the second, in Kiev in 1960. More than 450 geologists from various republics of the Soviet Union participated in the conference.

The next conference on this subject will be held in Leningrad in the spring of 1964.

138. Conference on Remote and Program Control in Forging-Stamping Industry

"All-Union Scientific-Technical Conference on Remote and Program Control in the Forging-Stamping Industry," by V. V. Filippov; Moscow, Kuznechno-Shtampovochnoye Proizvodstvo, No 1, Jan 63, pp 47-48

A Scientific-Technical Conference on Remote and Program Control in the Forging-Stamping Industry was held in June 1962 in Moscow. The conference was sponsored by the Section on Pressure Treatment of Metals of the Central Board of the Scientific-Technical Society of the Machine Building Industry, the State Committee of the Council of Ministers USSR on Automation and Machine Building, and the Moscow House of Scientific-Technical Propaganda imeni F. E. Dzerzhinskiy. The conference was attended by approximately 400 persons, including representatives from five Bloc countries.

It was resolved that conferences on this subject be called every 3 years.

139. Forthcoming Conference on the Theory of Adhesion

"Conference on the Theory of Friction and Wear," by A. Loginova;
Riga, Izvestiya Akademii Nauk Latvyskoy SSR, No 11 (184),
1962, p 124

A Conference on Problems of Friction and Wear, Sponsored annually by the Institute of Automatics and Mechanics of the Academy of Sciences Latvian SSR, was held in Riga on 23-26 June 1962. This year [1962] the theme of the conference was the theory of the mechanism of wear of solids. It was proposed that a "Conference on the Theory of Adhesion" be called in 1963. [presumably in June, in Riga].

140. All-Union Conference on Fracture Reservoirs in 1964

"Second All-Union Conference on the Problem of Fracture Reservoirs," by I. Krisyuk and V. Golozubov; Moscow, Geologiya Nefti i Gaza, No 1, Jan 63, pp 64-65

The Second All-Union Conference on the Problem of Fracture Reservoirs, organized by the Groznyy Scientific-Research Petroleum Institute and the Administration of the Petroleum Production and Gas Industry of the Checheno-Ingushskiy Sovnarkhoz, was held on 23-27 October 1962 in Groznyy. The participants adopted a resolution to hold the "Third All-Union Conference" on the Problem of Fracture Reservoirs in 1964, in L'vov.

141. Conference on the Shipbuilding Industry in Hungary

"The 1963 Program of the Scientific Society of the Machine Industry"; Budapest, Gep, Vol 15, No 1, Jan 63, pp 42-43

A conference on the shipbuilding industry will be held [probably in Budapest] on 12-14 September 1963, under the auspices of the Scientific Society of the Machine Industry. The purpose of the conference is to promote the realization of the most recent requirements pertaining to Danubian, Danube-maritime, and maritime vessels and shipping through a council of specialists in the field of navigation and ship-building in the countries bordering the Danube.

Topics of discussion will include:

1. New technologies in shipbuilding with special emphasis on cold-forming and welding.
2. Increasing the maneuverability of river boats.
3. Optimum speed and performance of Danubian tugs and push tugs.
4. Diminution of vibration and noise.

142. Conference on Standardization in Hungary

"The 1963 Program of the Scientific Society of the Machine Industry"; Budapest, Gep, Vol 15, No 1, Jan 63, pp 42-43

A Conference on Standardization will be held [probably in Budapest] on 24-27 June 1963, under the auspices of the Scientific Society of the Machine Industry. The purpose of the conference is to promote the development of a uniform attitude in regard to standardization in the socialist countries and to designate the course of future development and cooperation.

The conference will deal with the following topics:

1. Political, economic, and international significance of standardization of the socialist machine industry.
2. Machine industry standardization in the "friendly countries."
3. Role of standardizing centers.
4. Relationship between standardization and centralized production.
5. Role of machine industry standardization in automation.
6. Training of specialists in the field of standardization.

143. Czech Conference on Information Processing Machines

"Conference on Information Processing Machines;" Prague, Technicky Tydenik, 14 Nov 62, p 4

In late October, the Czechoslovak Scientific and Technical Society, the Jan Sverma Plants in Brno, and the Research Institute for Mathematical Machines in Prague organized the Fifth National Scientific Conference on Information Processing Machines. The conference was attended by over 500 specialists from all over the republic, and 74 scientific reports were given.

A number of the lectures were on the subject of the work of the Research Institute of Mathematical Machines, especially work connected with the construction of the EPOS I automatic computer. According to a report given by Engr V. L. Eisler, the EPOS I basic unit has been in test operation since April 1961 and is expected to go into uninterrupted operation in the near future. During a field trip to the TOS Kurim Plant, the participants in the conference observed program-controlled machine tools in operation. In the Jan Sverma Plants in Brno, the participants also saw a small E-1b automatic computer.

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Czechoslovakia has also produced a number of analogue computers, the most significant of which are the MEDA machines, 80 of which have already been produced, and the large ANALOGON analogue computer, which was completed in 1961 and has already been put into operation in the Research and Aviation Experimental Institute in Prague-Letnany. * * * (FOR OFFICIAL USE ONLY) (COPYRIGHT, 1962).

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Central Intelligence Agency



Washington, D.C. 20505

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

A handwritten signature in cursive script, reading "Sergio N. Alcivar".

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

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Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0343932	78-03117A	213	1	18	5117	Scientific Information Report Chinese Science (34)	10/22/1963	89	Approved For Release	3/29/2004
AD0344702	78-03117A	214	1	21	5149	Scientific Information Report Chinese Science (35)	11/4/1963	133	Approved For Release	3/29/2004
AD0344965	78-03117A	215	1	4	5163	Scientific Information Report Chinese Science (36)	11/7/1963	133	Approved For Release	3/29/2004
AD0345229	78-03117A	215	1	23	5182	Scientific Information Report Chinese Science (37)	11/18/1963	179	Approved For Release	3/29/2004
AD0345750	78-03117A	216	1	20	5209	Scientific Information Report Chinese Science (38)	12/11/1963	174	Approved For Release	3/29/2004
AD0344419	78-03117A	217	1	20	5241	Scientific Information Report Chinese Science (39)	12/27/1963	75	Approved For Release	3/29/2004
AD0346493	78-03117A	218	1	21	5277	Scientific Information Report Chinese Science (40)	1/10/1964	115	Approved For Release	3/29/2004
AD0346725	78-03117A	219	1	27	5320	Scientific Information Report Chinese Science (41)	1/27/1964	78	Approved For Release	3/29/2004
AD0347051	78-03117A	220	1	25	5359	Scientific Information Report Chinese Science (42)	2/6/1964	78	Approved For Release	3/29/2004
AD0347849	78-03117A	221	1	39	5407	Scientific Information Report Chinese Science (43)	3/2/1964	174	Approved For Release	3/29/2004
AD0347929	78-03117A	222	1	25	5438	Scientific Information Report Chinese Science (44)	3/5/1964	104	Approved For Release	3/29/2004
AD0348352	78-03117A	223	1	20	5479	Scientific Information Report Chinese Science (45)	3/20/1964	117	Approved For Release	3/29/2004
AD0349491	78-03117A	225	1	18	5560	Scientific Information Report Chinese Science (46)	4/24/1964	118	Approved For Release	3/29/2004
AD0349657	78-03117A	225	1	34	5581	Scientific Information Report Chinese Science (47)	5/4/1964	98	Approved For Release	3/29/2004
AD0332751	78-03117A	183	1	29	3940	Scientific Information Report Electronics And Engineering (22)	10/19/1962	68	Approved For Release	3/29/2004
AD0333146	78-03117A	186	1	20	4041	Scientific Information Report Electronics And Engineering (23)	11/23/1962	73	Approved For Release	3/29/2004
AD0334103	78-03117A	188	1	37	4136	Scientific Information Report Electronics And Engineering (24)	12/20/1962	62	Approved For Release	3/29/2004
AD0334236	78-03117A	190	1	40	4217	Scientific Information Report Electronics And Engineering (25)	1/22/1963	48	Approved For Release	3/29/2004
AD0334769	78-03117A	193	1	39	4339	Scientific Information Report Electronics And Engineering (26)	2/28/1963	68	Approved For Release	3/29/2004
AD0335480	78-03117A	196	1	17	4436	Scientific Information Report Electronics And Engineering (27)	3/21/1963	95	Approved For Release	3/29/2004
AD0336306	78-03117A	199	1	2	4538	Scientific Information Report Electronics And Engineering (28)	4/25/1963	69	Approved For Release	3/29/2004
AD0332433	78-03117A	183	1	35	3946	Scientific Information Report Organization And Administration Of Soviet Science (5)	10/22/1962	60	Approved For Release	3/29/2004