

2/2 009

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AT0124758

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. FORMULAS SHOWN ON MICROFICHE. THE
HCL SALTS WERE STABLED ONLY IN CONCD. OF HCL SOLN. AND WERE ALSO
OBTAINED BY TREATING I WITH HCO SUB2 H OR HYDROLYZING I WITH CALCD. AMT.
H SUB2 O IN ETHER. FACILITY: INST. ORG. KHIM., KIEV, USSR.

UNCLASSIFIED

Acc. Nr: **AF0047332**

Ref. Code: **UR0206**

PRIMARY SOURCE: Vestnik Dermatologii i Venerologii, 1970,
Nr 1, pp 40-46

DIAGNOSTIC CRITERIA IN RECOGNITION OF DISSEMINATED FORMS OF SKIN
TUBERCULOSIS

O. V. Lifouchenko

Summary

On the basis of observations the author concludes that differential diagnosis of papulo-necrotic tuberculosis and indurated erythema must be made first of all with diseases the morphogenesis of which is based on changes of the vessels of derma and subcutaneous cellular tissue, that is, with cutaneous and subcutaneous vasculites. A valuable diagnostic criterion is Mantoux test (1:2000) which in more than half of the patients is accompanied by a short focal reaction. In obscure cases, tentative treatment with anti-tuberculosis drugs of the narrow spectrum of effect (GING+PASK) is indicated.

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REEL/FRAME
19790856

USSR

UDC 621.382.2:539.1.074

LITOVCHENKO, P. G., GONCHAR, V. G., BARABASH, L. I., DEMIDOVA, G. N., and KIBRALO, T. I.

"Some Special Semiconductor Detector Types for Studying Nuclear Reactions"

Kiev, Poluprovodnikovaya tekhnika i mikroelektronika, No. 4, 1970, pp 122-129

Abstract: Noting that recent articles have been devoted to nuclear reaction detectors made of silicon compensated with lithium and having a sensitivity region thickness of up to 6 mm, the authors describe their experiments using charged particles of higher energy which entered the silicon to a depth of several millimeters. The detectors used by the authors had a resolution of 50-60 kev for alpha particles of Am^{243} with an energy of 5.8 Mev. The better detector specimens with an area of about 2 cm² had a resolution of 30 kev. The plot of the Am^{243} alpha particle spectrum detected by a No. 52 specimen is shown. To prepare detectors of this and other types, the authors used the brand BKT-1000 of silicon, which is obtained from the noncrucible zone of the melt and contains less than $2 \cdot 10^{16}$ oxygen atoms per cc, with the lifetime of 1/2

USSR

LITOVCHENKO, P. G., et al., Poluprovodnikovaya tekhnika i mikroelektronika, No 4, 1970, pp 122-129

minority carriers varying from 200-400 μ s and a dislocation concentration of less than $5 \cdot 10^4 \text{ cm}^{-2}$. A diagram of the cross-section construction of the planar detector as well as the diagrams of the ring and "hat" types is shown.

2/2

- 146 -

USSR

UDC 678.675:678.06-419.8:677.521

CHUDINA, L. I., TANUNINA, P. M., LITOVCHENKO, S. I., CHERVINSKAYA, M. A.,
CHERDASOV, M. V., VOROB'YEV, V. D., VLASOVA, K. N., KISELEV, B. A., and
DAVIDOVA, I. F.

"Polyimides and Polybenzimidazols for Plexiglasses and Cements"

Moscow, Plasticheskiye Massy, No 4, 1973, pp 15-17

Abstract: The physical and chemical properties were determined for a number of thermoplastics -- such as the polyimides (PI), polyamidoimides (PAI), and polybenzimidazols (PBI) -- forming 15-68% solutions with different solvents. The PAI and PBI plus three of the PI resins formed linear structures; two of the PI resins formed a three-dimensional structure. The linear resins have a greater strength than the crosslinked below temperatures of about 300°C. The data are given in several tables and graphs.

1/1

- 66 -

LITOVCHENKO, T.A.

Virology

SI: JPRS 54153
28 SEP 71

UDC: 616.5:092.9:017.5-012.2

SOME OF THE RESULTS OF A STUDY OF DERMAL HETEROGENIZATION IMPROVED BY A
LATENT VIRUS OF C37H/6J MICE (II) - *Ukrainian*
Article by A.L. Litovchenko, T.A. Sveridlovskaya, D.M. Konevskaya, P.N. Smetanina,
M.A. Litovchenko, A.P. Yegorova, N.Ye. Sverdlovskaya, N.Ye. Konevskaya, P.N. Smetanina,
and G.P. Litovchenko. Institute of Health, Institute of Experimental and
Clinical Oncology USSR AND (Academy of Medical Science) Institute of Sur-
gical and Hygiene, Georgian Ministry of Health, Institute of Epidemiology and
Microbiology Imed N.F. Gamsalaya, USSR AND; Moscow, Vsesenik Akademiicheskii Institut
Mikrobiologii, Moscow, No 7, 1971, pp 76-81.

In 1965, in our experiments with sarcoma K-237, induced in inbred
C37H/6J mice with the chemical carcinogen DMBA, we discovered the unusual
phenomenon of clonal incompatibility. Skin transplants from mice with
tumors to recipients of the same line, consistently underwent rejection just
as in the case with skin transplants of allogeneic origin from another inbred
line of mice (C.Ya. Sveridlovskiy et al., 1967a, b, c). Further investiga-
tion of this phenomenon, which was named "skin heterogenization," established
that its onset is linked with the effect of a distinctive virus associated with
sarcoma K-237 (G.Ya. Sveridlovskiy et al., 1968a, b). These investigations
define two directions of research which have been developed in recent times
by a number of authors in many laboratories the world over: 1) investigation
of appearance of new antigens in normal tissues of tumor carriers and, of a
more general question, investigation of antigen exchange between cells exist-
ing in the organism and in vitro; 2) investigation of viral heterogenization of
normal cells and the role of such phenomena in pathology, in particular with
reference to immunopathological states. Thus, investigation of this problem
is timely both for general immunology and for such directions in it as
transplantation and antitumor immunity. In this report we should like to
sum up some of the results of investigation of skin heterogenization as an
example of the experimental model we have described, and to discuss the
present status of the problem as a whole. Like any new problem, this one
presents a number of debatable aspects which are also going to be discussed.

Material and methods. The experiments were conducted on fibrosarcoma C37H/6J
BALB/C, C3H, C57H, 616 mice which were obtained from the Sverdlovskaya
Nursery of the USSR AMN. Hybrids from crosses between C37H/6J and BALB/c
mice were obtained in our initial shelter. To induce tumors, we gave the

skin heterologous injections of 7,12-dimethylbenzanthracene (DMBA) in sterile oil solution, in a dosage of 0.5 mg. Tumors developed at the site of injection of the carcinogen within 3-5 months. They were transferred to syngeneic mice by means of subcutaneous implantation of small pieces. The method of preparing virus-containing ocular tumor extracts and of treating them on mice was described previously (G.Ya. Svet-Koldovskiy et al., 1968b, b, 1970).

Skin transplants were transferred following a slight modification of the method of Blinham and Hedner (1951). Recipient skin transplants, including all layers, 3.5x2 cm in size were applied to recipients by means of an adhesive strip along the margins of the transplant and site. For this purpose we used a special preparation of B-6 adhesive (adhesive for microtumors). The first excision of the recipient's skin was made on the 25th day after the transplant; primary acceptance of any type of transplant normally occurred within this time. At this time we rejected all recipients showing signs of injury or infection of the transplants. The percentage of such rejects ranged from zero to ten in the different experiments. In order to investigate the time of transplant rejection, they were examined daily. The final criterion of acceptance or rejection was the presence or absence of hair growth, which was in the opposite direction from growth on the recipient's back because the graft was twisted at the time of transplantation.

Chief phenomenon and etiological agent. The reaction of rejection of skin grafted to syngeneic C57Bl/6J recipients from carriers of sarcoma K-23) was identical to the reaction of rejection of allogeneic transplants (of skin from BALB/c mice to C57Bl/6J recipients). Both, as well as normal syngeneic transplants, showed vascularization by the 6th day and were accepted. Development of rejection occurred between the 8th and 14th experimental day (Table 1). Histological examination of the transplants also revealed complete similarity of rejection of syngeneic heterografted and allogeneic skin. In both instances (Figures 1-4), on the tenth day the reaction was characterized by marked dilatation of vessels and arrested circulation. There was fixed cellular infiltration of the transplants, and this is quite typical precisely for the rejection reaction in mice (Brent, 1955). In addition to macrophages, there was a considerable number of polymorphonuclear leukocytes in the transplants. There were also marked signs of activation of connective tissue in the transplants (edema and adhesion layer). The agent "responsible" for development of heterogenization of the skin presented properties that were typical for viruses. It could be separated from tumor cells; it remained in acellular extracts of the tumor, ultracentrifugates, and ultracriticates (for more details see G.Ya. Svet-Koldovskiy et al., 1970). Table 2 gives the summary data on the heterogenizing effect of the tumor and of extracts thereof. As seen in Table 2, in almost 1,000 cases of transplantation, there was heterogenization of the skin by the tumor or virus-containing extract, whereas in the control (provided accurate consideration of primary healing of the grafts was made) no rejections were observed. It has been shown (O.N. Ivanova et al., 1970; G.Ya. Svet-Koldovskiy et al., 1970) that skin heterogenization occurs both after infection with tumor extract and after transplantation of heterogenized skin. In the latter event, the phenomenon developed after each successive transplantation for 15 passages, starting in 1968. Thus, the viral nature of the agent is confirmed by the fact that it can be separated from cells; it

Organ and Tissue Transplantation

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UDC 612.6.054.017.4

3

SVET-MOLDAVSKIY, G. Ya., SHAGIYAN, G. Sh., MKHEIDZE, D. M., LITOVCHENKO, T. A.,
OZERETSKOVSKAYA, N. N., KADAGIDZE, Z. G., and CHERNYAKHOVSKAYA, I. Yu., Institute
of Experimental and Clinical Oncology, Academy of Medical Sciences USSR, Moscow
(Presented by Academician V. V. Parin)

"Inhibition of Transplantation Immunity in Mice Infected With *Trichinella spiralis*"

Moscow, Doklady Akademii Nauk SSSR, Vol 190, No 4, Feb 70, pp 999-1000

Abstract: In this study the authors attempted to get experimental support for the theory proposed by Svet-Moldavskiy that helminths produce substances which drastically inhibit the immunity of the host. Experiments were based on skin transplants. It was determined that in mice infected with *Trichinella spiralis*, the allogenic skin transplant survived much longer, and the detachment of necrotic sections occurred much later than in controls.

USSR

UDC: 621.315.592

ZUYEV, V. A., LITOVHENKO, V. G., GLINCHUK, K. D., LICOVCHENKO,
N. M., SUKACH, G. A., and LINNIK, L. F.

"Current Carrier Recombination Processes on Ge and Si Surfaces
Under Laser Excitation"

Leningrad, Fizika i tekhnika poluprovodnikov, No 10, 1972, pp 1956-
1944

Abstract: While investigations of volume recombination processes of current carriers under laser excitation have been made and have yielded important information on the characteristics of local centers and new recombination mechanisms, investigations of surface processes have been limited to low excitation levels. The experiments described in this paper were designed to measure four effects: photoconductivity amplitude and relaxation time; absorption of infrared light by unbalanced current carriers; zone-zone recombination radiation intensity and relaxation; capacitor photo-EMF. A block diagram of the experimental equipment is given. A neodymium laser operating at a wavelength of 1.06 microns and a ruby laser at 0.6943 microns, with maximum intensity of 10^{25} kw/cm²·sec, were used to generate the unbalanced current carriers. A signal of
1/2

USSR

UDC: 621.315.592

ZUYEV, V. A., et al, Fizika i tekhnika poluprovodnikov, No 10,
1972, pp 1936-1944

infrared radiation was supplied by a 300 watt incandescent lamp with a germanium filter, and the receiver of the infrared radiation was a low-inertia photoresistance using germanium with a gold impurity. The authors thank O. V. Snitko, D. Pataki, and A. V. Sachenko for their useful comments on a number of problems encountered in the course of this work.

2/2

USSR

UDC 621.382.2

LITOVCHENKO, V.G.

"Some Current Physical And Practical Problems In Semiconductor-Insulator Systems"

Poluprovodn. tekhn. i mikroelektronika. Resp. mezhved. sb. (Semiconductor Technology And Microelectronics. Republic Interdepartmental Collection), 1972, Issue 8, pp 3-14 (from RZh:Elektronika i yeye primeneniye, No 11, Nov 1972, Abstract No 11B132)

Translation: The paper analyzes the possibilities and prospects of the use of microelectronic metal-insulator-semiconductor (MIS) structures for a study of the physical phenomena in semiconductors and in multiphase laminated systems. The most important applied trends are considered, based on the use of MIS and DP [insulator-semiconductor] structures (field-effect transistors, integrated circuits, reactive elements, elements of optoelectronics, and others). 45 ref. Summary.

1/1

- 131 -

USSR

UDC 621.315.592:546.28

LITOVCHENKO, V.G., LYSENKO, V.S., PRIKHODENKO, V.I., SHUL'MAN, A.YE.,
~~KAZAROV, R.YE.~~, STADNIK, A.V.

"Effect Of Structural Factors Of Monocrystalline Silicon Films On Their Surface Properties"

Poluprovodn. tekhn. i mikroelektronika. Resp. mezhved. sb. (Semiconductor Technology And Microelectronics. Republic Interdepartmental Collection), 1972, Issue 7, pp 38-40 (from RZh:Elektronika i yeye primeneniya, No 9, Sept 1972, Abstract No 9B82)

Translation: A comparative study is made of a number of volumetric characteristics which depend on the defectiveness of the volume of Si films grown on sapphire substrates (mobility of charge carriers and others), and of the surface-sensitive characteristics (bending of zones, density of fast traps, and others). It is shown that the electrical properties of the surface of strongly defective films depend on the volume structure. 4 ref. Summary.

1/1

- 121 -

USSR

UDC 537.311.33:546.28

LITOVCHENKO, V. G.

"Study of the Characteristics of a Dielectric--Semiconductor System by the Methods of Infrared Spectroscopy"

Poluprovodn. tekhn. i mikroelektronika. Resp. mezhved. sb. (Semiconductor Technics and Microelectronics. Republic Interdepartmental Collection), 1971, Issue 6, pp 49-55 (from RZh-Elektronika i yeye primeneniye, No 9, September 1971, Abstract No 9B39)

Translation: A study is made of the physical characteristics of the oxide and face of the system Si--SiO₂ by the methods of infrared spectroscopy (reflection, absorption of electrical reflection, and extrinsic conductivity). 6 ref. Summary.

1/1

- 89 -

USSR

UDC 535.215.12+621.382.28

LITOVCHENKO, V. G., SERBA, A. A., GORBAN', D. N., MOSKAL', D. N.,
IVANOVA, T. P., TKACHIK, V. P., and PROKUROV, A. V.

"Using Optical-Electronic Converters Using MOS Photovaricaps in
Dosimetric Equipment"

Kiev, Poluprovodnikovaya tekhnika i mikroelektronika, No. 5, 1971,
pp 108-113

Abstract: An investigation is made of the basic characteristics of a new type of semiconductor voltage modulator used as the active element in a surface metal oxide semiconductor photovaricap. This paper is thus a sequel to two earlier articles (Elektronnaya tekhnika, Series 2, 1967, 1, 96, and Radiotekhnika i elektronika, 1967, 12, 1, 76) written by the same authors, which dealt with the theoretical analysis of the physical phenomena determining the operation of MOS varicaps of the optical variety, and the experimental results of research into their characteristics. The experiments described in the present paper were conducted with p-type silicon specimens of various resistivities, from 10^2 to 10^4 ohm.cm, the surfaces of which were cleaned and sputtered with a layer of SiO_2 . A block diagram of the measuring equipment is shown and its operation described. The authors conclude that these photovaricaps can

1/2

USSR

LITOVCHENKO, V. G., et al., Poluprovodnikovaya tekhnika i mikro-
elektronika, No. 5, 1971, pp 108-113

be successfully used in equipment for measuring small constant or slowly varying currents and voltages from high-resistance sources. They are associated with the Semiconductor Institute, Ukrainian Academy of Sciences.

2/2

- 31 -

USSR

UDC 621.383.5+621.382.28+535.215.12

LITOVCHENKO, V. G., SERBA, A. A., GORBAN', A. P.

"Some Physical Processes in the Metal-Dielectric-Semiconductor System under Conditions of Strong Nonstationary Depletion of the Semiconductor"

Kiev, Poluprovodnikovaya tekhnika i mikroelektronika, No 5, 1971, pp 11-18

Abstract: A method is proposed for a combined study of the capacitance and conductivity of a metal-dielectric-semiconductor structure converted to the nonstationary depletion condition by means of a rectangular-pulse voltage. The system was studied under two conditions: in the absence of intensification (the thermodynamically equilibrium situation in a neutral space) and with intensification (thermodynamically known equilibrium situation in neutral space).

In the thermodynamically equilibrium situation, measurement of the capacitance and longitudinal conductivity permits determination of the concentration of the equilibrium carriers (without distorting the effect of the mobility, the Hall constant, and so on) and the mobility of the majority carriers (including the distribution of the mean mobility with respect to thickness of the specimen). In the thermodynamically nonequilibrium situation, the investigated system has high collector properties for nonequilibrium electron-hole pairs; it permits obtaining of a "gigantic" photocapacitive

1/2

USSR

LITOVCHENKO, V. G., et al., Poluprovodnikovaya tekhnika i mikroelektronika,
No 5, 1971, pp 11-18

effect ($k = C_{\text{eff}}/C_{\text{eff}0} \sim 10^4-10^5$) and determination of the photogeneration
function of the electron-hole pairs in the semiconductor in absolute units.
Extraordinarily small light fluxes can be recorded here ($\sim 10^{-12}$ watts/cm²).
Experimental results are presented which confirm the theoretical analysis.

2/2

- 97 -

USSR

UDC 621.315.592

LITOVCHENKO, V. G.

"Investigating the Characteristics of Dielectric-Semiconductor Systems Through Infrared Spectroscopy"

Kiev, Poluprovodnikovaya tekhnika i mikroelektronika, No. 6, 1971, pp 49-55

Abstract: By using three methods of infrared study of dielectric-semiconductors, the author and his colleagues of the Semiconductor Institute of the Ukrainian Academy of Sciences show that this kind of study can yield essential information concerning the nature of the physical processes in the two-phase dielectric-semiconductor device. These three methods are: the study of optical reflection and absorption spectra; the method of full internal electrical reflection; study of the impurity photoconductivity spectra. The block diagram for the first type is given and its operation explained. A method of multiple internal reflection proposed by the author and his colleagues, similar to this first type, is also explained. The method of full internal electrical reflection is capable of fixing extremely small changes in optical constants, thus making possible a fine method of solid state research. Examples of impurity photoconductivity are shown.

1/1

USSR

UDC 535.215.12+621.382.28

LITOVCHENKO, V. G., SERBA, A. A., GORBAN', D. N., NOSKAL', D. N., IVANOVA, T. P.,
TKACHIK, V. P., PROKUROV, A. V.

"Use of an Optoelectronic Converter based on a Metal-Dielectric-Semiconductor
Photovaricap in a Dosimetric Device"

Kiev, Poluprovodnikovaya tekhnika i mikroelektronika, No 5, 1971, pp 108-113

Abstract: A study was made of the basic characteristics of a new type of semiconductor voltage modulator using a surface metal-dielectric-semiconductor photovaricap as the active element. The theoretical analysis of the physical phenomena determining the operation of the MDS photovaricaps and also some experimental results of studying their characteristics were presented previously [V. G. Litovchenko, et al., Elektronnaya tekhnika, Series 2, No 1, 96, 1967; V. G. Litovchenko, et al., Radiotekhnika i elektronika, Vol 12, No 1, 76, 1967].

An optoelectronic modulator of constant and low-frequency voltages from high-resistance sources was developed on the basis of an MDS photovaricap and a light diode. The modulator is characterized by high-frequency parameters (10^5 - 10^7 hertz), high input impedance ($> 10^{12}$ ohms), small size and weight. Experimental data were obtained which illustrate the operation of the MDS photovaricap in the optoelectronic modulator, in particular, combined with the
1/2

USSR

LITOVCHENKO, V. G., et al., Poluprovodnikovaya tekhnika i mikroelektronika, No 5, 1971, pp 108-113

ionization chamber. The application of these optoelectronic modulators permits an increase in their modulation frequency by several orders (by comparison with mechanical dynamic capacitors) and, therefore, use of ordinary alternating voltage amplifiers instead of electrometric input cascades.

2/2

- 12 -

1/2 028 UNCLASSIFIED PROCESSING DATE--23OCT70
TITLE--SURFACE ELECTRICAL CHARACTERISTICS OF SINGLE CRYSTAL SILICON FILMS
ON SAPPHIRE -U-
AUTHOR--(04)-LISENKO, V.S., LITOVCHENKO, V.G., KOSENKO, V.YU., IGNATKOV,
V.D.
COUNTRY OF INFO--USSR
SOURCE--UKRAINS'KII FIZICHNII ZHURNAL, VOL. 15, MAR, 1970, P. 409-414.
DATE PUBLISHED-----70
SUBJECT AREAS--MATERIALS, PHYSICS
TOPIC TAGS--SILICON SINGLE CRYSTAL, PHOTOCONDUCTIVITY, BIBLIOGRAPHY, METAL
FILM, EPITAXIAL PN JUNCTION, EPITAXIAL GROWTH
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--1996/1923 STEP NO--UR/0185/70/015/000/0409/0414
CIRC ACCESSION NO--AP0118885

UNCLASSIFIED

2/2 028

UNCLASSIFIED

PROCESSING DATE--23OCT70

CIRC ACCESSION NO--AP0118985

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. APPLICATION OF FIELD EFFECT, CONTACT POTENTIAL DIFFERENCE, AND PHOTOCONDUCTIVITY MEASUREMENTS TO DETERMINE THE SURFACE ELECTRICAL CHARACTERISTICS OF P AND N TYPE HETEROEPITAXIAL SILICON FILMS ON SAPPHIRE. A SIGNIFICANT NONUNIFORMITY OF THE FREE SURFACE POTENTIAL IS SHOWN TO BE CAUSED BOTH BY SURFACE BOUNDARIES IN MOSAIC TYPE FILMS AND BY HETEROGENEITY OF THE SURFACE. THE FREE SURFACE CONTAINS SIGNIFICANT CONCENTRATIONS OF BOTH ACCEPTOR AND DONOR CENTERS. THE SURFACE ADJACENT TO THE SAPPHIRE SUBSTRATE EXHIBITS RELATIVELY HIGH FIELD EFFECT MOBILITY, WITH ACCEPTOR PREDOMINANCE IN BOTH N AND P TYPE FILMS. THE PHOTOCONDUCTIVITY OF THE FILMS HAS A MAINLY UNIPOLAR NATURE. FACILITY: AKADEMIIA NAUK UKRAINS'KOI RSR. INSTITUT NAPIVPROVIDNIKIV, KIEV, UKRAINIAN SSR.

UNCLASSIFIED

USSR

UDC: 539.216.22:546.28

LITOVCHENKO, V. G., LYSENKO, V. S., PRIKHODENKO, V. I., SHUL'MAN, A. Ye.,
KAZAROV, R. Ye., STADNIK, A. V., Institute of Semiconductors, Academy of
Sciences of the UkrSSR

"Effect of Structural Factors of Single-Crystal Silicon Films on Their Sur-
face Properties"

Kiev, Poluprovodnikovaya Tekhnika i Mikroelektronika, Resp. Mezhd. Sb.,
No 7, 1972, pp 38-40

Abstract: A comparative study is made of a number of volumetric charac-
teristics which depend on the volumetric imperfection of silicon films
grown on sapphire substrates (mobility of the charge carriers, etc.), as
well as surface-sensitive characteristics (zone flexure, density of fast
traps, etc.). It is shown that the electrical properties of the surface
of strongly imperfect films depend on the volumetric structure.

1/1

- 67 -

USSR

UDC: 621.315.592

LYSENKO, V. S., LITOVCHENKO, V. G., KORNYUSHIN, S. I., CHERNOPIISKIY, V. P.,
Institute of Semiconductors, Academy of Sciences of the UkrSSR

"Effect of Gamma Irradiation on the Electrical Properties of a Real Ger-
manium Surface"

Kiev, Poluprovodnikovaya Tekhnika i Mikroelektronika. Resp. Mezhd. Sb.,
No 7, 1972, pp 47-51

Abstract: The paper gives some results of a study of radiation defects induced by exposure to gamma quanta on the surface and in the space charge region in germanium. Thin specimens of N-type ($\rho = 20, 43, 50 \Omega\text{-cm}$) and P-type ($\rho = 30 \Omega\text{-cm}$) were studied. The results of the research showed an appreciable increase in the rate of surface recombination, especially in the region of positive potentials, with a new recombination level on curves for surface recombination rate as a function of initial potential in this region. Specimens with an elevated oxygen content showed an increase in the density of fast shielding states throughout the potential range, whereas oxygen-free specimens showed practically no change in the concentration of such states. The initial potential was shifted toward the N-side after ex-

1/2

- 68 -

LYSENKO, V. S. et al., Poluprovodn. Tekh. i Mikroelektron. Resp. Mezhved. Sb., No 7, 1972, pp 47-51

posure in all specimens. The maximum displacement was accompanied by a reduction in the density of "slow" states. The stability of the new centers was shown by the fact that the surface characteristics of irradiated specimens were not altered by exposure to the atmosphere for two months. Very brief treatment in hydrogen peroxide (about 4 s) almost completely restored the surface potential to the values observed in specimens before irradiation. This indicates that the potential displacement observed is due to alteration of the chemical structure of the surface oxide phase.

1/2 035 UNCLASSIFIED PROCESSING DATE--13NOV70
TITLE--DETERMINATION OF CROSS SECTIONS OF PHOTON CAPTURE BY SURFACE
ELECTRON STATES -U-
AUTHOR--(02)-LITOVCHENKO, V.G., KOVBASYUK, V.P.
COUNTRY OF INFO--USSR
SOURCE--FIZ. TEKH. POLUPROV. 1970, 4(5), 975-8
DATE PUBLISHED-----70
SUBJECT AREAS--PHYSICS
TOPIC TAGS--FREQUENCY CHARACTERISTIC, IR PHOTOCONDUCTOR, SILICON,
RELAXATION PROCESS, IR ABSORPTION SPECTRUM, CRYSTAL VACANCY, CAPTURE
CROSS SECTION
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--3004/0885 STEP NO--UR/0449/70/004/005/0975/0978
CIRC ACCESSION NO--AP0131472
UNCLASSIFIED

2/2 035

UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0131472

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE WAVELENGTH (λ) DEPENDENCE OF THE RELAXATION TIME, τ_{subir} , OF THE IR SURFACE PHOTOCOND. (PC) WAS DETD. IN SI BY MEASURING THE PC DECAY AND (OR) THE FREQUENCY (ω) DEPENDENCE OF THE PC. τ_{subir} DECREASED WITH INCREASING λ AND EXHIBITED 2 REGIONS IN THE ω DEPENDENCE OF THE PC: ONE AT LOW ω (10-20 HZ), THE OTHER AT HIGH ω (2 TIMES 10^{15} - 10^{16} HZ). THE 2 REGIONS CORRESPOND TO STEPS IN THE PC SPECTRUM, INDICATING A LEVEL CHANGE WITH INCREASING λ . THE PHOTON CAPTURE CROSS SECTION, α_{subphi} WAS CALCD. FROM $\alpha_{subphi} = \frac{\Delta \rho_{subir}}{\rho_{subir} \tau_{subir}}$ OVER τ_{subir} THE CARRIER CONC. IN THE SPACE CHARGE REGION OF THE VALENCE BAND, ρ_{subir} IS THE NO. OF VACANCIES ON THE LEVEL, AND L_{subir} IS THE NO. OF INCIDENT PHOTONS. THE VALUES FOR THE SLOW AND FAST REGIONS ARE $\alpha_{subphi} \approx 10^{-15}$ CM² AND $\alpha_{subphi} \approx 10^{-16}$ - 10^{-17} CM², RESP. FACILITY: INST. POLUPROV., KIEV, USSR.

UNCLASSIFIED

1/2 022 UNCLASSIFIED PROCESSING DATE--30OCT70
TITLE--THE EFFECT OF MUSCULAR EXERCISES ON THE LIPOLYTIC ACTIVITY OF THE
BLOOD SERUM AND OF THE CARDIAC MUSCLE OF RATS UNDER NORMAL CONDITIONS
AUTHOR--(03)--LITOVCHENKO, YU.S., LEYTES, F.L., LEMPERT, B.L.

COUNTRY OF INFO--USSR

SOURCE--PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA, 1970,
VOL 14, NR 3, PP 37-42
DATE PUBLISHED--70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--EXERCISE, BLOOD SERUM, LIPID METABOLISM, MYOCARDIUM, DIABETES
MELLITUS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--3001/1935

STEP NO--UR/0396/70/014/003/0037/0042

CIRC ACCESSION NO--AP0127336

UNCLASSIFIED

2/2 022

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0127336

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. IN RATS FORCED TO RUN IN A TRAITBAN (MODERATE AND MAXIMAL MUSCULAR EXERCISES) BEFORE MEALS A RISE OF LIPOLYTIC ACTIVITY OF THE BLOOD SERUM WHICH OCCURRED POINTED TO INCREASED WAYS OF ENERGY UTILIZATION OF TRIGLYCERINE COMPONENT OF THE BLOOD SERUM BETA-LIPOPROTEIDS. BUT ON FULL STOMACH THIS REACTION WAS NOTED ONLY AT THE MAXIMAL MUSCULAR LOAD. IN RATS WITH ALLOXAN DIABETES MUSCULAR EXERCISES PRODUCED THE SAME EFFECT UPON THE LYPOLYTIC ACTIVITY OF THE BLOOD SERUM AS IN INTACT ANIMALS, AND ONLY DECREASED WITH MAXIMAL MUSCULAR EXERCISES IN THE ANIMALS MADE TO RUN ON FASTING STOMACH. THE ACTIVITY OF LIPOLYTIC ENZYMES IN THE MYOCARDIUM OF RATS ELEVATES IN MODERATE PHYSICAL EXERCISES AND IN ALLOXAN DIABETES, BUT FELL BELOW THE NORMAL LEVEL IN THEIR COMBINATION. FACILITY: LABORATORIYA PATOKHIMII ZHIRO-LIPOIDNOGO OBMENA PRI KAFEDRE PATOFIZIOLOGII TSENTRAL'NOGO INSTITUTA USOVERSHENSTVOVANIYA VRACHEY, MOSKVA.

UNCLASSIFIED

AP0052328

REF. CODE: 000000

PRIMARY SOURCE: Fiziologichnyi Zhurnal, 1970, Vol 16, Nr 1, pp 42-48

CHANGE IN SOME INDICES OF FAT-CARBOHYDRATE METABOLISM UNDER MUSCULAR LOADING IN RATS

Yu. S. Litovchenko

Department of Pathological Physiology, Central Advanced Training Institute for Doctors, Moscow

Summary

In intact rats after 18-hour starvation the maximum muscular loading in tread-mill (stoppage of running) evokes a decrease in blood sugar, total lipids and serum cholesterol with a drop in the glycogen content of the liver and muscles, intensification of the lipolytic activity in fat tissue and a rise in the fat content of the liver. The content of ketone bodies in blood and cholesterol in the liver does not change. The same loading causes the same changes of carbohydrate and fat metabolism in both satisfied and hungry animals, with the exception for a decrease in the content of total lipids in serum.

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REEL/FRAME
19820912

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AP0052328

In diabetic animals the same muscle loading carried out both on an empty stomach and in a satisfied state is accompanied by a drop of blood sugar level and glycogen content in the liver and muscles.

The data obtained make it possible to assume that the maximum muscle loading to an equal extent raises carbohydrate consumption in intact animals and alloxan-diabetic rats. Utilization of higher fatty acids is more pronounced in diabetic animals than in intact ones.

2/2

Blh

19820913

1/2 026 UNCLASSIFIED PROCESSING DATE--18SEP70
TITLE--LOW TEMPERATURE MODIFICATION OF THE LOWER MOLYBDENUM CARBIDE -U-
AUTHOR--(04)-YEREMENKO, V.N., VELIKANOVA, T.YA., LISTOVNICKIY, V.YE.,
KOMAROVA, S.A.
COUNTRY OF INFO--USSR
SOURCE--IZV. AKAD. NAUK SSSR, NEORG. MATER. 1970, 6(1), 11-14
DATE PUBLISHED-----70

SUBJECT AREAS--CHEMISTRY, PHYSICS

TOPIC TAGS--MOLYBDENUM COMPOUND, CARBIDE, X RAY DIFFRACTION, CRYSTAL
STRUCTURE, THERMAL EFFECT, ELECTRIC RESISTIVITY, THERMOGRAPHIC ANALYSIS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRA--1984/0151

STEP NO--UR/0363/70/006/001/0011/0014

CIRC ACCESSION NO--AP0054947

UNCLASSIFIED

UNCLASSIFIED

PROCESSING DATE--18SEPT70

2/2 026

CIRC ACCESSION NO--AP0054947

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THERMOGRAPHIC AND X RAY DIFFRACTION METHODS WERE USED. DURING X RAY DIFFRACTION INVESTIGATION OF MO-C ALLOYS, CAST AND ANNEALED IS GREATER THAN 1200DEGREES (WITH C CONTENT 12.538 AT. PERCENT AT IS LESS THAN 1634DEGREES AND UP TO 50 AT. PERCENT C AT LOWER TEMPS.), ONLY THE PSEUDOHXAGONAL LATTICE WAS OBSD. FOR THE MO SUBC-BASED PHASE, WITH THE PARAMETERS: ALPHA EQUALS 2.993, C EQUALS 4.739 KX, AND C-A EQUALS 1.58 (AT 31 AT. PERCENT C); AND ALPHA EQUALS 3.015, C EQUALS 4.739 KX, AND C-A EQUALS 1.57 (AT 33.75 AT PERCENT C). A PHASE TRANSITION WAS OBSD. AT 1170 PLUS OR MINUS 13DEGREES IN THE LOWER MO CARBIDE MO SUB2 C, ACCOMPANIED BY AN EXOTHERMAL EFFECT (DURING COOLING) WITH A SIGNIFICANT TEMP. HYSTERESIS. A DECREASE IN THE SYMMETRY OF THE CRYST. LATTICE, I.E. RHOMBOHEDRAL DISTORTION OF THE ORTHORHOMBIC MO SUB2 C STRUCTURE, IS OBSD. THE MO CARBIDES STUDIED HAD THE COMPNS. OF MOC SUB0.48 AND MOC SUB0.51, RESP. EXPTS. WERE PERFORMED RELATIVE TO THE MEASUREMENT OF SP. ELEC. RESISTIVITY OF MOC SUB0.48 AS DEPENDENT ON THE QUENCHING TEMP. WITHIN THE TRANSITION TEMP. RANGE. THE ELEC. RESISTIVITY OF THE ALLOY QUENCHED FROM 1400DEGREES DOES NOT DIFFER FROM THE ELEC. RESISTIVITY OF THE CAST ALLOY. WITH DECREASED QUENCHING TEMP. THE ELEC. RESISTIVITY DECREASES TO 1050DEGREES, WHERE UPON IT REMAINS UNCHANGED. THE DEPENDENCE OF THE P VALUE ON THE QUENCHING TEMP. OF THE SAMPLE CAN BE ASSOCD. WITH THE CHANGE IN ITS CRYST. STRUCTURE. AN-ADDNL. THERMAL EFFECT WAS OBSD. AT 1634DEGREES.

UNCLASSIFIED

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PROCESSING DATE--27NOV70

172 023

TITLE--COEFFICIENT OF THE TEMPERATURE CONDUCTIVITY OF ALUMINOSILICATE
REFRACTORIES AT 200-1600DEGREES -U-
AUTHOR-(03)-LITOVSKIY, YE.YA., LANDA, YA.A., MILSHENKO, R.S.

COUNTRY OF INFO--USSR

SOURCE--OGNEUPORY 1970, 35(5), 17-19

DATE PUBLISHED-----70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--THERMAL CONDUCTIVITY, REFRACTORY MATERIAL, ALUMINA, SILICA,
ANISOTRGPY, TEMPERATURE DEPENDENCE/(U)KML7 FURNACE REFRACTORY, (U)D2
BLAST FURNACE REFRACTORY

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--3006/0645

STEP NO--UR/0131/70/035/005/0017/0019

CIRC ACCESSION NO--AP0134407

UNCLASSIFIED

2/2 023 UNCLASSIFIED PROCESSING DATE--27NOV70
CIRC ACCESSION NO--AP0134407
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THERE ARE DATA IN THE LITERATURE ON THERMAL COND. AND HEAT CAPACITY COEFFS. OF ALUMINOSILICATE REFRACTORIES IN THE 300-1100DEGREES RANGE, BUT SUCH DATA ARE NOT AVAILABLE AT HIGHER TEMPS. IN GLASS FOUNDRY FURNACES, AS WELL AS IN MANY APP. USED FOR STEEL MAKING, SUCH REFRACTORIES ARE NEEDED CAPABLE OF OPERATING AT 1550-1600DEGREES. THE TEMP. DEPENDENCE OF THERMAL COND. COEFF. OF ALUMINOSILICATE REFRACTORIES OF VARIOUS TYPES WAS INVESTIGATED WITHIN THE 200-1600DEGREES RANGE. THE DETN. OF THE TEMP. COND. COEFF. OF THE REFRACTORIES WAS PERFORMED BY TAKING INTO CONSIDERATION THE POSSIBLE ANISOTROPY OF THE ARTICLES IN THE DIRECTIONS PERPENDICULAR AND PARALLEL TO THE PRESSING DIRECTION. NO SIGNIFICANT DIFFERENCES WERE OBSERVED BETWEEN THE REFRACTORIES INVESTIGATED. THE TEMP. DEPENDENCE OF TEMP. COND. FOR THE MAJORITY OF THE SAMPLES INVESTIGATED WAS FOUND TO BE THE SAME: UP TO 400-600DEGREES A DECREASE IN TEMP. COND. IS OBSD., UP TO 1100-1300DEGREES ITS INCREASE, AND ABOVE 1200-1300DEGREES AGAIN ITS DECREASE. THE VERY HIGHEST TEMP. COND. DURING THE INVESTIGATION WAS OBSD. IN CASE OF ROOFING TILING KH-17, AND THE LOWEST IN CASE OF THE BLAST FURNACE TYPE D-2. FACILITY: VSES. INST. OGNEUPDR., LENINGRAD, USSR.

UNCLASSIFIED

1/2 010 UNCLASSIFIED PROCESSING DATE--13NOV70
TITLE--PHOTOCOLORIMETRIC METHOD FOR DETERMINING SILICON DIOXIDE IN
BULGARIAN BARITE -U-
AUTHOR--(02)-VAKHRANEYEVA, I.V., LITS, L.B.
COUNTRY OF INFO--USSR
SOURCE--KHIM. PRGM. UKR. 1970, (1), 43-4
DATE PUBLISHED-----70
SUBJECT AREAS--CHEMISTRY, EARTH SCIENCES AND OCEANOGRAPHY
TOPIC TAGS--SILICON-DIOXIDE, COLORIMETRIC ANALYSIS, MINERAL, BARIUM
SULFATE
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--2000/0424 STEP NO--UR/0436/70/000/001/0043/0044
CIRC ACCESSION NO--AP0124175
UNCLASSIFIED

2/2 010

UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0124175

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. FUSE 1 G BARITE WITH 10 G NAKCO SUB3 IN A PT CRUCIBLE, LEACH THE MELT WITH HOT H SUB2 O, FILTER THE PPT. OFF AND WASH IT WITH 1PERCENT NA SUB2 CO SUB3. DIL. THE FILTRATE TO 500 ML WITH H SUB2 O; TO A 10 ML ALIQUOT, ADD 70 ML 2N HCL, 5 ML 5PERCENT (NH SUB4)SUB2 MOO SUB4 AND H SUB2 O TO 500 ML. AFTER 10-15 MIN MEASURE THE ABSORBANCE. USING HOT H SUB2 O TRANSFER THE PPT. INTO A 500 ML VOLUMETRIC FLASK, WASH THE FILTER WITH 1:1 HCL AND DIL. TO VOL. WITH H SUB2 O. TO A 10 ML ALIQUOT, ADD 35 ML 2N HCL AND FURTHER TREAT IN THE SAME WAY AS THE FILTRATE. ADD THE ANT. OF SI DETD. IN ALK. SOLN. TO THAT IN ACID SOLN. THE METHOD WAS USED FOR ANAL. OF BARITE CONC. CONTG. 3.89-5.05PERCENT SID SUB2; THE ABS. ERRORS WERE 0.04-0.25PERCENT.

UNCLASSIFIED

AA0040689

UR 0482

Soviet Inventions Illustrated, Section I Chemical, Derwent, ¹⁻⁷⁰

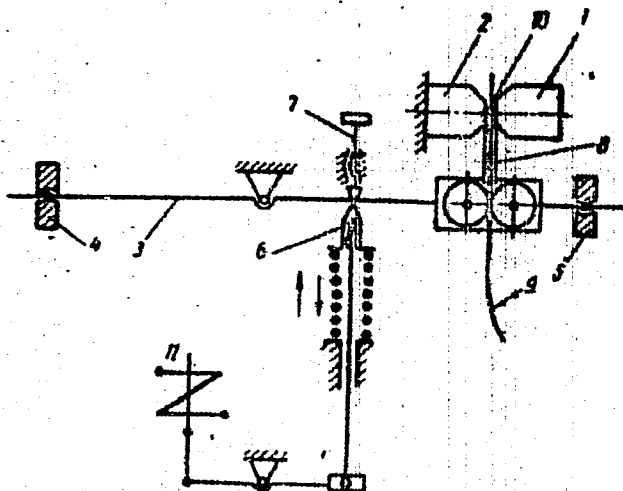
241957 CONTACT SOLDERING MECHANISM has solder feed control comprising a double-arm lever (3), with weights (4,5). Tube (8) for solder (9) feed is attached to the lever. The component for soldering (10) is placed between the electrodes (1,2), heat applied, and the lever is pulled down by electromagnet (11), tearing off the required amount of solder.

AUTHORS: Litsis, A. E., Rudzit, R. B.; Moskvin, E. G.; and Mukhiputdinov, A. L.
Rizhskiy Politeknicheskii Institut

18

19750303

AA0040689



30.10.67 as 1194057/25-27. A.E.LITSIS et alia.RIGA
POLYTECHNIC (28.8.69) Bul 14/18.4.69. Class 49h.
Int.Cl.B 23k.

19750304

USSR

LITSOV, A. N.

"Electroencephalographic Studies on Sleep Dynamics in Operators Under Conditions of Interrupted Regimes"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Biologicheskaya, No 1, 1973, pp 26-32

Abstract: Sixteen healthy subjects age 25 to 42 followed one of three noncontinuous sleep regimes: (1) 1300 to 1600, 2300 to 0200, and 0500 to 0800 hours; (2) 1400 to 1700, 2000 to 2300, and 0400 to 0700 hours; (3) 1400 to 1700, 2200 to 0100, and 0800 to 1100 hours. The shift from normal to broken sleep resulted in marked qualitative (distribution of slow-wave and REM sleep) and quantitative (total duration) deterioration in all the sleep periods. Three main stages distinguished in the first regime: (1) initial (first 3 days) marked by insomnia in all the periods; (2) middle (second 3 days) sleep improved mainly in the night hours; (3) last 3 days) sleep improved in all three periods. The other two regimes were characterized by the same three stages of adaptation but they were less pronounced. In other words, adaptation set in quicker when 6 of the 9 hours of sleep were at night.

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LITSOV, A. N.

①
JPRS 58173
7 February 1973

UMI 612323

EFFECT OF SLEEP AND WAKEFULNESS IN CASES OF THE SPACEFLIGHTS SCENE 3-2
SERVO, DURING AND AFTER EXPOSURE TO SPACEFLIGHT

Article by A. N. Litsov, Izvestiya Akademii Nauk SSSR, Seriya
Biologicheskaya, Moscow, No 6, 1972, pp 436-451

Abstract: During the course of preparations for spaceflight and during its execution the crew of the "Soyuz-3" exhibited similar disturbances in the rhythms of sleep and wakefulness (phase shift, change in ratio from 2:1 to 6:1) associated, on the one hand, with the influence of modified, daily schedules (primarily of the nighting type), and on the other hand, psychologically stress and excitement. The dynamics of motor nervous activity of these cosmonauts during space flight revealed four stages: (first (from the start to the second day) -- a deterioration in the general feeling of well-being, performance and sleep; second (from the second to the sixth days) -- recovery and retention of functional state and performance of the cosmonaut to a high level; third (from the seventh day) -- a gradual decline in functional state and performance of the cosmonaut; fourth (from two days prior to the landing) -- a brief increase in functional state and performance of the cosmonaut. During the post-flight period there was a general slowing in the rate of resynchronization of the sleep and wakefulness rhythms.

It is known from the data published in the Soviet and foreign literature that the desynchronization of biological rhythms arising when using modified daily schedules can lead not only to a decrease in the overall and occupational performance of cosmonauts, but also in some cases

1 (I - USSR - A/C)

LITSOV, A. N.

Space Medicine

SO: JPRS 53388
17 Jul 71

UIC 61275-061612-RS 1.75

DIURNAL RHYTHM OF HUMAN PHYSIOLOGICAL FUNCTIONS AND PERFORMANCE
IN A SCHEDULE WITH FREQUENT ALTERNATION OF SLEEP AND WAKEFULNESS

in (Space Medicine)
[Article by A. N. Litsov, Moscow, *Kosmicheskaya Biologiya i Meditsina*, Russian, Vol. 5, No. 4, 1971, pp 44-52, submitted for publication
23 December 1969]

Abstract: Fifteen healthy test subjects divided into three groups participated in experiments with frequently alternating work and rest cycles (three 3-hour sleep periods alternating with periods of wakefulness lasting 3 to 7 hours). The diurnal rhythms of basic functions in the human body gradually adjusted to the new stereotypic of work and rest cycles. The adaptation rate was dependent on the duration of the new cycles from the normal rhythms, psychophysiological capacity of the test subjects for the required restructuring, their knowledge of the daily regimen, strict adherence to the schedule, etc. It is concluded that schedules involving significant deviations from normal rhythms can be used for only short periods, to be followed by more favorable cycles.

Extensive studies by Soviet and foreign authors have shown that in all cases of a prolonged change in the customary schedule of sleep and wakefulness both human subjects and animals exhibit a distinct restructuring of the diurnal rhythms of the principal body functions (O. P. Shtrombeker; G. M. Cherkovskii; Haniel; Simpson and Loban; I. S. Kambori; E. S. Akhmetzhanov; V. N. Pysmenikov; I. I. Tikhonov; V. V. Prizhik; and others). Research has shown that with a change in the daily schedule there is a restructuring primarily of the higher body functions (motor activity, behavior, conditioned reflex activity, etc.), followed by autonomic functions (pulse rate and respiration, body temperature, arterial pressure, etc.) and considerably later, basal functions (basal, mineral, hormonal metabolism, and others). Among the performance indices it is the simple reactions which are most rapidly adapted to the new schedule; complex functions adapt considerably

USSR

UDC 612.611.81

LITSOV, A. N.

"Dynamics of the EEG During Human Sleep With Ordinary and Altered Daily Routines"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Biologicheskaya, No 4, 1970, pp 521-529

Abstract: The duration of the various EEG phases during the sleep of 28 healthy subjects with ordinary and altered daily routines was determined. Following the normal pattern (sleep from 2300 to 0800 hours), eight subjects exhibited the typical electroencephalographic stages. Slow-wave sleep (stages A, B, C, D, and E) lasted 75 to 92% of the time, and the paradoxical stage 3.3 to 36.1%. In a second group of eight subjects who slept from 0500 to 1400 hours and a third group of 12 subjects who slept from 1400 to 2300 hours, the distribution of EEG stages was impaired both qualitatively (predominance of the stages of superficial sleep) and quantitatively (decreased duration). But as the subjects adapted to the new regimes, the total length of sleep gradually increased and its quality improved while the distribution of orthodox and paradoxical sleep became the same as in those who slept at the usual time. Improvement occurred more rapidly in the group with the 0500 to 1400 regime.

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- 58 -

1/2 040 UNCLASSIFIED PROCESSING DATE--11SEP70
TITLE--NATURE OF THE EEG FOR FLIERS (COMMUNICATION I) -U-
AUTHOR--LITSOV, A.N., NISTRATOV, V.V., TEREITYEV, V.G.
COUNTRY OF INFO--USSR
SOURCE--MOSCOW, KOSMICHESKAYA BIOLOGIYA I MEDITSINA, RUSSIAN, VOL 4- NO 1,
JANUARY-FEBRUARY 1970, PP 73-74
DATE PUBLISHED-----70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES

TOPIC TAGS--ELECTROENCEPHALOGRAPHY, AERONAUTIC PERSONNEL, PERSONNEL
SELECTION, MEDICAL EXAMINATION

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--1986/1617

STEP NO--UR/0453/70/004/001/0073/0074

CIRC ACCESSION NO--AP0103383

UNCLASSIFIED

2/2 040

UNCLASSIFIED

PROCESSING DATE--11SEP70

CIRC ACCESSION NO--AP0103383

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. TAKING INTO ACCOUNT THE PRACTICAL IMPORTANCE OF AN ANALYSIS OF THE EEG FOR FLIGHT PERSONNEL AND CANDIDATES FOR SELECTION AS STUDENTS AT AVIATION SCHOOLS, WE MADE INVESTIGATIONS OF CEREBRAL BIELECTRIC ACTIVITY IN MORE THAN 100 SUBJECTS. WE ANALYZED MORE THAN 1,200 ELECTROENCEPHALOGRAMS REGISTERED AT REST WITH THE SUBJECTS IN A SEMIRECLINING POSITION WITH THE EYES CLOSED. WE REGISTERED THE EEG IN FRONTAL SINCIPITAL, SINCIPITAL OCCIPITAL AND FRONTAL OCCIPITAL LEADS FROM THE RIGHT AND LEFT SIDES.

UNCLASSIFIED

1/2 020 UNCLASSIFIED PROCESSING DATE--23OCT70
TITLE--EEG CHARACTERISTICS IN PILOTS -U-
AUTHOR-(03)-LITSOV, A.N., NISTRATOV, V.V., TEREITYEV, V.G.
COUNTRY OF INFO--USSR
SOURCE--KOSMICHESKAIA BIOLOGIJA I MEDITSINA, VOL. 4, JAN.-FEB. 1970, P
73-74
DATE PUBLISHED-----70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES
TOPIC TAGS--ELECTROENCEPHALOGRAPHY, AIRCRAFT PILOT

CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1997/1975 STEP NO--UR/0453/70/004/000/0073/0074
CIRC ACCESSION NO--AP0120618
UNCLASSIFIED

2/2 020

UNCLASSIFIED

PROCESSING DATE--23OCT70

CIRC ACCESSION NO--AP0120618

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. RESULTS OF AN ANALYSIS OF A TOTAL OF MORE THAN 1200 EEGS OF PILOTS RECORDED IN A QUIET RECLINED POSITION WITH CLOSED EYES. HIGH AND MEDIUM ALPHA RHYTHM ACTIVITIES ARE ESTABLISHED IN 77.7PERCENT OF TESTS. THE DISTRIBUTION OF THE SUBJECTS ACCORDING TO ALPHA WAVE AMPLITUDE IS MODERATELY ASYMMETRICAL WITH A MAXIMUM AMPLITUDE BETWEEN 70 AND 90 MICROVOLT. IT IS CONCLUDED THAT THE ALPHA AND BETA RHYTHMS PREVAIL IN MOST HEALTHY PILOTS.

UNCLASSIFIED

LITSOV, A. N.
LITSOV

SPACE PHYSIOLOGY

TPAS: 60471
7 NOV. 73

LITSOV, A. N.
SPACE PHYSIOLOGY



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UDC 612.766.1:6012.021.7/92*

EXPERIMENTAL STUDY OF THE DIURNAL RHYTHM OF PHYSIOLOGICAL FUNCTIONS, PERFORMANCE AND SLEEP IN MAN MODIFIED REGIMES WITH DISTURBANCE OF SLEEP AND WAKEFULNESS

M/C

[Article by A. N. Litsov, Kazan'skaya Medicinskaya I Meditsina, Kazan, Vol. 7, No. 1, 1973, pp. 78-83]

Abstract: The dynamics of diurnal rhythm of physiological functions, work performance and sleep of test subjects exposed to two schedules with a double alternation of work and rest exhibited the same three stages (latent, apparent and deep) which were observed under other schedules. The adaptation of test subjects to this alternation of sleep and wakefulness may adhere to a fractioned (6 + 4 hours and 6 + 7 hours), displaced (4 + 0.6 + 0 hours) or mixed (fractioned, disturbed and retracted) schedule. The best schedule was a cycle with 6 + 2 hours of sleep. A schedule with two equal sleep cycles can be used temporarily to solve operational or emergency problems as well as an intermediate one.

As demonstrated by research data (B. S. Alyabinskii, 1967, 1969; O. N. Kunznetsov, et al., 1967, 1968; Raboulet, et al.; Struhold, 1969, 1969, and others) in the case of a prolonged change in the customary work and rest regimes man develops rather distinct body disturbances: sleeplessness, listlessness, distraction, reduced appetite, unstable mood, etc., accompanied by shifts in the dynamics of physiological functions, performance and sleep. It was established experimentally (B. S. Alyabinskii, 1969; A. N. Litsov, 1967, 1970; V. L. Yaroslavtsev, and others) that the degree of expression of these impairments and also the rate of their disappearance are closely related to the degree of deviation of the employed schedules from the ordinary schedule, with the accuracy and strictness in carrying out the daily schedule, body capacity of a specific person for readapting to a new schedule, motivation and other factors.

USSR

UDC: 621.396.699

LITSUKOV, A. I.

"An Antenna Insulator Unit"

Moscow, Otkrytiya, Izobreteniya, Promyshlennyye Obratzsy, Tovarnyye Znaki, No 17, Jun 72, Author's Certificate No 340009, Division H, filed 1 Oct 70, published 24 May 72, p 176

Translation: This Author's Certificate introduces an antenna insulator unit which contains an insulator with tailpieces, and also tiepieces. As a distinguishing feature of the patent, the design is simplified and operational reliability is improved by making the insulator faces with grooves which accommodate crossed brackets with pins which pass through openings in the insulator and are used to tie the tailpieces to the insulator.

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USSR

ALEBASTROVA, A. N., ANTONOVA, L. A., ZIMIN, V. A., LITSYN, N. M.

"One Algorithm for Preliminary Processing of Electrocardiograms"

Med. Kibernetika [Medical Cybernetics -- Collection of Works], Kiev, 1972, pp 66-74 (Translated from Referativnyy Zhurnal Kibernetika, No 6, 1973, Abstract No 6V704, by V. Mikheyev).

Translation: One possible approach to the problem of preliminary processing of electrocardiograms (EKG) is studied, based on element-by-element analysis of the waves and intervals between them. The analysis program includes a curve-smoothing algorithm, determination of levels of isolines (reading lines), investigation of periodicity, recognition of waves and comparison of data produced with the norms. To determine the level of the isolines, the ordinates of the EKG points are looked upon as values of a certain random quantity and the statistical distribution series is constructed for it. The ordinate with the greatest frequency defines the level of the x_0 isoline.

The positive and negative waves are read from this isoline. In order to input the EKG into a computer, the initial information, produced as an analog voltage, is converted to a digital series. For various reasons (influence of

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Alebastrova, A. N., Antonova, L. A., Zimin, V. A., Litsyn, N. M., Med. Kibernetika, Kiev, 1972, pp 66-74.

bioelectric currents, apparatus noise), the quality of recording of the EKG may be poor which, in turn, may cause incorrect recognition of elements of the cardiogram and, therefore, improper diagnosis. It is therefore quite important to eliminate "noise," i.e., to produce an EKG in pure form. Smoothing of the curve is performed in several passes. First-power errors are eliminated first. If point (x_i, t_i) is erroneous, the new value of ordinate x_i is assumed equal to the value of the ordinate in the preceding point $\bar{x}_i = x_{i-1}$. In the next stage, second power errors are eliminated, and it is assumed that $\bar{x}_{i+1} = \bar{x}_i = x_{i+1}$. After each stage, visual observation was performed, indicating that it is sufficient to perform three or four stages of smoothing to produce a satisfactory curve. One peculiarity of the EKG curve is its periodicity. An EKG curve can be analyzed for pathology by simply checking its periodicity, without determining the characteristics of the arrhythmia. The algorithm for determination of the EKG period uses the autocorrelation function $K_x(T)$ to calculate the degree of similarity between two neighboring sectors of the EKG. 1 table, 3 figures, 6 biblio. refs.

2/2

USSR

UIC 621.371.13:533.951

YEREMIN, B. G., LITVAK, ~~A. G.~~, POLUYAKHINOV, B. K. [Nauchno-issledovatel'skiy radiofizicheskiy institut--Scientific-Research Radio Physics Institute]

"Investigation of Thermal Electromagnetic Wave Self-Focusing in Plasma"

Izv. VUZ: Radiofizika, Vol XV, No 3, Aug 1972, pp 1132-1138

Abstract: The results are presented of a study of thermal self-focusing of electromagnetic waves of the microwave band in an isotropic weakly-ionized plasma. The experimental study was conducted on a unit consisting of a microwave generator (CW magnetron with power up to 100 W), a vacuum chamber, an injector, a receiving waveguide, a tuned filter, a dielectric antenna, a double T-piece, and a klystron oscillator. It is shown that the special features of the phenomena observed are in good agreement with existing theoretical assumptions. 5 fig. 5 ref. Received by editors, 17 Dec 1971.

1/1

USSR

UDC 621.371.123

LITVAK, A. G., FRAYMAN, G. M., Scientific Radio Physics Institute

"Interaction of Opposing Electromagnetic Wave Beams in a Transparent Nonlinear Medium"

Gor'kiy, Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, Vol XV, No 9, 1972, pp 1341-1348

Abstract: The Lagrange function description of electromagnetic waves was used to study the interaction of opposing beams of electromagnetic waves in a transparent nonlinear medium. The aberrationless approximation equations were obtained for the widths of beams with a gaussian intensity profile, and the critical self-focusing parameters were defined. The characteristics of the instability of opposing plane waves with respect to small disturbances of a three-dimensional structure are analyzed. The nature of the interaction of the opposing beams is illustrated by the problem of reflection of an electromagnetic wave beam from a plane layer of nonlinear material one of the boundaries of which is ideally reflecting.

The effect of a three-dimensional instability of opposing waves in a "defocusing" medium cannot be explained by ordinary geometric-optical beam principles, and this instability does not lead to the formation of isolated self-focusing beams. The instability can be easily interpreted in the language

USSR

LITVAK, A. G., et al., *Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika*,
Vol XV, No 9, 1972, pp 1341-1348

of four-photon interaction. The instability in any medium is possible only if the synchrony conditions are satisfied for the pumping waves and the amplified waves. A degenerate parametric interaction is also possible in the case of opposing waves when there is synchrony of two opposing disturbance quanta with two opposing pumping quanta. This interaction is possible only if the pumping quanta have the same electric field polarization.

2/2

USSR

LITVAK, B. G.

"The Convergence of Absolutely Integer Problems with Fixed Vector of Limitations"

Issled. po diskretnoy mat. [Studies in Discrete Mathematics -- Collection of Works], Moscow, Nauka Press, 1973, pp 41-45 (Translated from Referativnyy Zhurnal - Kibernetika, No 8, 1973, Abstract No 8 V505 by Yu. Finkel'shteyn)

Translation: In earlier works by 1) the author and A. M. Rappaport (RZHMat 1971, 1V447) and 2) A. A. Fridman, the author and A. M. Rappaport (Abstract 8V507), the reducibility of absolutely integer programming problems to the problem of circulation of minimal cost with certain natural assumptions concerning the latter was studied. The reducibility of an entire set of problems, differing either in their linear integer coefficients or their integer limitation vectors, was studied.

In this work, necessary and sufficient conditions of reducibility to the problem of the circulation of minimal costs are found for absolutely integer problems $P(b)$ with fixed vector limitations $b=(b_1, \dots, b_m)$.

1/5

USSR

LITVAK, B.G., Issled. po diskretnoy mat., Moscow, Nauka Press, 1973,
pp 41-45

Let us study the linear programming problem:

$$\sum_{j=1}^n a_j x_j \rightarrow \min,$$
$$\sum_{j=1}^n \alpha_{ij} x_j \leq b_i, \quad i=1, \dots, m,$$
$$x_j \geq 0, \quad j=1, \dots, n$$

where a_j, b_i, α_{ij} are integers and the problem of minimum-cost circulation
 $T(1,c)$:

2/5

USSR

LITVAK, B. G., Issled, po diskretnoy mat., Moscow, Nauka Press, 1973, pp 41-45

$$\sum_{(s,p) \in Q} a(s,p) f(s,p) \rightarrow \min,$$

$$\sum_{(s,p) \in Q} f(s,p) - \sum_{(r,s) \in Q} f(r,s) = 0, \quad s=1, \dots, N,$$

$$l(s,p) < f(s,p) < c(s,p), \quad (s,p) \in Q,$$

where $a(s,p)$, $c(s,p)$ are integers, Q is the set of lines in the network of problem $T(l,c)$; N is the number of junctions in the network; $a(s,p)$ is the arch cost of line (s,p) ; $l(s,p)$ is the lower boundary of the flow along line (s,p) ; $c(s,p)$ is the upper boundary of the flow along line (s,p) ; $f(s,p)$ is the flow along line (s,p) . Assumptions 1-3 of work 2) concerning problem $T(l,c)$ are considered fulfilled. The linear programming problem $P(b)$ with variables x_1, \dots, x_n is reduced, with any integer a_j , to the problem of circulation of minimal cost $T(l,c)$ with variables $f(s,p)$, $(s,p) \in Q$, if among the latter we can find f_1, \dots, f_n such that optimality of vector solution

3/5

USSR

LITVAK, B. G., Issled, po diskretnoy mat., Moscow, Nauka Press, 1973, pp 41-45

$f^0(s,p)$, $(s,p) \in Q$ for problem $T(l,c)$ indicates optimality of vector solution $x_j = f_j^0$, $j=1, \dots, n$ for problem $P(b)$. The remaining concepts used in the presentation can be found in 2). Let us represent by $P^*(b)$ the set of problems $P(b)$, the rows in the matrix of limitations of which form a M set. The multi-bound sets of limitations of the problems are represented by $G(P(b))$, $G(P^*(b))$, $G(T(l,c))$.

Theorem 1. Linear programming problem $P_1(b)$ is reduced to the problem of circulation of minimal cost when and only when there is an absolutely integer problem $P_2(b) \in P^*(b)$ such that

$$G(P_1(b)) = G(P_2(b)).$$

4/5

USSR

LITVAK, B. G., Issled. po diskretnoy mat., Moscow, Nauka Press, 1973, pp 41-45

Theorem 2. Linear programming problem $P_1(b)$ is reduced to the problem of circulation of minimal cost when and only when linear combinations of inequalities $G(P_1(b))$ with non-negative coefficients and addition to the vector of limitations of a certain non-negative vector can be used to go over to problem $P_2(b) \in P^*(b)$ such that

$$G(P_1(b)) = G(P_2(b)).$$

It is noted that the transition from linear programming problems to the equivalent absolutely integer problems $P^*(b)$, the rows in the matrix of limitations of which form a M set, makes it possible to reduce a new set of problems of linear programming with fixed limitations vector to a problem of circulation of minimal cost. A corresponding example is presented of a problem which is not reducible to the problem of circulation of minimal cost by means of the method shown in work 1), 2), but is reducible after conversion to an equivalent absolutely integer problem belonging to $P^*(b)$.

5/5

USSR

LITVAK, B. G.

"Ordering of Objects According to Preferences"

Mat. vopr. upr. proiz-vom [Mathematical Problems of Production Control -- Collection of Works], No 5, Moscow, 1973, pp 47-56 (Translated from Referativnyy Zhurnal - Kibernetika, No 8, 1973, Abstract No 8 V514 by Yu. Finkel'shteyn)

Translation: Frequently in studies using expert evaluations, the problem arises of ordering objects according to preference. Suppose m experts have ordered n objects according to preference and suppose $A_\nu = [a_1^{(\nu)}, \dots, a_n^{(\nu)}]$ is the order of the objects provided by expert ν ($\nu=1, 2, \dots, m$). Some objects may be rated equally by experts. Cases are permitted when the experts, insufficiently familiar with some of the objects, do not include them in the sequence. How can the sequence agree most closely with the ordering of all experts be found?

1/5

USSR

LITVAK, B. G., Mat. vopr. upr. proiz-vom, No 5, Moscow, 1973, pp 47-56

The author defines the measure of closeness $d(A_1, A_2)$ between two sequences by introducing the following natural axioms.

Axiom 1.1. $d(A_1, A_2) \geq 0$; here, $d(A_1, A_2) = 0$ when and only when A_1 and A_2 agree.

Axiom 1.2. $d(A_1, A_2) = d(A_2, A_1)$.

Axiom 1.3. $d(A_1, A_2) + d(A_2, A_3) \geq d(A_1, A_3)$; the equality occurs only when sequence A_2 lies "between" sequences A_1 and A_3 (i.e., when preference for each pair of objects in A_2 coincides the preference for the same pair either in A_1 or A_3 , or is indifferent, if the preferences in A_1 and A_3 differ).

Axiom 2. If sequence A_1' is produced from sequence A_1 by a certain permutation of objects, A_2' is produced from A_2 by the same permutation, then $d(A_1', A_2') = d(A_1, A_2)$.

2/5

- 70 -

USSR

LITVAK, B. G., Mat. vopr. upr. proz-vom, No 5, Moscow, 1973, pp 47-56

The natural subset $a_{i_1}, \dots, a_{i_1+k}$ of the set of all objects a_1, a_2, \dots, a_n is called by the author a (k-element) segment.

Axiom 3. If A_1 and A_2 are identical everywhere with the exception of a k-element set which is a segment of both of them, then $d(A_1, A_2)$ is equal to the distance between the segments in question.

Axiom 4. The minimum positive difference is equal to 1.

The measure of closeness, satisfying these axioms, is defined uniquely.

Each sequence A_ν can be represented in the form of a matrix $\|a_{ij}^\nu\|$, where

USSR

LITVAK, B. G., Mat. vopr. upr. prozvom, No 5, Moscow, 1973, pp 47-56

$$a_{ij}^v = \begin{cases} 1, & \text{if object } a_i \text{ is preferable to object } a_j \\ -1, & \text{if object } a_j \text{ is preferable to object } a_i \\ 0, & \text{if objects } a_i \text{ and } a_j \text{ are equivalent.} \end{cases}$$

The distance between sequences fixed by the formula

$$d(A_1, A_2) = \frac{1}{2} \sum_{i,j=1}^n |a_i^{(1)} - a_j^{(2)}|.$$

satisfies all axioms, and, consequently, unambiguously defines the difference between sequences. In order to find the sequence agreeing most closely with all sequences of the experts, the concepts of the medium and mean value are

USSR

LITVAK, B. G., Mat. vopr. upr. proizvod, No 5, Moscow, 1973, pp 47-56

introduced. The medium of a given set of sequences A_1, A_2, \dots, A_m refers

to a sequence A for which the sum $\sum_{v=1}^m d(A, A_v)$ is minimal. The sequence A mini-

mizing $\sum_{v=1}^m d^2(A, A_v)$ is called the mean value. Certain properties of this con-

cept of distance are studied, and the necessary conditions of optimality are produced. A heuristic algorithm is suggested for determination of the medium. Further, an algorithm in branches and bounds is presented (with a unidirectional branching plan of the "go to the right" type) is presented for determination of the medium.

S/S

USSR

FRIDMAN, A. A., LITVAK, B. G., RAPPOPORT, A. M.

"Absolutely Integer Problems in Numerical Programming"

Issled. po diskretnoy mat. [Studies in Discrete Mathematics -- Collection of Works], Moscow, Nauka Press, 1973, pp 27-40 (Translated from Referativnyy Zhurnal - Kibernetika, No 8, 1973, Abstract No 8 V507 by Yu. Finkel'shteyn)

Translation: Earlier works by B. G. Litvak and A. M. Rappoport (RZHMat, 1971, 1V447; 8 V592) have studied the reduction of linear programming problems with integer optimal solutions with any integer vectors of limitations (absolutely integer problems) to extreme problems in a network (circulation or flow of minimal costs). In (RZHMat, 1971, 1V447), the concepts of reducibility of problems, M sets of vectors, intermediate representation and representation of the flow along a line of a network were introduced, as well as the concept of the problem of circulation at minimum cost $T(b)$ corresponding to linear programming problem P. In particular, it has been established that: a) linear programming problem P has a corresponding problem of circulation at minimal cost $T(P)$ when and only when the rows of its matrix of limitations form a M set. b) If the rows of a matrix of limitations of problem P form a M set, P can be reduced

1/2

- 65 -

USSR

FRIDMAN, A. A., LITVAK, B. G., RAPPOPORT, A. M., Issled. po diskretnoy mat., Moscow, Nauka, Press, 1973, pp 27-40

to a problem of circulation at minimum cost, namely to T(P).

In this work, with certain natural assumptions concerning problems of circulation a minimum cost, necessary and sufficient conditions are found for convergence of a linear programming problem to a problem of circulation at minimum cost, and also a broader class of absolutely integer problems is described, allowing a network statement.

2/2

USSR

LITVAK, B. G., NAYVEL'T, A. V.

"The Solution of the Multidimensional Knapsack Problem with Additional Limitations"

Issled. po diskretnoy mat. [Studies in Discrete Mathematics], Moscow, Nauka Press, 1973, pp 69-83 (Translated from Referativnyy Zhurnal - Kibernetika, No 8, 1973, Abstract No 8 V516 by M. Kazakova)

Translation: In order to solve the problem

$$L(X) = \sum_{j=1}^n c_j x_j \rightarrow \max,$$

$$\sum_{j=1}^n a_{ij} x_j < b_i, \quad i=1, \dots, m,$$

$$\sum_{j \in A_v} x_j < 1, \quad v=1, \dots, k,$$

$x_j \geq 0, x_j$ is an integer, $j=1, \dots, n,$

1/2

USSR

LITVAK, B. G., NAYVEL'T, A. V., Issled. po diskretnoy mat., Moscow, Nauka Press, 1973, pp 69-83

where $A_{v_1} \cap A_{v_2} = \emptyset$, if $v_1 \neq v_2$, $\bigcup_{v=1}^k A_v = \{1, \dots, n\}$, a combinatorial branches and

bounds algorithm is suggested. The lower and upper boundaries of values of function $L(x)$ are sought. In seeking out the upper bounds, estimates are used for the one-dimensional knapsack problem ($l=1$). Several possible methods of construction are suggested.

2/2

USSR

UDC: 51

LITVAK, B. G.

"On the Reducibility of Absolutely Integral Problems With Fixed Vector of Limitations"

Moscow, Issled. po diskretnoy mat.---sbornik (Studies in Discrete Mathematics--collection of works), "Nauka", 1973, pp 41-45 (from RZh-Matematika, No 8, Aug 73, abstract No 8V505 by Yu. Finkel'shteyn)

Translation: In papers by (1) the author and A. M. Rappoport (RZhMat, 1971, 1V447) and (2) A. A. Fridman, the author, and A. M. Rappoport (abstract 8V507) an investigation was made of the reducibility of absolutely integral problems of linear programming to a problem of circulation of minimum cost, with certain natural assumptions relative to cost. At the same time, the authors considered reducibility of an entire set of problems distinguished either by the whole-number coefficients of linear form or by whole-number vectors of limitations.

In this paper necessary and sufficient conditions are found for reducibility to a problem of circulation of minimum cost for absolutely integral problems $P(b)$ with fixed vector of limitations $b = (b_1, \dots, b_m)$.

1/4

- 86 -

USSR

LITVAK, B. G., Issled. po diskretnoy mat., "Nauka", 1973, pp 41-45

Let us consider the linear programming problem:

$$\sum_{j=1}^n a_j x_j \rightarrow \min,$$

$$\sum_{j=1}^n \alpha_{ij} x_j < b_i, \quad i=1, \dots, m,$$

$$x_j > 0, \quad j=1, \dots, n$$

where a_j , b_i , α_{ij} are whole numbers and the problem of circulation of minimum cost $T(\bar{L}, c)$:

$$\sum_{(s,p) \in Q} a(s,p) f(s,p) \rightarrow \min,$$

$$\sum_{(s,p) \in Q} f(s,p) - \sum_{(r,s) \in Q} f(r,s) = 0, \quad s=1, \dots, N,$$

$$l(s,p) < f(s,p) < c(s,p), \quad (s,p) \in Q$$

where $a(s,p)$, $c(s,p)$ are whole numbers; Q is the set of arcs of the network of problem $T(\bar{L}, c)$; N is the number of nodes of the network; $a(s,p)$ is the

2/4

USSR

LITVAK, B. G., Issled. po diskretnoy mat., "Nauka", 1973, pp 41-45

arc cost of arc (s,p) ; $l(s,p)$ is the lower limit of the flow along arc (s,p) ; $c(s,p)$ is the upper limit of the flow along arc (s,p) ; $f(s,p)$ is the flow along arc (s,p) . Assumptions 1-3 of paper (2) relative to problem $T(l,c)$ are considered satisfied. The linear programming problem $P(b)$ with variables x_1, \dots, x_n reduces for any integer a_j to a problem of circulation of minimum cost $T(l,c)$ with variables $f(s,p)$, $(s,p) \in Q$ if among the latter we can isolate f_1, \dots, f_n such that from optimality of the vector solution $f^0(s,p)$, $(s,p) \in Q$ we get optimality of the vector solution $x_j^0 = f_j^0$, $j = 1, \dots, n$ for the problem $P(b)$. The other concepts used in the exposition can be found in work (2). Let us use the symbol $P^*(b)$ to denote the set of problems $P(b)$ for which the rows of the matrix of limitations form an M -family. Polyhedral sets of limitations of problems are denoted by $G(P(b))$, $G(P^*(b))$, and $G(T(l,c))$ respectively.

Theorem 1. A linear programming problem $P_1(b)$ reduces to a problem of circulation of minimum cost if and only if there exists an absolutely integral problem $P_1(b) \in P^*(b)$ such that

$$G(P_1(b)) = G(P_1(b)).$$

3/4

USSR

LITVAK, B. G., Issled. po diskretnoy mat., "Nauka", 1973, pp 41-45

Theorem 2. The linear programming problem $P_1(b)$ reduces to a problem of circulation of minimum cost if and only if one can, with the aid of linear combinations of inequalities $G(P_1(b))$ with nonnegative coefficients and by adding a certain nonnegative vector to the resultant vector of limitations, make a transition to a problem $P_2(b) \in P^*(b)$ such that

$$G(P_1(b)) - G(P_2(b)).$$

It is noted that transition from linear programming problems to equivalent, absolutely integral problems $P^*(b)$ for which the rows of the matrix of limitations form an M-family makes it possible to reduce the new set of linear programming problems with fixed vector of limitations to a problem on circulation of minimum cost. A corresponding example is given of a problem which is not reducible to a problem on circulation of minimum cost with the aid of the methods shown in papers (1) and (2), but which can be reduced after transition to an equivalent, absolutely integral problem belonging to $P^*(b)$.

4/4

USSR

UDC: 51

FRIDMAN, A. A., LITVAK, B. G., RAPPOPORT, A. M.

"Absolutely Integral Linear Programming Problems"

Moscow, Issled. po diskretnoy mat.--sbornik (Studies in Discrete Mathematics--collection of works), "Nauka", 1973, pp 27-40 (from RZh-Matematika, No 8, Aug 73, abstract No 8V507 by Yu. Finkel'shteyn)

Translation: Papers by B. G. Litvak and A. M. Rappoport (RZhMat, 1971, 1V447, 8V592) investigated the reduction of linear programming problems having a whole-number optimum solution for any whole-number vectors of limitations (absolutely integral problems) to extremum problems on networks (on circulation or flow of minimum cost). In RZhMat, 1971, 1V447 the authors introduced the concepts of reducibility of problems, M-families of vectors, intermediate representation and representation of the flow along the arc of a network, and also the concept of the problem of circulation of minimum cost $T(P)$ corresponding to the linear programming problem P . It was found, in particular, that: a) Linear programming problem P has a corresponding problem on circulation of minimum cost $T(P)$ if and only if the rows of its matrix of limitations form an M-family. b) If the rows of

1/2

- 88 -

USSR

Fridman, A. A. et al., Issled. po diskretnoy mat., "Nauka", 1973, pp
27-40

the matrix of limitations of problem P form an M-matrix, then P reduces to a problem on circulation of minimum cost, and specifically to T(P).

In this paper, with certain natural assumptions relative to problems on circulation of minimum cost, the necessary and sufficient conditions are found for reducibility of linear programming problems to a problem of circulation of minimum cost, and a more extensive class of absolutely integral problems which permit network formulation is described.

2/2

USSR

UDC: 51

LITVAK, B. G., MAYVEL'T, A. V.

"Concerning Solution of the Multidimensional Knapsack Problem With Additional Limitations"

Moscow, Issled. po diskretnoy mat.--sbornik (Studies in Discrete Mathematics--collection of works), "Nauka", 1973, pp 69-83 (from RZh-Matematika, No 8, Aug 73, abstract No 8V516 by M. Kazakova)

Translation: A combinatorial algorithm of the "branches and boundaries" type is proposed for solving the problem

$$L(X) = \sum_{j=1}^n c_j x_j \rightarrow \max,$$

$$\sum_{j=1}^n a_{lj} x_j < b_l, \quad l = 1, \dots, m,$$

$$\sum_{j \in \lambda_v} x_j < l, \quad v = 1, \dots, k,$$

$x_j > 0$. x_j is a whole number, $j = 1, \dots, n$, and

1/2

USSR

LITVAK, B. G., NAYVEL'T, A. V., Issled. po diskretnoy mat., "Nauka", 1973, pp 69-83

$A_i \cap A_j = \emptyset$ if $v_i \neq v_j$, $\bigcup_{v=1}^k A_v = \{1, \dots, n\}$. Lower and upper boundaries are sought for the values of the function $L(x)$. In finding the upper boundaries, the authors use estimates for the one-dimensional knapsack problem ($l=1$). Several possible methods are suggested for constructing these estimates.

2/2

USSR

UDC 51

LITVAK, B. G."Concerning Arrangement of Objects with Respect to Preferences"

Moscow, Mat. vopr. upr. proiz-von -- sbornik (Mathematical Problems of Production Control -- collection of works), vyp. 5, 1973, pp 47-56 (from RZh - Matematika, No 8, Aug 73, Abstract No 8V514 by Yu. Finkel'shteyn)

Translation: In studies using expert estimates the problem of arranging objects by preferences frequently arises. Let us assume that m experts have arranged n objects by preferences, and let $A_v = [a_1^{(v)}, \dots, a_n^{(v)}]$ be the arrangement of objects by expert v ($v = 1, 2, \dots, m$). The expert may give equal preferences to some objects. Cases the experts leave some objects out of an arrangement because of insufficient familiarity are allowed. How do we find that arrangement which agrees best with the arrangement of all experts?

The author defines a measure of closeness $d(A_1, A_2)$ between two arrangements, introducing the following natural axioms:

Axiom 1.1. $d(A_1, A_2) \geq 0$; $d(A_1, A_2) = 0$ if and only if A_1 and A_2

coincide.

1/4

USSR

LITVAK, B. G., Mat. vopr. upr. proiz-vom, vyp. 5, 1973, pp 47-56

Axiom 1.2. $d(A_1, A_2) = d(A_2, A_1)$.

Axiom 1.3. $d(A_1, A_2) + d(A_2, A_3) \geq d(A_1, A_3)$: equality holds if and only if arrangement A_2 lies "between" arrangements A_1 and A_3 i. e., when preference for every pair of objects in A_2 coincides with the preference for this same pair either in A_1 or in A_3 , or is indifferent if the preferences in A_1 and A_3 are different.

Axiom 2. If arrangement A_1' is obtained by permutation from A_1 , and A_2' is obtained from A_2 by the same permutation, then $d(A_1', A_2') = d(A_1, A_2)$.

The proper subset $a_{i_1}, \dots, a_{i_1+k}$ of the set of all objects a_1, a_2, \dots, a_n the author calls a (k-element) segment.

Axiom 3. If A_1 and A_2 are identical everywhere with the exception of a k-element subset which is a segment of both of them, then $d(A_1, A_2)$ is equal to the distance between the given segments.

Axiom 4. The minimum positive distance is equal to 1.

The measure of closeness which satisfies the given axioms is uniquely defined.

Each arrangement A_i can be represented in the form of a matrix $\|a_{ij}^i\|$, where

2/4

USSR

LITVAK, B. G., Mat. vopr. upr. proiz-vom, vyp. 5, 1973, pp 47-56

$$a_{ij} = \begin{cases} 1, & \text{if object } a_i \text{ is preferable to object } a_j, \\ -1, & \text{if object } a_j \text{ is preferable to object } a_i, \\ 0, & \text{if objects } a_i \text{ and } a_j \text{ are equivalent.} \end{cases}$$

The distance between arrangements is given by the formula

$$d(A_1, A_2) = \frac{1}{2} \sum_{i,j=1}^n |a_{ij}^{(1)} - a_{ij}^{(2)}|.$$

which satisfies all axioms and hence uniquely defines the distance between arrangements. To find that arrangement which best matches all experts' arrangements, the concepts of the median and the mean are introduced. The median of a given set of arrangements A_1, A_2, \dots, A_m is defined as the arrangement A for which the sum $\sum_{v=1}^m d(A, A_v)$ is a minimum. The arrangement A which minimizes $\sum_{v=1}^m d^2(A, A_v)$ is called the mean. Some properties of the given idea of distance are studied, and the necessary conditions of optimality

3/4

- 93 -

USSR

LITVAK, B. G., Mat. vopr. upr. proiz-vom, vyp. 5, 1973, pp 47-56

are found. A heuristic algorithm for finding the median is proposed. Then an algorithm of branches and boundaries is presented for finding the median (with a unilateral branching scheme of the type of the "go to the right" rule).

4/4

USSR

UDC 51

LITVAK, B. G. and RAPPOPORT, A. M.

"On the Reduction of Several Linear Programming Problems to a Problem of the Minimum Cost Flow"

V sb. Optimiz. Issled. operatsiy. Bionika (Optimization and Operations Research. Bionics -- collection of works) Moscow, Nauka, 1973, pp 76 - 84 (from RZh Matematika No 12, 1973, item No 12 V540)

Translation: This continues a series of works by these authors (see, for example, RZh Mat, 1971, 1 V447; 8 V592; 1973, 1 V708; 1970, 7 V418; 1971, 2 V475). It is known that the algorithms for solving the minimal cost flow problem are simpler than algorithms for solving the general problem of linear programming. The authors are investigating the possibility of reducing linear programming problems to minimal cost flow problems. For several problems they have succeeded in finding the necessary and sufficient conditions of such reduction. This is true, in particular, of the transport problem with supplementary limitations of a certain type.

Abstract by Yu. Finkel'shteyn.

1/1

USSR

LITVAK, B. G., RAPPOPORT, A. M.

"Some Types of Fully Unimodular Matrices"

Mat. Vopr. Upr. Proiz-vom. [Mathematics Problems of Production Control], No 3, Moscow, 1971, pp 46-54 (Translated from Referativnyy Zhurnal, Kibernetika, No 1, 1973, Abstract No 1 V708 by Yu. Finkel'shteyn).

Translation: Earlier works by the authors (RZhMat, 1971, 1V447, 2V475) produced a rather broad set of fully unimodular matrices, the rows of which form M-sets (M-matrices). The importance of M-matrices results, in particular, from the fact that they describe a class of problems in linear programming, reducible to transport problems in a grid. The present work, using M-matrices, formulates sufficient conditions for reducibility of problems in linear programming to one of the most effectively solved problems in a grid -- the problem of the maximum flow. Further, certain types of M-matrices are studied and a recognition algorithm for M-matrices is presented. This algorithm requires no more than $m(m-1)/2$ vector comparison operations (where m is the number of limitations -- bilateral inequalities in the linear programming problem studied).

1/1

UDC 51

USSR

MEYEROV, M. V., LITVAK, B. L.

"Mathematical Programming in Problems of Optimizing Multiconnected Systems"

V sb. Methody optimiz. sistem mnogosvyazn, regulir. (Methods of Optimizing Multiconnected Control Systems — collection of works), Moscow, Nauka Press, 1972, pp 5-20 (from RZh-Kibernetika, No 9, Sep 72, Abstract No 9V482)

Translation: A study was made of the methods of solving special classes of problems of linear and convex programming and multiextremal problems arising during statistical optimization of multiconnected systems.

1/1

USSR

UDC 51

LITVAK, B. L.

"On Optimization of a Class of Multivariable, Controlled Plants"

Tr. IV Vses. soveshch. po avtomat. upr., 168. Teoriya avtomat. upr. (Proceedings of Fourth All-Union Conference on Automatic Control, 168. Automatic Control Theory), Moscow, "Nauka," 1972, pp 289-294, discussion on pp 374-375 (from RZh-Matematika, No 3, Mar 73, Abstract No 3V517 from author's abstract)

Translation: The article considers the question of optimization of multi-variable, controlled plants described by a system of linear algebraic equations with a symmetric matrix. In the event of a linear, generalized performance index the optimization of multivariable, controlled plants of such a class reduces to solution of linear programming problems. The work shows the form of the constraint matrix of the linear programming problem which permits preservation of the symmetry property of the initial matrix. A method is indicated for transforming the matrix of the plant, and an algorithm is described for solution of the resultant problem, using the Dantzig-Wolfe decomposition principle. The method here presented permits consideration of the peculiarities of the constraint matrix during solution of the problem, and this makes possible a considerable lowering of computer storage requirements.

1/1

1/2 007 UNCLASSIFIED PROCESSING DATE--16OCT70
TITLE--STATIC OPTIMIZATION OF SYSTEMS OF MULTIVARIABLE CONTROL OF LARGE
DIMENSIONALITY, III -U-
AUTHOR--(02)-MEYEROV, M.V., LITVAK, B.L.
COUNTRY OF INFO--USSR
SOURCE--AVTOMATIKA I TELEMEXHANIKA, 1970, NR 5, PP 152-168
DATE PUBLISHED-----70
SUBJECT AREAS--ELECTRONICS AND ELECTRICAL ENGR., MATHEMATICAL SCIENCES
TOPIC TAGS--LINEAR EQUATION, ELECTRONIC CIRCUIT MODELING
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--1993/0905 STEP NO--UR/0103/70/000/005/0162/0168
CIRC ACCESSION NO--AP0113740
UNCLASSIFIED

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CIRC ACCESSION NO--AP0113740

UNCLASSIFIED

PROCESSING DATE--16OCT70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THERE IS SUGGESTED A METHOD OF SOLVING LINEAR PROBLEMS OF THE STATIC OPTIMIZATION OF MULTIVARIABLE OBJECTS ON ELECTRIC MODELLING NETS OR ON KNOWN MATRIX SCHEMES WITHOUT USING ANY ADDITIONAL DEVICES FOR THE MODELLING OF RESTRICTIONS. THE METHOD ALLOWS TO SOLVE THE PROBLEMS OF THE OPTIMIZATION OF THE CLASS CONSIDERED DURING MODELLING. THE PROBLEM OF THE ANALYTIC INVESTIGATION OF THE REQUIRED ACCURACY OF MODELLING IS ALSO CONSIDERED.

UNCLASSIFIED

1/2 010 UNCLASSIFIED PROCESSING DATE--23OCT70
TITLE--STATIC OPTIMIZATION OF MULTIVARIABLE SYSTEMS OF BIG DIMENSIONALITY
-U-
AUTHOR--(02)-MEYEROV, M.V., LITYAK, B.L.
COUNTRY OF INFO--USSR
SOURCE--AVTOMATIKA I TELEMEXHANIKA, 1970, NR 3, PP 143-154
DATE PUBLISHED-----70
SUBJECT AREAS--MATHEMATICAL SCIENCES, MECH., IND., CIVIL AND MARINE ENGR
TOPIC TAGS--OPTIMAL AUTOMATIC CONTROL, ALGORITHM, LINEAR EQUATION
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1988/1473 STEP NO--UR/0103/70/000/003/0143/0154
CIRC ACCESSION NO--AP0106229
UNCLASSIFIED

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UNCLASSIFIED

PROCESSING DATE--23OCT70

CIRC ACCESSION NO--AP0106229
ABSTRACT/EXTRACT--(U) GP-0-

ABSTRACT. THE GENERAL STATEMENT OF THE
PROBLEM OF THE STATIC OPTIMIZATION OF MULTIVARIABLE OBJECTS IS PRESENTED
AND THE EXAPMLES OF CONCRETE PROBLEMS ARE GIVEN. THERE IS SUGGESTED THE
ALGORITHM OF SOLVING LINEAR PROBLEMS OF THE TYPE CONSIDREED UNDER THE
CONDITIONS OF BIG DIMENSIONALITY, THE ALGORITHM BASED ON THE UTILIZATION
OF THE SPECIFIC CHARACTER OF THE PROBLEMS.

UNCLASSIFIED

1/2 008 UNCLASSIFIED PROCESSING DATE--16OCT70
TITLE--STATIC OPTIMIZATION OF MULTIVARIABLE SYSTEMS OF LARGE
DIMENSIONALITY. II -U-
AUTHOR-(02)-MEYEROV, M.V., LITVAK, B.L. L
COUNTRY OF INFO--USSR
SOURCE--AVTOMATIKA I TELEMEXHANIKA, 1970, NR 4, PP 133-139
DATE PUBLISHED-----70
SUBJECT AREAS--MECH., IND., CIVIL AND MARINE ENGR
TOPIC TAGS--NONLINEAR SYSTEM, ALGORITHM, AUTOMATIC CONTROL SYSTEM
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--1996/1729 STEP NO--UR/0103/70/000/004/0133/0139
CIRC ACCESSION NO--AP0118707
UNCLASSIFIED

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UNCLASSIFIED

PROCESSING DATE--16OCT70

CIRC ACCESSION NO--AP0118707

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THERE ARE CONSIDERED CERTAIN
NONLINEAR PROBLEMS OF THE STATIC OPTIMIZATION OF MULTIVARIABLE OBJECTS,
THE PROBLEMS REDUCED TO THE PROBLEMS OF CONVEX PROGRAMMING AND TO THE
MULTIEXTREMAL PROBLEMS OF SPECIAL KIND. THE ALGORITHMS OF SOLVING THE
PROBLEMS CONSIDERED UNDER THE CONDITIONS OF LARGE DIMENSIONALITY ARE
SUGGESTED.

1/2 020 UNCLASSIFIED PROCESSING DATE--30OCT70
TITLE--A LACUNAR CONDITION OF THE BRAIN IN AN ATHEROSCLEROTIC PHASE OF
HYPERTENSIVE DISEASE -U-
AUTHOR-(02)-LITVAK, L.B., NYAGUBELYAYEVA, A.I.
COUNTRY OF INFO--USSR
SOURCE--ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA, 1970,
VOL 70, NR 6, PP 801-808
DATE PUBLISHED-----70
SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES
TOPIC TAGS--HYPERTENSICN, ATHEROSCLEROSIS, BRAIN, SENSORY MOTOR AREA
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAE--3001/1015 STEP NO--UR/0246/70/010/006/0801/0808
CIRC ACCESSIGN NO--AP0126653
UNCLASSIFIED

2/2 020

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0126653

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. COMPARING THE FEATURES OF CEREBRAL SYMPTOMATOLOGY AND THE SPECIFIC PATHOMORPHOLOGICAL CHANGES OF THE BRAIN TISSUE THE AUTHORS DISCUSS THE FEATURES OF A LACUNAR CONDITION OF THE BRAIN IN AN ATHEROSCLEROTIC PHASE OF HYPERTENSIVE DISEASE. A COMBINATION OF TYPICAL EXTRAPYRAMIDAL MOTOR DISORDERS, A SPECIFIC GAIT, PSEUDOBULBAR SYMPTOMS, CHANGES SENSITIVENESS AND GROSS MEMORY IMPAIRMENT DETERMINE THE SPECIFIC CLINICAL PICTURE. THE BASIS OF IT IS A DEVELOPMENT OF MANY SMALL FOCI WITH BRAIN DISTRUCTION: LACUNAE, THE LOCATION OF WHICH HAS A PREDILECTIVE CHARACTER. THE AUTHORS STRESS THE PROGRESSIVE DEVELOPMENT, WITHOUT STROKES, WHERE 2 PERIODS CAN BE ELIMINATED. THIS FORM OF CEREBRAL VASCULAR PATHOLOGY IS FREQUENTLY SEEN NOT ONLY IN OLD AGE, BUT IN YOUNGER PATIENTS AS WELL. FACILITY: KHAR'KOVSKIY NAUCHNO'ISSLED. INSTITUT NEVROLOGII I PSIKHIATRII.

UNCLASSIFIED

USSR

UDC 620.178.3.05

LITVAK, V. I., and BARANOV, N. V.

"Fatigue Crack Indicator"

Moscow, Zavodskaya Laboratoriya, Vol 39, No 6, Jun 73, pp 751-753

Abstract: A device is described which signals the formation of fatigue cracks on samples undergoing fatigue testing. Of major importance are the sensors and the materials used for the sensor system. Good results were obtained using copper wires 0.1-0.12 in diameter coated with type PEV enamel insulation and fastened to the test parts with HF-2 or HF-4 mastic. The importance is stressed about knowing the location where maximum stresses will occur in the article being tested. This can be done by experimentation or calculation. By experimenting it is possible to use films of materials whose optical properties change under stress and by the use of lacquers which crack at the points of stress concentrators. A schematic diagram is contained in the article. 1 figure.

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Litvak, M. L.

Soviet Inventions Illustrated, Section II Electrical, Derwent, 1/70

239404 AUTOMATIC STEERING INSTALLATION for ships.
To reduce the time required to regain a set course, also to extend the life of steering gear by reducing the number of movements necessary in a given time, the following additional components are incorporated: A unit for measuring constant integration of the integrator unit, two full-wave rectifiers, a comparison unit, four diodes, threshold discriminator units, keys, and two 'AND' units connected by their first inputs via one threshold discriminator unit, the comparison unit, and a full wave rectifier, to the output of a phase sensitive rectifier, to which are connected the second inputs of the 'AND' units via two cross-connected diodes and a pair of threshold discriminator units. The third inputs of the 'AND' units are connected via a second pair of threshold discriminator units and cross connected diodes to the output of a different-

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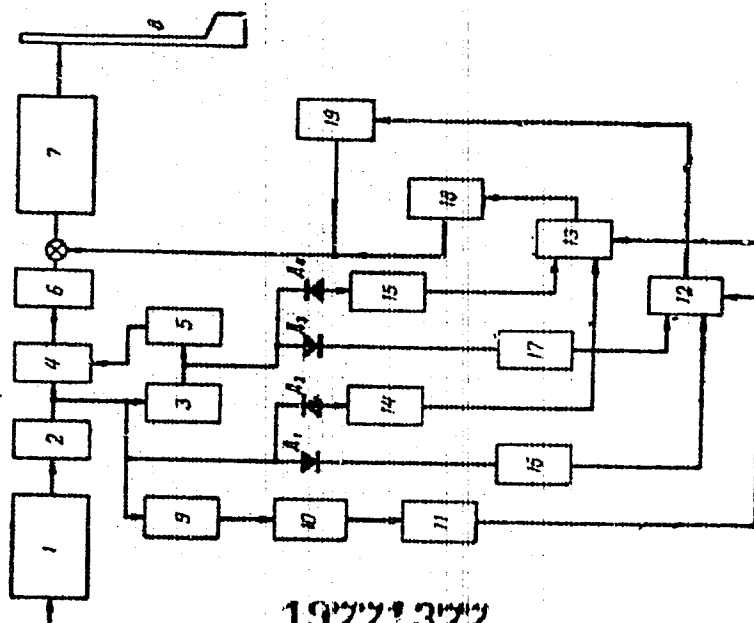
ial unit which has its output connected to the unit which varies the constant integration of the integrator units. The outputs of the 'AND' units are connected via keys to the steering servo drive. Diagram components: gyro-compass course data unit (1), phase sensitive rectifier (2), differential unit (3), constant integration time measuring unit (4), rectifier (5), integrator unit (6), servo-drive (7), steering (8), full wave rectifier (9), comparison unit (10), threshold discriminator unit (11), 'AND' units (12 & 13), threshold discriminator units (14-17) keys (18 & 19).

16.10.67 as 1191342/18-24. N.S. KOVANTSEV & YU.I. LITVAK (11.8.69) Bul 11/18.3.69. Class Zic, 65#2.
Int.Cl.G 05d, B 60k.

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UDC: 621.315.592

GERSHENZON, Ye. M., IL'IN, V. A., KURILENKO, I. N., and LITVAK-GORSKAYA, L. B.

"Reluctance in n-InSb With a Conductance Impurity"

Leningrad, Fizika i tekhnika poluprovodnikov, No 10, 1972, pp 1868-1873

Abstract: The purpose of this paper is to set up a connection between the nature of the reluctance, as a function of the magnetic field and the temperature, and the electrical conductivity mechanisms of a semiconductor. The semiconductor used for the experiments described in the paper was n-InSb since all characteristic dependences of the reluctance can be realized in this material with comparatively weak magnetic fields. The transverse and longitudinal reluctances were investigated in the temperature range of 0.5-10⁰ K and at magnetic fields of 0-5000 oersteds. A description of the preparation of the specimens is given together with a table of their parameters. Differences in the temperature behavior of the reluctance of specimens with various types of conductivity as well

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GERSHENZON, Ye. M., et al., Fizika i tekhnika poluprovodnikov, No 10, 1972,
pp 1868-1873

as both positive and negative reluctance in those specimens are
discussed. The authors thank V. S. Ivlev for preparing the n-InSb
specimens.

2/2

USSR

UDC: 621.315.592

GERSHENZON, Ye. M., IL'IN, V. A., LITVAK-GORSKAYA, L. B.,
RABINOVICH, R. I., and SHAPIRO, Ye. Z.

"Dispersion of Hot Electrons in n-InSb at Low Temperatures"

Leningrad, Fizika i tekhnika poluprovodnikov, No 10, 1972, pp 1888-1894

Abstract: The purpose of this paper is to study the mechanisms of hot-electron dispersion in n-type InSb in a broad range of electric fields, and to compare the results of this study with the results of theoretical research. By so doing, the authors hope to clear up some of the mystery surrounding the dispersion of energy and impulse of hot electrons in InSb at temperatures much below the limiting frequency of the optical phonon. They investigate the dependence of their specimens' conductivity, Hall constant, and particle mobility, on the intensity of the electric field at ~~temperatures of 1.5-4.20 K~~ and at field intensities ranging from 1-400 V/cm. The specimens, whose parameters are given in a table, were made with markedly different concentrations of impurities and compensations. Curves are given for the dependences noted above.

1/1

- 126 -