"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

91-58-8-25/34

A Power Supply for Automatic Telephone Offices Using Selenium Rectifiers

requisite smoothing circuit is described. In case of failure of the line supply, the stand-by power unit is switched in by relay. There is 1 circuit diagram.

1. Telephone systems--Power supplies 2. Power supplies --Applications 3. Selenium rectifiers--Applications

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APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, B. M.

"The Electrical Equipment of the Knyazhaya Guba Hydroelectric Power Plant."

in book - New Developments in tehDesign of Electric Equipment for Hydroelectric Power Plants, 1957. 222 p. Moscow-Leningrad, Gosenergoizdat.
(Data on the Conference on Design and Operation, Mosoow, 16-24 May 1956.)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

S/121/61/000/010/003/005
D040/D113

AUTHORS: Tsetlin, B.S., and Maslov, A.M.

TITLE: Hot burr-free stamping of gear-shaper cutter blanks

PERIODICAL: Stanki i instrument, no. 10, 1961, 30-31

TEXT: Hot burr-free stamping has been used at the Moskovskiy instrumental'nyy zavod (Moscow Tool Plant) since 1960 for gear-shaper cutter blanks. In 1961, hot stamping completely replaced drop forging in flat dies for two blank sizes - for cutters with 75 and 100 mm pitch circle diameters. The new technology is based on research work conducted by the VNII. The Moscow Tool Plant is a short-scale production plant, and gear-shaper cutters are being produced in lots of 200-300, although lots of 500 are estimated to be more economical. The article describes the die design (Fig.3) and gives details of the production process. The cutters are made from P 18 (R18) high-speed steel. Serving as stock are hot-rolled R18 steel bars, 45 mm in diameter for gear-shaper cutters with a pitch circle diameter of 75 mm and forged steel 60 mm in diameter for gear-shaper cutters 100 mm in pitch

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Hot burr-free stamping ....

circle diameter. Stock is cut to lengths with ± 0.5 mm accuracy in abrasive cutting-off machines, and length has to be determined for practically every rod since the standard permits 2.5 mm rod diameter deviations and ovality. An МКП-1500 (MKP-1500) crank press is used for stamping. The press, shown in a photograph, has a maximum force of 1500 tons and has a 300 mm slide travel. Dies are made of 5ХНВ (5KhNV) steel and hardened to RC 43-45, and assembled in MZMA design blocks. Stampings (Fig.1) are shaped by two strokes. The first die impression has 1-2 mm larger diameter than the stock, and upsetting in the first impression also produces a centering protrusion. The upset blank is fixed by the center protrusion in the second die impression and finally stamped. The punch forms the inside, and the bed die the outside of the cutter. A 1.0-1.5 mm gap has to be maintained between the punch and the bed die in view of possible blank height inaccuracy. Machining allowance of 4-6 mm on the outer diameter and 3-4 mm in height is needed for the obligatory removal of the decarburized metal layer by machining. Blanks are heated in batches of 70 to 100 in a small gas furnace beginning at 900-1000°C and heating up to a forging temperature of 1100-1150°C for 30-40 min in slightly reducing atmosphere with a gas surplus to reduce decarburization and scale. Scale is removed by air blast

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

Hot burr-free stamping ....

S/121/61/000/010/003/005
D040/D113

and lubrication of stamps is not used. Annealing after stamping is carried out in a special crucible placed into a shaft furnace with temperature program control. The annealing procedure is as follows: soaking for 2-3 hours at 850°C, cooling rapidly to 750°C and soaking for 4-5 hours at this temperature, cooling in the furnace to 500°C, then unloading and finally cooling in the open air. Rejects are possible when the stock length cut off is too small or too large, cracks occur when cooling is too fast, and dies fill unevenly when not accurately placed in the press. However, the die costs are 30-35 times lower than the cost of expensive high-speed steel spared through the use of hot stamping instead of open drop forging, and 50% less machining work is needed on stamped blanks. Dies withstand 2000-2500 stampings before the first machining becomes necessary, and 2-3 overhauls are possible before complete wear. There are 4 figures.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, B.S.; MASLOV, A.M.

Seamless hot stamping of slotter-ram blanks. Stan.i instr. 32 no.10:30-31 O '61. (MIRA 14:9)

(Forging)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

BOCHAROV, Nikolay Filippovich [deceased]; DEGTYAREV, Viktor Olegovich; KOVALEV, Anatoliy Ivanovich. Prinimal uchastiye STEPANOV, N.G.; ZAUSAYLOV, B.A., retsenzent; FEDOROVSKIY, P.Ye., retsenzent; TSETLIN, B.V., red.; PESKOVA, L.N., red.; BOBROVA, Ye.N., tekhn. red.

[Fundamentals of safety engineering and fire prevention measures] Osnovy tekhniki bezopasnosti i protivopozharnoi tekhniki. Moskva, Transzheldorizdat, 1962. 202 p. (MIRA 16:2)

(Railroads--Safety measures)
(Railroads--Fires and fire prevention)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

1. TSETLIN, B.V.

2. USSR (600)

4. Technology

7. Safety techniques in machine-building. Moskva, Oborongiz,1952

9. Monthly List of Russian Accessions, Library of Congress, February, 1953. Unclassified.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, Boris Viktorovich; POLUEKTOV, Yevgeniy Vyacheslavovich; ROZOVSKIY, R.S., inzh, retsenzent; KUGINIS, B.L., inzh, retsenzent; DUVANKOV, G.S., red.; BARYKOVA, G.I., red.izd-va; TIKHANOV, A.YA., tekhn.red.

[Safety measures in operating load-lifting machinery at machinery manufacturing plants] Tekhnika bezopasnosti pri ekspluatatsii gruzopod"emnykh mashin na mashinostroitel'nykh zavodakh. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1958. 145 p. (MIRA 12:1)

(Hoisting machinery) (Machinery industry--Safety measures)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, BORIS VIKTOROVICH

Okhrana Truda V Promyshlennosti (Protection of labor in industry) Moskva, 1958.

V. Tables.

At head of title: Russia. M nisterstvo Vysshego Obrazovaniya, and Moscow. Gosudarstvennyy Ekonomicheskiy Institut.

Bibliography: P. (278)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, Boris Viktorovich,; KAPLANOVICH, Semen Lipovich,; BLINDER, Ye. N.,red.; TSIRUL'NITSKIY, N.P., tekhn. red.

[Safety measures in the operation of industrial enterprises; a practical manual] Okhrana truda pri ekspluatatsii promyshlennykh predpriiatii; prakticheskoe rukovodstvo. Moskva, Vses. koop. izd-vo, 1958. 345 p. (MIRA 11:12)

(Industrial safety)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

14(8); 25(5) PHASE I BOOK EXPLOITATION SOV/1646

Tsetlin, Boris Viktorovich, and Semen Lipovich Kaplanovich

Okhrana truda pri ekspluatatsii promyshlennykh predpriyatiy; prakticheskoye rukovodstvo (Plant Safety in Industrial Establishments; Practical Guide) Moscow, Koiz, 1958. 345 p. 20,000 copies printed.

Ed.: Ye.N. Blinder; Tech. Ed.: N.P. Tsirul'nitskiy.

PURPOSE: This industrial safety manual is intended for personnel in producers' cooperative establishments and local industries.

COVERAGE: The manual emphasizes the safe operational aspects of industrial equipment employed in metal working establishments. It describes such items as the basic legislation on labor safety, maintenance of industrial buildings, general safety measures, and personal protective equipment. It outlines precautions that should be taken when operating electrical and hoisting devices, machine tools, boilers and pressure vessels, furnaces and ovens,

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and gas and electric welding equipment. Measures to be taken when handling inflammable liquids, chemicals, plastics, and glues are also discussed. The concluding chapter is devoted to First Aid. Chapters II, X, and XVII were written by S.L. Kaplanovich, Chapters III and XI were written jointly by S.L. Kaplanovich and B.V. Tsetlin, and the remaining chapters were written by B.V. Tsetlin. There are no references. No personalities are mentioned.

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TSETLIN, B.V.

[Protection of labor in industry; a textbook] Okhrana truda v promyshlennosti; uchebnoe posobie. Moskva, Mosk.gos.ekon.univ. Pt.1. 1958. 275 p. (MIRA 12:5)
(Industrial safety)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, P. V.

Technology

Safety techniques in machine-building, Moskva, Oborongiz, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952. UNCLASSIFIED.

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, B.V.; DUBANKOV, G.S., redaktor; TIMOFEYEV, N.K., redaktor; VELLER, Ye.L., redaktor; ZUDAKIN, I.M., tekhnicheskiy redaktor

[Safety engineering in machine-building] Tekhnika bezopasnosti v mashinostroenii. Pod red. G.S.Duvankova i N.K.Timoveeva. Moskva, Gos. izd-vo obor.promyshl., 1952. 611 p. (MLRA 9:7)
(Machinery--Construction--Safety measures)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, Boris Viktorovich; NOVOSPASSKIY,V.V., redaktor; VUL'F,D.A. redaktor; MAKOV,S.I., tekhnicheskiy redaktor

[Work safety in the process of the heat treatment of metals] Bezopasnost' pri protsessakh termicheskoi obrabotki metallov. [Moskva] Izd-vo VTsSPS Profizdat, 1955. 156 p. (MIRA 9:3)
(Metals--Heat treatment--Safety measures)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

MUSTEL', Boris Viktorovich.

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Bezopasnost' truda pri protsessakh termicheskoy obrabotki metallov (Accident prevention in work during processes of thermal working of metals) Moskva, Profizdat, 1955.

156 p. illus., diagrs., tables.

"Literatura": p. 155

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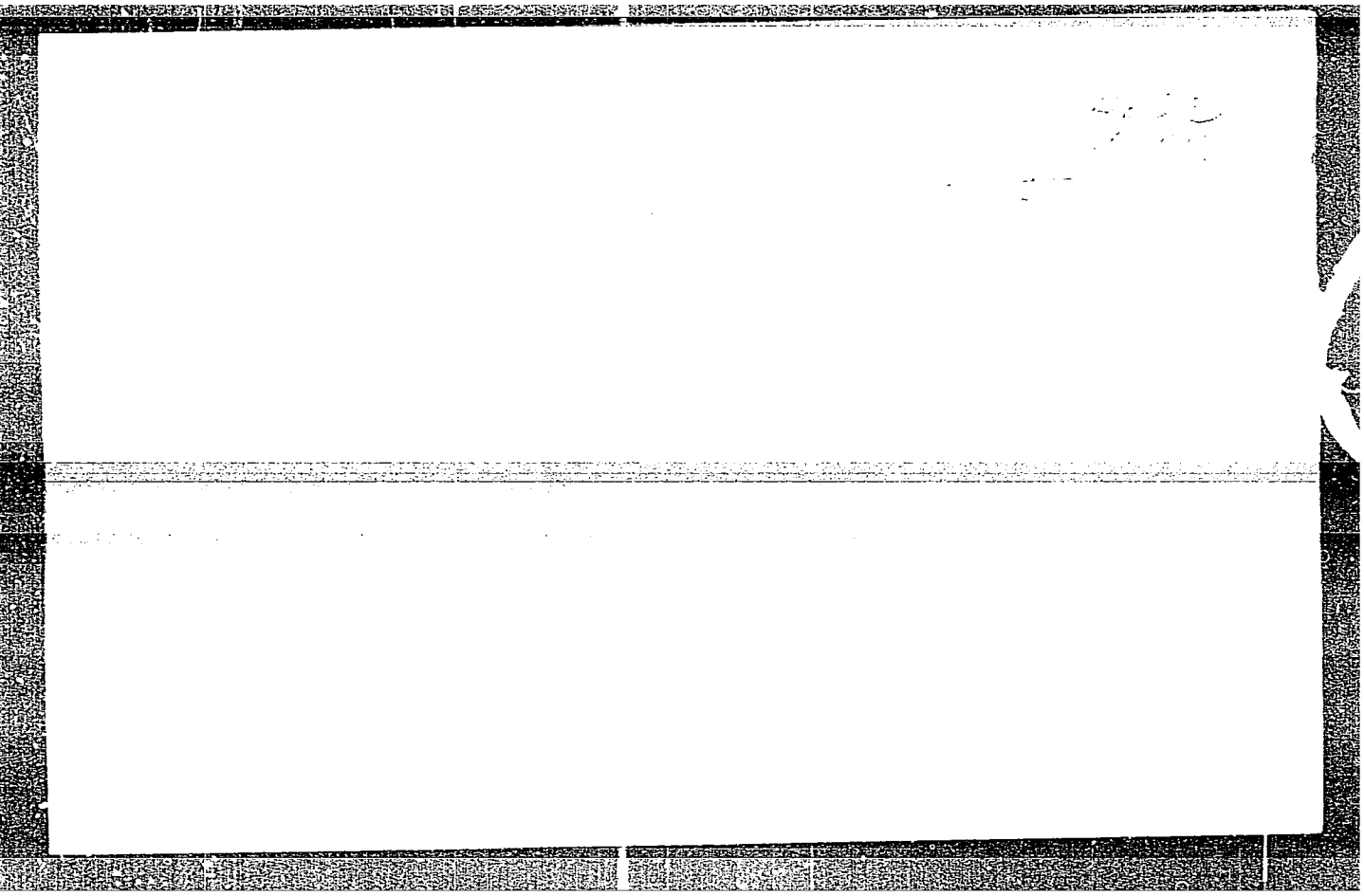

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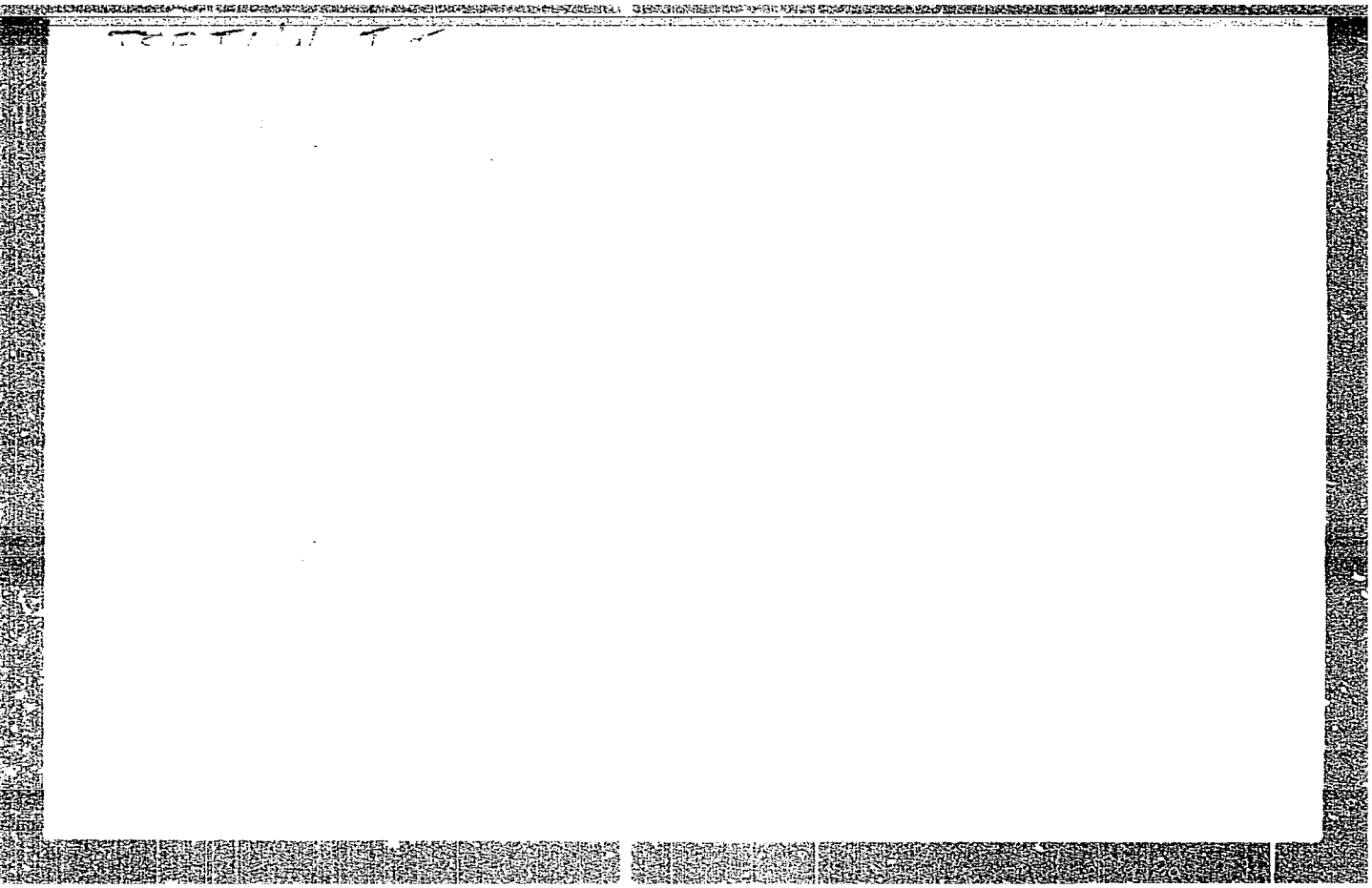

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

PETROV, A.D.; SADYKHZADE, S.I.; TSETLIN, I.L.

Direct synthesis of alkyl-and alkenyl chlorosilanes on the basis of 1,1-dichlorethane and 2.2-dichloropropane. Dokl.AN SSSR 107 no.1: 99-102 Mr '56. (MLRA 9:7)

1.Chlen-korrespondent AN SSSR (for Petrov).2.Institut organicheskoy khimii imeni N.D.Zelinskogo Akademii nauk SSSR.
(Silane)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

~~TZETLIN, I. I.~~ TZETLIN, I. L.
~~TZETLIN, I. I.~~

USSR/Organic Chemistry. Synthetic Organic Chemistry. E-2

Abs Jour: Ref Zhur-Khimiya, No 6, 1957, 19258.

Author : Sadykhzade S. I., Tzetlin I. I., Petrov A. D.
Inst :
Title : Synthesis of Silicon Containing Simple Ethers and Diethers.

Orig Pub: Zh. obshch. khimiyi, 1956, 26, No 5, 1239-1243.

Abstract: According to the diagrams of Grignard and Barbier--Yavorskiy were synthesized a series of ethers with a Si-atom in β-, γ-, and δ - positions to the ether linkage. It is determined, that in -silicone ethers the bond Si-C is not broken by the action of conc. HCl on heating, or $AlCl_3$ at usual temperature. With $AlCl_3$ at 50-60° is formed $(CH_3)_3Si\ Cl$ (I). The action of Br_2 on $(CH_3)_3Si(CH_2)_3\ OCH_3$ (II) led to the formation of $(CH_3)_3SiBr$. To 30 g. Mg and 0.5 g $AlCl_3$ in 350 cc abs. ether is gradually added

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Abs Jour: Ref Zhur-Khimiya, No 6, 1957, 19258

a mixture of 108.5 g. $Cl(CH_2)_3OCH_3$(III) (b.p. 110.2°/734 mm, $n^{20}D$ 1.4133, d_4^{20} 0.9971) and 108.5. I and the mixture is stirred while heating for 5 hours. After the usual treatment II is obtained, yield 68% b.p. 142°/746 mm, $n^{20}D$ 1.4112, d_4^{20} 0.7907. Analogically were synthesized (given substance, yield in %, b.p. °C/mm, $n^{20}D$ and d_4^{20}): $(C_2H_5)_3Si(CH_2)_3OCH$ (IV), 7.2 207/746, 1.4413, 0.8375 $(CH_3)_2C_2H_5Si(CH_2)_3OCH_3$ (V) 50, 164/752, 1.4211, 0.8059; $(CH_3)_2Si[(CH_2)_3OCH_3]_2$ 36, 105-105.6/20, 1.4330, 0.8676. By the interaction of $(CH_3)_3SiCH_2Mg$ Cl and CH_3OCH_2Cl in usual conditions is obtained $(CH_3)_3SiCH_2CH_2OCH_3$, yield 40% b.p. 48-49°/70 mm, $n^{20}D$ 1.4030, d_4^{20} 0.7867. Analogically is synthesized $(CH_3)_3Si(CH_2)_4OCH_3$, yield 8%, b.p. 59°/12 mm, $n^{20}D$ 1.4243, d_4^{20} 0.8213. To 34 g. Mg and 0.5g $AlCl_3$ in 250 cc abs. ether is added in drops 108.5 g. III; obtained reaction mass is added to 85 g. $SiCl_4$ in 100 cc

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

USSR/Organic Chemistry. Synthetic Organic Chemistry. E-2

Abs Jour: Ref Zhur-Khimiya, No 6, 1957, 19258

ether, heated 5 hours, and filtered. At the distillation of the filtrate is obtained $Cl_3Si(CH_2)_3OCH_3$, yield 23.5%, b.p. 172.5°/744 mm, $n^{20}D$ 1.4421, d_4^{20} 1.2272. At the action of conc. H_2SO_4 on IV is formed $[(CH_3)_2Si(CH_2)_3OCH_3]_2O$, b.p. 122-124°/10 mm, $n^{20}D$ 1.4253, d_4^{20} 0,8896 . Analogically from V is obtained $[(CH_3)_2C_2H_5Si(CH_2)_3OCH_3]_2O$, b. p. 128-130°/7 mm, $n^{20}D$ 1.4312, d_4^{20} 0.8943. It is noted, that 2-chlor-4-methoxybutane does not give with Mg the Grignard reagent, but splits off the HCl, forming $CH_3CH=CHCH_2OCH_3$.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, I. L.

USSR/Organic Chemistry - Synthetic Organic Chemistry E-2

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4461

Author : Petrov, A.D., Sadykhzade, S.I., Tsetlin, I.L.
Inst : Academy of Sciences USSR
Title : Direct Synthesis of Alkyl- and Alkenyl Chlorosilanes on the Basis of 1,1-Dichlorethane and 2,2-Dichloropropane

Orig Pub : Dokl. AN SSSR, 1956, No 1, 99-102

Abstract : Study of interaction of 1,1-dichlethane (I) and 2,2-dichloropropane (II) with an alloy of Si-Cu (80:20) (16-25 hours at 360-380° under conditions of a circulation-type equipment). From I were obtained: 4.5% $SiCl_4$, 15.2% I, 6.4% vinyl-dichlorosilane (BP 72-73°/750.5 mm, $n^{20}D$ 1.4160, d_4^{20} 1.1222), 16% vinyl-trichlorosilane (BP 92.5°/750.5 mm, $n^{20}D$ 1.4295, d_4^{20} 1.2426); 6.5% 1,1-bis-dichlorosilylethane (III) (BP 165.5°/750.5 mm, $n^{20}D$ 1.4678, d_4^{20} 1.3343); 18.5% 1-dichlorosilyl-1-trichloro-silylethane (IV) (BP 181°/750.5 mm, $n^{20}D$ 1.4740, d_4^{20}

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Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4461

1.4310) and 18.5% 1,1-bis-(trichlorosilyl)-ethane (V) (BP 197.5°/750.5 mm, $n^{20}D$ 1.4820, d_4^{20} 1.5059). From II were obtained: 2% $SiCl_4$; 15% II; 7.6% dichlorisopropenyl-silane (VI) (BP 90°/758 mm, $n^{20}D$ 1.4310, d_4^{20} 1.0787); 10.1% isopropenyltrichlorosilane (BP 113°/758 mm, $n^{20}D$ 1.4412, d_4^{20} 1.2398); 14% 2,2-bis-(dichlorosilyl)-propane (VII) (BP 175.8/8°/758 mm, $n^{20}D$ 1.4709, d_4^{20} 1.2635); 11.5% 2-dichlorosilyl-2-trichlorosilyl-propane (VIII) (BP 195.5°/758 mm, $n^{20}D$ 1.4818, d_4^{20} 1.3808); 8.5% 2,2-bis-(trichlorosilyl)-propane (BP 214°/758 mm, $n^{20}D$ 1.4927, d_4^{20} 1.3733) and a small amount of a substance having a melting point of 88-90°, and according to analytical data the composition $[SiCl_2C(CH_3)_2]_3$. By methylation there were obtained:
From III -- $CH_3CH(SiH(CH_3)_2)_2$ (IX), BP 124°/746 mm,

$n^{20}D$ 1.4252, d_4^{20} 0.7597; from IV -- $CH_3CHSiH(CH_3)_2$.

Card 2/3 - 97 - $.Si(CH_3)_3$

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(X), BP 140°/733.5 mm, $n^{20}D$ 1.4288, d_4^{20} 0.7756; from V -- $CH_3CH(Si(CH_3)_3)_2$ (XI), BP 155.7°/733 mm, $n^{20}D$ 1.4340, d_4^{20} 0.7821; from VII -- $(CH_3)_2C(SiH(CH_3)_2)_2$, BP 142-143°/758 mm, $n^{20}D$ 1.4360, d_4^{20} 0.7779; from VIII -- $(CH_3)_2C(SiH(CH_3)_2Si(CH_3)_3)$ (XII), BP 159-160°/758 mm, $n^{20}D$ 1.4378, d_4^{20} 0.7939; compounds III and VI-XII were obtained for the first time. From 1,2-dichloethane, under the above-described conditions, vinylsilane chlorides are not formed.

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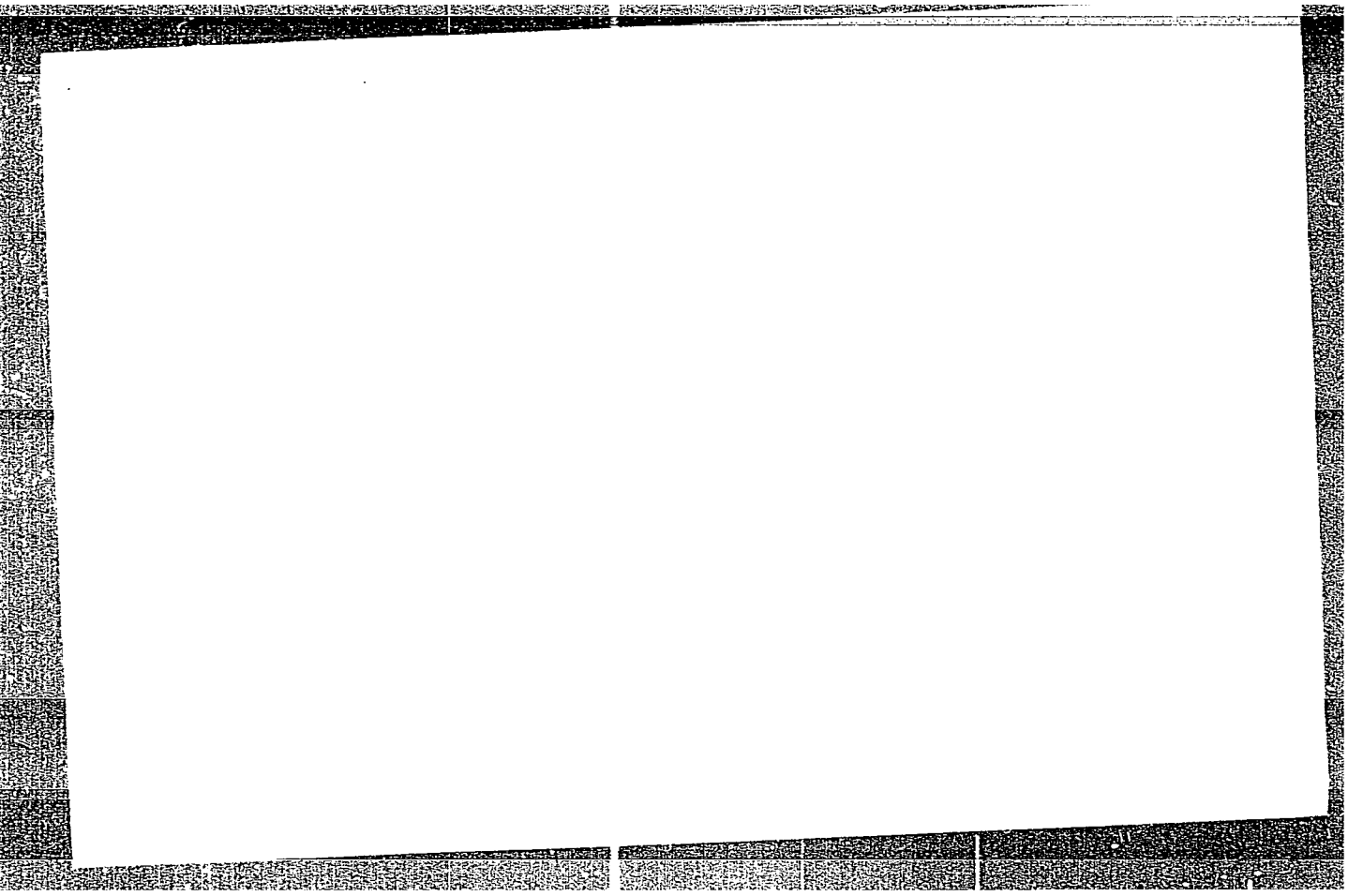

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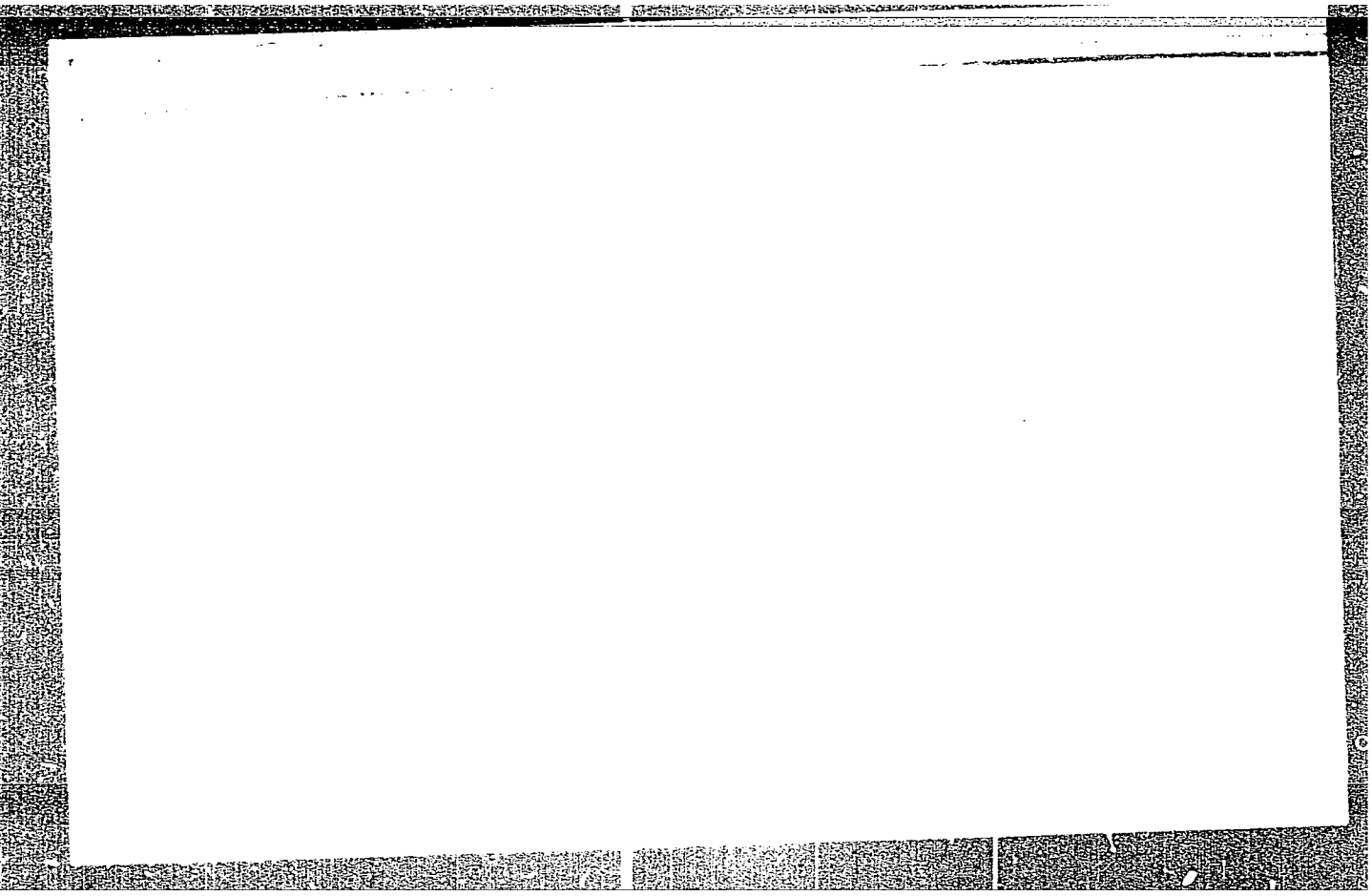

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, Lev Solomonovich; ZUBOV, V.P., otvetstvennyy red.; MIL'NER, Ya.A., red. izd-va; MAKUNI, Ye.V., tekhn. red.

[History of scientific thought in Russia; science and scientists at Moscow University in the second half of the 19th century] Iz istorii nauchnoi mysli v Rossii; nauka i uchenye v Moskovskom universitete vo vtoroi polovine XIX veka. Moskva, Izd-vo Akad. nauk SSSR, 1958. (MIRA 11:7)
275 p.
(Moscow University) (Science—Study and teaching)

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, L.B.

Academician Mikhail Aleksandrovich Menzbir; on the 25th anniversary of his death. Biul. MOIP. Otd. biol. 65 no. 6:129-140 N-D '60. (MIRA 14:2)

(MENZBIR, MIKHAIL ALEKSANDROVICH, 1855-1935)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, I. S.

Science

K. A. Timiryazev 2 dop. izd. Moskva, Izd-vo Akademii nauk SSSR, 1952

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSEILIN, M. L.

Matrixes

Application of matrix computation to the synthesis of relay-contact schemes. Dokl. AN SSSR 86 no. 3, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952. Unclassified.

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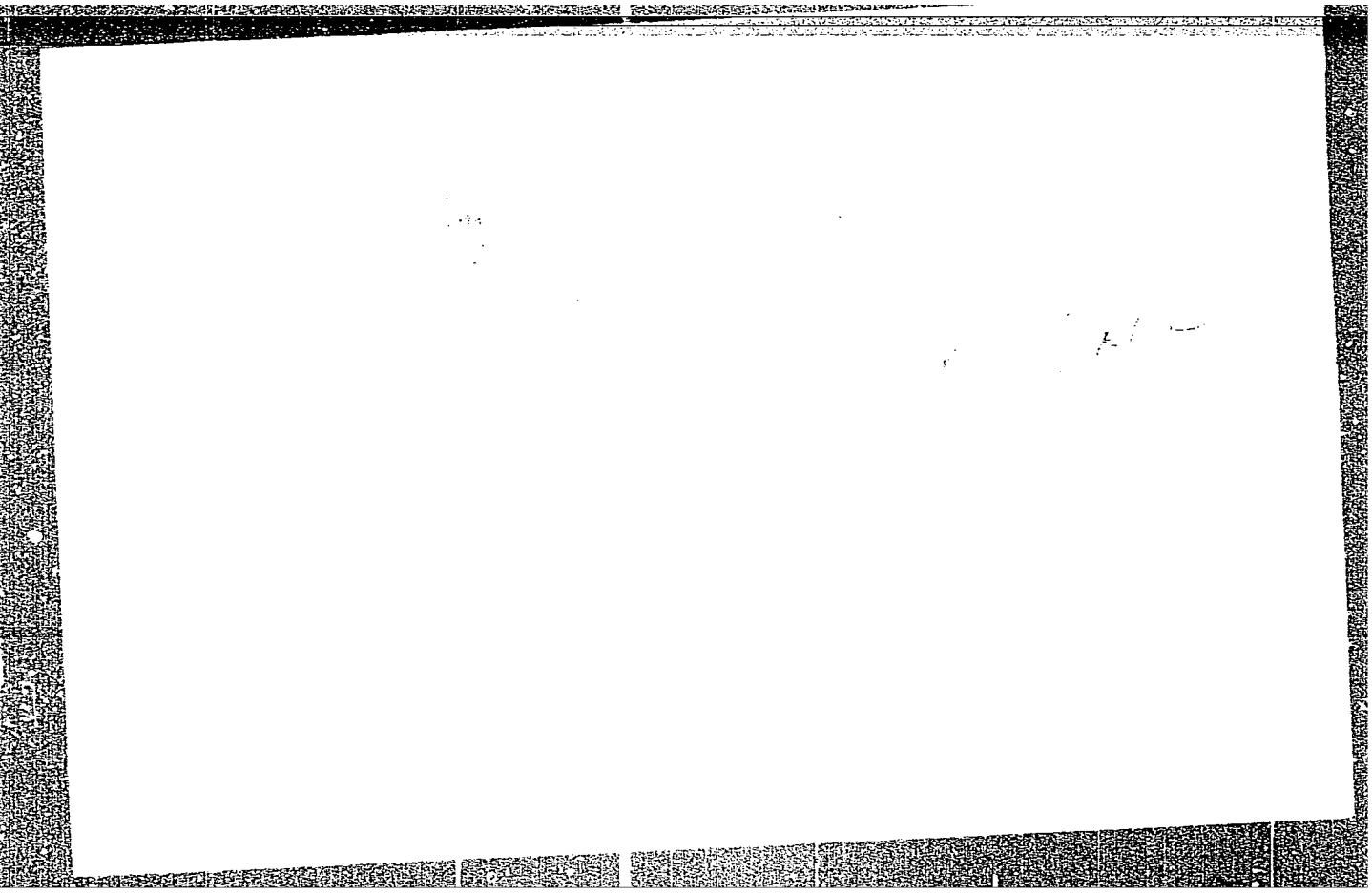

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TSETLIN, M.L.

PA - 2030

AUTHOR: GEL'FAND,I.M., CETLIN,M.L.

TITLE: On the Quantities with Anomalous Symmetry and on a Possible Explanation of the Degeneration (with Respect to Symmetry) of K-Mesons.

PERIODICAL: Zhurnal Eksperimental'noi i Teoret.Fiziki, 1956, Vol 31, Nr 6, pp 1107-1109 (U.S.S.R.)

Received: 1 / 1957 Reviewed: 3 / 1957

ABSTRACT: Within the limits of experimental accuracy the rest masses of θ- and τ-mesons are equal and this equality is called the "degeneration of K-mesons with respect to symmetry". In this connection the examination of the behavior of the corresponding quantities with reflections is of interest. Besides, such examinations are interesting themselves. Besides the well-known possible symmetries with respect to space and time reflections there is an additional possibility which is here called "anomalous symmetry".

It is purposeful to determine the transformations of the quantities with respect to one or the other group with an accuracy leaving one factor arbitrary. Well-known examples for the occurrence of such factors are the spinors or the wave functions of a system of particles which obey the FERMI statistics. The corresponding mathematical notions are the so-called projective representations of one group. Here the representation of a group

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On the Quantities with Anomalous Symmetry and on a Possible Explanation of the Degeneration (with Respect to Symmetry) of K-Mesons.

of reflections consisting of the following four elements is examined: the element of the unit and of the operators of the time-dependent, spatial, and time-space reflections. With transpositions of the operators T_t (a certain projective representation of the reflection groups) the quantities transformable by the operators of the representation have four possibilities of symmetry. The only additional possibility follows if the demand of transpossibility of the operators is renounced. Then the relations between the operators can be expressed by a matrix. In the simplest case, with the transformation of scalar quantities, the operators can be written in the form of three anti-commuting matrices of second order which are analogous to the well-known PAULI matrices. The quantities to be transformed ("scalars with anomalous symmetry" form numerical pairs which do not change during the transformation proper and which transform during reflections according to the matrices already mentioned. The irreducible representation of the LORENTZ group, together with the reflections, decomposes into two representations of the

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On the Quantities with Anomalous Symmetry and on a Possible Explanation of the Degeneration (with Respect to Symmetry) of K-Mesons.

LORENTZ group proper. Thereby four normal and one not normal possibilities exist. This and other considerations permit the subdivision of the particles into classes with normal and not normal symmetry. Attributing the not normal symmetry to the K-mesons and the normal one to the pions, the same normality would follow for the particles Λ , Σ just as for the particles n, Ξ . For this purpose the consideration of one reaction with strong reciprocal effect suffices. The K-meson can exist in two different states with different space symmetry and equal mass.

ASSOCIATION: Not given.
PRESENTED BY:
SUBMITTED:
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TSEYTLIN, M. L.

AUTHORS: Kobrinskiy, A. Ye., Breydo, M. G., Gurfinkel', V.S., 20-1-20/42
Sysin, A. Ya., Tseytlin, M. L., Yakobson, Ya. S.,

TITLE: A Bioelectric Control System (Bioelektricheskaya sistema upravleniya)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 1, pp. 78-80 (USSR)

ABSTRACT: At first something on the general situation of this problem is said. The authors of the present papers wanted to work out a bioelectric system, which according to a certain programme controls a mechanical servo drive. This programme was worked out in the form of oscillations of the bioelectric potential of the muscles. The possibility of realizing such a system is based on the results of different investigations in which the dependence of the oscillations of the bioelectric potential of a muscle on its functional condition was investigated. The results of these investigations briefly indicate the following: 1) The oscillations of the biopotential of a muscle are a constant and inalienable phenomenon of the stimulating process. 2) The penetration of the biocurrent always occurs before a shortening of the muscle. 3) There is an unequivocal relation between the amount of the biopotential and the tension developped by the muscle, this relation being approximately linear to the tension up to a certain

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A Bioelectric Control System.

level. An added diagram illustrates an oscillogram of the biocurrents which were deduced from different stretched finger-joint by applied electrodes. These deduced biocurrents develop by the total effect of the muscle fibres of a certain muscle and the numerous oscillations of the fibres of the adjacent muscles provide an additional noise-background. The first problem in the experiments with these complicated signals was the elimination of the informations on the orders from the central nervous system, which regulate the level of the tension of the muscle. As carrier of the useful information in the here discussed system only one parameter of the bioelectric system is used, that is efficiency. The authors hope for application of further parameters. The block scheme of the control system is illustrated by a graph and its function method briefly described. The system is constructed so that the biocurrents are deduced by two antagonal muscles at the same time. In the case of technical application it is well possible to connect a circuit with feed-black coupling into the wiring diagram of the control system, which circuit is based on the application of special, automatical transmitters. There are 2 figures, and 2 references, 1 of which is Slavic.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

20-1-20/42

A Bioelectric Control System.

ASSOCIATION: Institute of Mechanics of the AN USSR, Central Scientific Research Institute for the Construction of Artificial Limbs, Moscow State University imeni M.V.Lomonosov (Institut mashinovedeniya Akademii nauk SSSR. Tsentral'nyy nauchno-issledovatel'skiy institut protezirovaniya i protezostroyeniya, Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova)

PRESENTED: June 2o, 1957, by A.A.Blagonravov, Academician

SUBMITTED: June 19, 1957

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M. L.

20-6-16/47

AUTHOR: Tsetlin, M. L.

TITLE: The Matrix Method of the Analysis and Synthesis of the Electron--Pulse-Schemes and the (Non-Primitive) Relay-Contact-Schemes (Matrichnyy metod analiza i sinteza elektronno-impul'snykh i releyno-kontaktnykh (neprimitivnykh) skhem)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 6, pp. 979 - 982 (USSR)

ABSTRACT: The author investigates an electric circuit with n + s input rails $x^1, \ldots, x^{n+s}$ and p + s output rails $f^1, \ldots, f^{p+s}$, any of which may at any moment be in one of two states. There two states, according to the type of physical realization of the electric circuit, differ by the presence of absence of a voltage impulse at the moment t, by one of the other voltage level, by open or closed contacts of the relay to be controlled by the given rail, etc. One of these states (the excited one) is ascribed the number 1, the other the number 0. The circuit is designated as primitive here when the assembly X_t of the quantities $x_t^1, \ldots, x_t^{n+s}$ which determines the states of the input rails of the circuit completely determines the states of the output rails of the scheme (i.e. the assembly $F_t = (f_t^1, \ldots, f_t^{p+s})$. In this case the relations $f_t^i = f^i(x_t^1, \ldots, x_t^{n+s})$ must apply. These functions can be realized

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The Matrix Method of the Analysis and Synthesis of the Electron-Pulse-Schemes and the (Non-Primitive) Relay-Contact-Schemes

as contact circuits or as electron-pulse-schemes. Then feedbacks with retardation with respect to time are introduced. The circuit P obtained from circuit Q by the introduction of such feedbacks is desginated as non-primitive here. The equations of the non-primitive circuit may be obtained from the equations of the primitive circuit and the feedbacks. The input of the circuit at the same moment completely determine the states of the circuit at the same moment completely determine the output of the circuit at the moment t+1 and the state of the circuit at the moment t+2. Various possibilities of realization are shortly indicated. Only the trigger circuit is somewhat more thoroughly discussed. Then the conceptions "switching functions of the trigger", "simple vector", "simple vector of state of the circuit" are defined and an expression for the matrix of the state of a nonprimitive circuit is written down. Then the matrices of the reactions of the circuit are given. The method of operation of these circuits may be described by the matrices of the state and the reactions of a non-primitive scheme. As analysis of the circuit the author here designates the construction of the matrices from the given equations, as synthesis - the redetermination of the equations of the circuit from the given matrices. Examples for the analysis and the synthesis of nonprimitive circuits are described.

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20-6-16/47

The Matrix Method of the Analysis and Synthesis of the Electron-Pulse-Schemes and the (Non-Primitive) Relay-Contact-Schemes

There are 2 figures, and 8 references, 7 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvenny universitet im. M. V. Lomonosova)

PRESENTED: July 19, 1957, by M. V. Keldysh, Academician

SUBMITTED: July 10, 1957

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TSETLIN, M.L., Cand Phys -Math Sci--(diss) "Matrix method of synthesis of ~~schemes~~ circuits and ~~certain~~ some of its applications." Mos,1958. 8 pp (Mos Order of Lenin and Order of Labor Red Banner State U im M.V. Lomonosov. Physics Faculty), 150 copies (KL,30-58,122)

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TSETLIN, M. L.

PHASE I BOOK EXPLOITATION SOV/1128

Problemy kibernetiki, vyp. 1 (Problems of Cybernetics, no. 1)
Moscow, Fizmatgiz, 1958. 268 p. 20,000 copies printed.

Ed. (title page): Lyapunov, Aleksey Andreyevich; Ed. (inside book): Smolyanskiy, M.L.; Tech. Ed.: Kolesnikova, A.P.; Eds. and Compilers: Lupanov, O.B., Pil'chak, B.Yu., Kulagina, O.S., Yablonskiy, S.V.

PURPOSE: The book is intended to relate the interests of scientific and engineering personnel whose work involves various aspects of cybernetics.

COVERAGE: This collection of articles deals with general problems of cybernetics, information theory, theory of algorithms and automatic machines, theory of control systems, theory of games and tactics, methods of operations analysis, problems in the theory of calculating machines, programming, and the application of cybernetics to other sciences, such as biology, economics and linguistics. "Problems of Cybernetics", as a recurrent publication, will continue to include original papers, survey articles and translations and,

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like the present work, will contain the results of seminars in cybernetics held at Moscow University. There are 107 references, of which 104 are Soviet, 2 English and 1 Hungarian.

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Problems of Cybernetics, no. 1 SOV/1128

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Problems of Cybernetics, no. 1 SOV/1128

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TSETLIN, M. L.

"Review of von Newmann's Article 'Probabilist Logic and Synthesis of Reliable Organisms From Unreliable Components'" (in the collection Avtomaty (Automata)) (7 December 1956).

Paper presented at the Seminars on Cybernetics at Moscow University during the 1956-57 school year.

Problemy Kibernetiki, No. 1, 1958

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16(2),9(2) SOV/44-59-9-8886

Translation from: Referativnyy zhurnal.Matematika,1959,Nr 9,p 43 (USSR)

AUTHOR: Tsetlin,M.L.

TITLE: On Imprimitive Circuits

PERIODICAL: Sb.: Probl.kibernetiki.Vyp.1.M.,Gos.izd-vo fiz.-matem.lit.1958, 23-45

ABSTRACT: The present article is devoted to the application of the matrix method for the investigation of the so-called imprimitive circuits which can be realized by relais- as well as by electronic impulse devices.

From the text of the article

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

AUTHORS: Tsetlin, M.L. and Eydus, G.S. SOV/106-58-4-7/16

TITLE: A Matrix Method for Synthesis of Multi-branch, Relay-contact Switching and Control Systems (Matrichnyy metod sinteza mnogotaktnykh releyno-kontaktnykh skhem svyazi i upravleniya)

PERIODICAL: Elektrosvyaz', 1958, Nr 4, pp 41 - 48 (USSR)

ABSTRACT: The author gives a matrix method of analysis and synthesis of relay-contact switching circuits together with several examples of its application.
A relay-contact system containing s electromagnetic relays $\Phi_1, \ldots \Phi_s$, n control elements (push-buttons, switches, contacts) $X_1, \ldots X_n$ and p output lines $f_1, \ldots, f_p$ is considered. The sequence in which the relays are switched and, consequently, the sequence of application of voltage to the output lines depends on the action of the control elements and is determined by the circuit arrangement. The number 1 is allotted to the energized state of a relay and 0 to the de-energised state. A circuit containing s relays can have, in all 2^s states. These states are conveniently written in the form $\beta_s, \ldots \beta_1$, where $\beta_k (k = 1, 2, \ldots, s)$ can have

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a value 0 or 1 . For example, if all the relays are de-energised, the state of the circuit can be symbolised by 0, 0, ..., 0 ($\beta_1 = \beta_2 = \ldots = \beta_s = 0$). If the 1st and 3rd relays are energised, the state changes to 0,0,0, ... 0,1,0,1 ($\beta_1 = \beta_3 = 1$, the remaining values equalling 0). All the states are numbered 0,1 ..., 2^s-1 and the state numbered k is written in binary form $\beta_s, \ldots, \beta_1$, the commas indicating that this is a binary number and not a product.
Let the circuit at some instant of time be in the state k . Due to the action of the control elements (push buttons) the state changes to the l^{th} state ($l = 0, 1, \ldots, 2^s-1$). This action can be represented as some function of the variables $x_1, \ldots, x_n$ and denoted by $a_{kl}(x_1, \ldots, x_n)$, so that the change-over from the k^{th} state to the l^{th} state occurs always, and only, when the values of the variables $x_1, \ldots, x_n$ are such that $a_{kl}(x_1, \ldots, x_n) = 1$. Conversely, if $a_{kl}(x_1, \ldots, x_n) = 0$, then the corresponding change-over

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cannot occur.
The values a_{kl} are written in matrix form:

$$A \begin{pmatrix} a_{0;0} & a_{0;1} & \cdots & \cdots & a_{0;2^s-1} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{2^s-1;0} & a_{2^s-1;1} & \cdots & \cdots & a_{2^s-1;2^s-1} \end{pmatrix} \quad (1)$$

Then the condition for change-over from the k^{th} to the l^{th} state, denoted by $a_{kl}(x_1, \ldots, x_n)$ is located at the intersection of the k^{th} line with the l^{th} column. The elements $a_{\alpha_s}, \ldots, \alpha_1; \beta_s, \ldots, \beta_1(x_1, \ldots, x_n)$ are functions of the control elements $X_1, \ldots, X_n$. The letter x_i represents contacts which are closed when the button X_i is pressed and opened when it is released. Similarly,

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A Matrix Method for Synthesis of Multi-branch, Relay-contact Switching and Control Systems

$\overline{x_i}$ represents contacts which are open when the button X_i is pressed and closed when it is released. Closed contacts are represented by 1, and open contacts by 0. Thus, if button X_i is pressed, $x_i = 1$, $\overline{x_i} = 0$; if X_i is released, $x_i = 0$, $\overline{x_i} = 1$.

Functions $a_{\alpha_s,\ldots,\alpha_1;\ \beta_s,\ \ldots,\beta_1}(x_1, \ldots, x_n)$ are formed from the values $x_1, \ldots, x_n$ by the basic operations:

logical addition, multiplication and negation (Ref 5). For example, if, initially, all the relays are disconnected and to switch in the s^{th} relay only, it is necessary to press buttons X_1 and X_2 and not to press X_3, then:

$$a_{0,0,\ \ldots,0;1,0,0,\ldots,0}(x_1,x_2,x_3) = (x_1 \vee x_2)\overline{x_3}$$

where $\vee$ denotes the logical summation.
It can be proven (Refs 9, 10) that the matrix of the states

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of relay-contact systems satisfies the following conditions:

1) The logical sum of the elements of any line equals 1:

$$\bigvee_{l} a_{k;l} = \bigvee_{\substack{\alpha_s, \ldots, \alpha_1; \beta_s, \ldots, \beta_1 \\ \beta_s, \ldots, \beta_1}} a_{\alpha_s, \ldots, \alpha_1; \beta_s, \ldots, \beta_1}(x_1, \ldots, x_n) = 1 \qquad (2)$$

2) The product of elements in different columns of one line equals 0:

$$a_{k;l_1} a_{k;l_2} = 0; \quad l_1 \neq l_2 \qquad (3)$$

Such matrices are called "simple" matrices.

On the circuits, the letter ϕ_i denotes the winding of the i^{th} relay, φ_i - the closed contacts and $\overline{\varphi_i}$ - the open contacts, when the relay is switched into circuit. Closed contacts are represented by 1 and open contacts by 0. The presence or absence of voltage on the winding of the relay ϕ_i is denoted by the value of ϕ_i ($\phi_i = 1$ or

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$\phi_i = 0$, respectively). If the voltage is applied to the relay ϕ_i but its contacts have not changed over, then $\phi_i = 1; \varphi_i = 0; \overline{\varphi_i} = 1$. After an interval of time necessary for operation of the relay, the contacts change over and then $\phi_i = 1$; $\varphi_i = 1$; $\overline{\varphi_i} = 0$. (The values φ_i, $\overline{\varphi_i}$, x_i, $\overline{x_i}$, ϕ_i depend on time and in Refs 9, 10, this is accounted for by an additional index t. For simplicity, this is not used in this work.)
The conditions for switching in the i^{th} relay are functions of the states of the control elements and the circuit relay contacts and are written in the form:

$$\phi_i = \phi_i (x_1, \ldots, x_n; \varphi_1, \ldots, \varphi_s) \qquad (4)$$

From Eq.(4), a single-valued matrix of the circuit states is established, i.e. the matrix elements
$^{a}\alpha_s, \ldots, \alpha_1; \beta_s, \ldots, \beta_1 (x_1, \ldots, x_n)$ are found by the

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formula:

$$a_{\alpha_s,\ldots,\alpha_1;\beta_s,\ldots,\beta_1}(x_1,\ldots,x_n)=\prod_{i=1}^{s}\left[\phi_i(x_1,\ldots,x_n;\alpha_1,\ldots\alpha_s)\right]^{\beta_i} \qquad (5)$$

Thus, to find the element $a_{\alpha_s,\ldots,\alpha_1;\beta_s,\ldots\beta_1}$ it is necessary to form the logical product from expressions of the type (4), replace φ_i by α_i and take the logical negation in those cases where $\beta_i = 0$.
If the circuit has output lines $f_1,\ldots, f_p$, then the presence of voltage on the i^{th} line is also a function of the state of the control elements and relay contacts, which can be presented in the form:

$$f_i = f_i(x_1,\ldots,x_n;\ \varphi_1,\ \ldots,\ \varphi_s) \qquad (6).$$

The application of the above method is demonstrated by the analysis of an example circuit.

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A Matrix Method for Synthesis of Multi-branch, Relay-contact Switching and Control Systems

The author next considers the synthesis of relay-contact systems, i.e. obtains a circuit which will meet given requirements. Insofar as the states matrix completely describes the circuit operation, the problem of synthesis of the circuit consists of finding the states matrix by which the relay switching functions (of the Eq.(4) type) are determined and hence the circuit itself is determined. For any simple matrix:

$$A = \| a_{\alpha_s,\ldots,\alpha_1;\beta_s,\ldots,\beta_1}(x_1, \ldots, x_n) \|$$

a single valued circuit can be established and the switching function of the i^{th} relay can be obtained by the relationship:

$$\phi_i(x_1,\ldots,x_n;\varphi_1,\ldots,\varphi_s)=\bigvee_{\alpha_s,\ldots,\alpha_1;\beta_s,\ldots\beta_1;\beta_i=1} a_{\alpha_s,\ldots,\alpha_1;\beta_s,\ldots,\beta_1}(x_1,\ldots,x_n)\left[\varphi_1\right]^{\alpha_1}\ldots\left[\varphi_s\right]^{\alpha_s} \quad . \quad (13)$$

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A Matrix Method for Synthesis of Multi-branch, Relay-contact Switching and Control Systems

in which:

$$[\varphi_i]^1 = \varphi_i, \quad [\varphi_i]^0 = \overline{\varphi_i} \qquad (14)$$

Application of the method is demonstrated by synthesis of an example circuit.
There are 4 figures and 11 references, of which 9 are Soviet and 2 English.

SUBMITTED: July 10, 1957

Card 9/9 1. Switching circuits--Mathematical analysis 2. Control systems--Mathematical analysis 3. Relays--Applications

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SOV/141-1-5-6-21/28

AUTHORS: Tsetlin, M.L. and Eydus, G.S.

TITLE: Algebraic Method of Synthesis of the Circuits Based on Bistable Trigger Units

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1958, Vol 1, Nr 5-6, pp 166 - 176 (USSR)

ABSTRACT: The algebraic method of synthesis of the so-called non-primitive circuits was described by one of the authors (M.L. Tsetlin - Ref 2) in an earlier article. Here, the method is applied to the systems employing bistable triggers and the theory presented assumes that the reader is familiar with the earlier article. The systems considered are suitable for the processing of the information which is periodically applied to inputs of the device. Since the absolute time scale is of no particular importance, it is assumed that the time changes in steps (0, 1, 2 and so on). It is also assumed that the input signals of the system or its output signals have only two levels (binary systems). The system has $n+s$ input busbars $x^1, x^2 \ldots x^{n+s}$ and $p+s$ output terminals $f', \ldots f^{p+s}$. The system is primitive if the state of

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Algebraic Method of Synthesis of the Circuits Based on Bistable Trigger Units

the output terminals at the instant t is determined by the state of the input terminals at the same instant. For this case, the equation relating the states of the input and output terminals is in the form of:

$$f_t^i = f^i(x_t^1, \ldots, x_t^{n+s}), \quad i = 1, 2, \ldots, p+s \qquad (1).$$

However, Eq (1) is inadequate for the description of real systems which contain parasitic capacitances and inductances, and produce delays between the input and output signals. The delays are disregarded in this work. If the output terminals of the device are connected with the input busbars by means of delay elements (as shown in Figure 1), a non-primitive system with s feedback paths is obtained; the symbol s denotes the number of delay elements. If the states of the input terminals x^{n+i} at the instant $t+1$ is denoted by φ_t^i and the state of the output

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Algebraic Method of Synthesis of the Circuits Based on Bistable Trigger Units

terminals f^{p+i} is φ^{i}_{t+1}, the system can be described by Eqs (2). The properties of the equations are analysed in detail and it is shown that an arbitrary equation of a non-primitive system can be realised by means of trigger circuits. The theory is used to design a converter which converts an ordinary binary code into a Grey code. The device is illustrated schematically in Figure 3. A binary difference counter is also designed; the system has two input terminals and its detailed circuit diagram is shown in Figure 5. A reversing ring counter is also designed and its circuit is shown in Figure 6. The circuits of Figures 5 and 6 were tested experimentally.
The authors express their gratitude to G.A. Levin for his interest in this work.
There are 6 figures and 7 Soviet references; 1 of the references is translated from English.

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06477
SOV/141-1-5-6-21/28

Algebraic Method of Synthesis of the Circuits Based on Bistable Trigger Units

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: First submitted to the editor of the journal "Elektrosvyaz'" - January 15, 1958
Submitted to the editor of this journal - June 23, 1958

Card 4/4

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

AUTHOR: Tsetlin, M. L.

20-3-20/59

TITLE: On Composition and Subdivision of Non-Primitive Circuit Diagrams (O kompozitsii i razbiyeniyakh neprimitivnykh skhem)

PERIODICAL: Doklady AN SSSR, 1958, Vol. 118, Nr 3, pp. 488-491 (USSR)

ABSTRACT: This communication investigates the circuits, which result from the composition of non-primitive circuits and by subdivision of non-primitive circuits in subcircuits. The definitions and the symbols are identical to those in a previous work by the author (reference 1). First the terms of the united sets and simplified single vectors are defined. The relations, which are valid between the coordinates $\widetilde{X}$, $\widetilde{Y}$, $\widetilde{Z}$ of the single vectors, are written down. These relations also can easily be generalized on the unification of 3 and more sets and single vectors, which correspond with them. The primitive scheme is supposed to have s feedbacks, n input bus bars, and p output busbars. Also the assumptions for the non-primitive scheme and the matrix of the reactions is given. To avoid terms, which disagree with each other, retardation lines are necessary. The connection of two circuits is

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

On Composition and Subdivision of Non-Primitive Circuit Diagrams 20-3-20/59

illustrated in a figure. The number of the input bus bars, output bus bars, and feedbacks, which are contained in the thus obtained scheme, are given. Then the terms of the direct and of the subsequent connections are defined. As an instance the author examines the directly subsequent connection of s Trigger circuits. For the elements of the matrix of states and of the matrix of the reactions terms are written down. The corresponding circuit is frequently used in experimental physics. Finally the circuits of P and Q are given, by the composition of which the circuit R results. The author brings here one of the possible subdivisions of the circuits R into the subcircuits P and Q. There are 1 figure and 2 references, all of which are Slavic.

ASSOCIATION: State University imeni M. V. Lomonosov, Moscow (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova)

PRESENTED: July 19, 1957, by M. V. Keldysh, **Academician**

SUBMITTED: July 16, 1957

AVAILABLE: Library of Congress

Card 2/2

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M.L.

9(5) PHASE I BOOK EXPLOITATION SOV/3176

Problemy kibernetiki, vyp. 2 (Problems of Cybernetics, No. 2) Moscow, Fizmatgiz, 1959. 323 p. Errata slip inserted. 18,000 copies printed.

Ed.: A. A. Lyapunov; Compilers-Editors: O. B. Lupanov, B. Yu. Pil'chak, S. V. Yablonskiy, and Yu. I. Yanov; Eds.: A. A. Konoplyankin, and M. L. Smolyanskiy; Tech. Ed.: S. N. Akhlamov.

PURPOSE: The purpose of this collection of articles is to organize scientific papers on cybernetics and to unite the efforts and interests of Soviet scientists working in this field.

COVERAGE: This is the second volume of "Problemy kibernetiki", dealing with problems of biology, mathematics and engineering as they relate to cybernetics. The first volume, which appeared in 1958, considered problems of programming, machine translation and computer design. Future volumes propose to include a still greater number of subjects related to cybernetics. The editors list 5 recent Soviet books (including 2 translations) dealing with cybernetics. They thank the following persons for their help in preparing the book for publication: G. V. Vakulovskaya, T. L. Gavrilova, A. A. Muchnik, B. I. Pinikov, M. L. Tsetlin and V. S. Shtarkman. References follow each article.

Val'skiy, R. E. (Leningrad). On the Least Number of Multiplications for Raising to a Given Power 73

The author presents his method of computation. There are no references.

PART II. THEORY OF CONTROL SYSTEMS

Yablonskiy, S. V. (Moscow). On Algorithmic Difficulties Encountered in the Synthesis of Minimum Switching Circuits 75

The author attempts to explain algorithmic difficulties arising when solving problems of cybernetics which allow for a trivial solution on the basis of the classical definition of the algorithm. However, such a solution is impracticable because of its cumbersomeness. The author suggests two variations for the solution of the problem. One consists in renouncing the minimum of circuits. The other consists in renouncing investigation of all the functions of the algebra of logic. There are 27 references: 21 Soviet (3 translations), 5 English and 1 French.

Krichevskiy, R. Ye. (Moscow). On the Realization of Functions by Superposition 123

The article consists of three parts. In the first part the author presents fundamental definitions: the superposition of elementary objects, realization, and the simplicity index. In the second part, the fundamental result (the value of $L(D_n)$, which is the upper bound of the indexes of the simplest constructions expressing functions of D_n) is obtained if the realizing constructions are superpositions of elementary objects. In part 3, a study is made of the consequences of the fundamental theorem pertaining to multi-value logic and the theory of networks. There are 13 references: 6 Soviet, 5 English and 2 German.

Tsetlin, M.L., and L.M. Shekhtman (Moscow). Two-cycle Ferro-transistor Circuits and Algebraic Methods of Their Synthesis 139

The authors aim at developing a regular algebraic method of synthesis of two-cycle ferro-transistor circuits, which recently have found rapidly increasing application in analog and digital computers and automatic control systems. Mathematical analysis is based on algebra of logic. The authors thank the following persons for their help: Professors K.F. Teodorchik and N.Ye. Kobrinskiy, and S.V. Yablonskiy, O.B. Lupanov, N.Ya. Matyukhin and Yu.B. Pil'chak. There are 22 references, 11 Soviet (4 are translations), 10 English and 1 German.

PART III. PROGRAMMING

Glushkov, V.M. (Kiyev). On a Method of Automatizing Programming 181

The author briefly reviews existing methods of automatic programming programs, which attempt to make the process of programming as automatic as that of computing. This can be done by creating a "library" of programming programs and adapting a method of "operational programming." There are no references.

Stogniy, A.A. (Kiyev). Principles of Developing a Specialized Automatic Programming System 185

The method of automatic programming suggested by V.M. Glushkov (see preceeding article) is being developed at the Computing Center of the Academy of Sciences, USSR. It consists in the creation of a library of specialized programming programs, and of programs for [illegible] the meth[illegible] and system of counti[illegible] [illegible] The author [illegible]

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

Tsetlin, M.L.

Problemy kibernetiki, vyp. 2 (Problems of Cybernetics, No. 2) Moscow, Fizmatgiz, 1959. 323 p. Errata slip inserted. 18,000 copies printed.

Ed.: A. A. Lyapunov; Compilers-Editors: O. B. Lupanov, B. Yu. Pil'chak, S. V. Yablonskiy, and Yu. I. Yanov; Eds.: A. A. Konoplyankin, and M. L. Smolyanskiy; Tech. Ed.: S. N. Akhlamov.

PURPOSE: The purpose of this collection of articles is to organize scientific papers on cybernetics and to unite the efforts and interests of Soviet scientists working in this field.

COVERAGE: This is the second volume of "Problemy kibernetiki", dealing with problems of biology, mathematics and engineering as they relate to cybernetics. The first volume, which appeared in 1958, considered problems of programming, machine translation and computer design. Future volumes propose to include a still greater number of subjects related to cybernetics. The editors list 5 recent Soviet books (including 2 translations) dealing with cybernetics. They thank the following persons for their help in preparing the book for publication: G. V. Vakulovskaya, T. L. Gavrilova, A. A. Muchnik, B. I. Finikov, M. L. Tsetlin and V. S. Shtarkman. References follow each article.

PART IV. CONTROL SYSTEMS AND COMPUTERS

Myazlin, A.N., and V.K. Smirnov (Moscow). Operational Cathode-ray Tube Storage Device 191
The authors describe the principle of operation of the storage device for the Soviet computer "Strela-1", which consists of cathode-ray tubes of the "Potentsialoskop" type, with a storage capacity of 2048 words of 43 bits. No references are given.

Breydo, M.G., V.S. Gurfinkel', A.Ye. Kobrinskiy, A.Ya. Sysin, M.L. Tsetlin, and Ya.S. Yakobson (Moscow). On the Bioelectric System of Control 203
The article deals with the utilization of biological myoelectric currents in the operation of technical devices. It also describes the principles of operation and design of a model of a servo-drive built for this purpose. There are 12 references. 5 Soviet (1 translation), 2 German and 5 English.

PART V. CONTROL PROCESSES IN LIVING ORGANISMS

Timofeyev-Resovskiy, N.V. (Sverdlovsk), and R.R. Rompe (Berlin). On Statisticity and Amplifier Principle in Biology 213
The article concerns problems of circulation of hereditary information from generation to generation and the physical process of its biological storage in living organisms. The authors summarize investigations in that field. There are 52 references, 16 Soviet (5 translations), 18 English, 14 German, and 4 French.

Krushinskiy, L.V. (Moscow). Investigation of Extrapolative Reflexes in Animals 229
The article deals with the physiology of the activity of the nervous system in animals. The article, according to the editor, is of great interest for the study of cybernetics since it concerns relations between biology, engineering and mathematics in the investigation of control processes occurring in living organisms. There are 11 references: 9 Soviet (2 translations), and 2 English.

PART VI. PROBLEMS OF MATHEMATICAL LINGUISTICS

Kulagina, O.S., and G.V. Vakulovskaya (Moscow). Experimental Translations From French Into Russian on the "Strela" Computer 283
The programming algorithms for the machine translation of mathematical texts from French into Russian were developed by O.S. Kulagina and I.A. Mel'chuk. These algorithms assume the existence of a special vocabulary which contains not words but stems. The authors give examples of translations obtained and methods used in eliminating errors. No references are given.

Kulagina, O.S. (Moscow). Operational Description of Translation Algorithms and Automatizing the Process of Their Programming 289
Mathematicians of the Soviet Union have developed a programming technique of operational programming based on an external notation that is written linearly across the page. This operational programming was tested on translations from French into Russian. The author describes the class of logical operators used. The sequence of operators will indicate their sequence of performance. The following types of operators are used: condition, resulting and neutral (finish, halt, iteration, etc.). The author explains the method of compiling programs [illegible] operators. [illegible]

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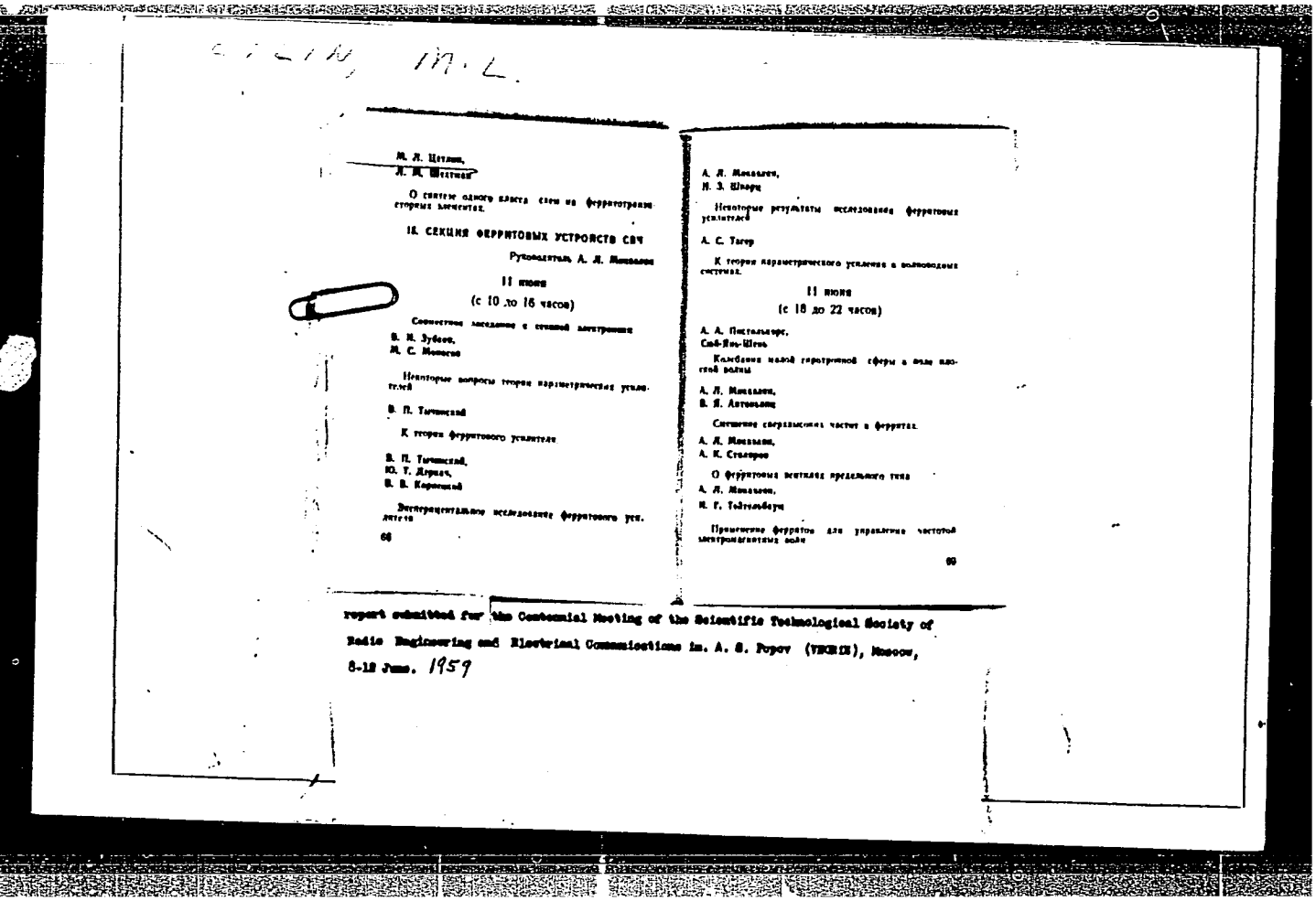

М. Л. Шетман,
Л. М. Шетман

О синтезе одного класса схем на ферротроидных сторонних элементах.

II. СЕКЦИЯ ФЕРРИТОВЫХ УСТРОЙСТВ СВЧ

Руководитель А. Л. Микаэлян

11 июня

(с 10 до 16 часов)

Совместное заседание с секцией электроники

В. М. Зубков,
М. С. Маевская

Некоторые вопросы теории параметрических усилителей

В. П. Тычинский

К теории ферритового усилителя

В. П. Тычинский,
Ю. Т. Дорман,
В. В. Кораблев

Экспериментальное исследование ферритового усилителя

60

А. Л. Микаэлян,
М. З. Шварц

Некоторые результаты исследования ферритовых усилителей

А. С. Тагер

К теории параметрического усиления в волноводных системах.

11 июня

(с 16 до 22 часов)

А. А. Пистольорс,
Сай-Янь-Шень

Колебания малой гиротропной сферы в поле плоской волны

А. Л. Микаэлян,
В. Я. Антонюк

Синтезирование сверхвысокочастотных ферритов

А. Л. Микаэлян,
А. К. Стеклов

О ферритовом вентиле предельного типа

А. Л. Микаэлян,
М. Г. Тайтельбаум

Применение ферритов для управления частотой электромагнитных волн

60

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VENIN), Moscow, 8-12 June. 1959

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

06345
SOV/141-2-1-17/19

AUTHORS: Ivanov, A.F. and Tsetlin, M.L.

TITLE: Triggered Multivibrator With Electronic Control

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 1, pp 133 - 134 (USSR)

ABSTRACT: The construction of large computers sometimes requires a pulse delay circuit whose delay time can be varied quickly and at the expense of little power. Figure 1 shows a cathode-coupled, biased multivibrator in which the coupling between the anode of $Л_1$ and the grid of $Л_2$ is elaborated by the addition of valves $Л_4$ and $Л_3$. A voltage u_g applied to the grid of $Л_4$ controls the charging of the capacitor C. The value $Л_3$ is a cathode-follower guaranteeing high input impedance to $Л_2$. Figure 2 shows the variation in pulse delay with u_g. When the latter varies from 0 to - 6 V, the delay changes from 3 μsec to 4 msec and the control is linear over a wide range. The valves are 6N1P ,

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Triggered Multivibrator with Electronic Control

the diode is a silicon D204. In Figure 1, E = 300 V; R_{a_1} = 11 kΩ; R_{a_2} = R_k = 3.4 kΩ; R_n = 47 kΩ; R_1 = 18 kΩ; R_2 = 110 kΩ; C = 100 pF.

There are 2 figures and 5 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: October 29, 1958

Card2/2

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M.L. (Moskva); SHEKHTMAN, L.M. (Moskva)

Push-pull transistor-magnetic circuits and an algebraic method for their synthesis. Probl. kib. no.2:139-179 '59 (MIRA 13:3)
(Transistor circuits)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

BREYDO, M.G. (Moskva);GURFINKEL', V.S.(Moskva);KOBRINSKIY, A.Ye. (Moskva);
SYSIN, A.Ya. (Moskva);TSETLIN, M.L. (Moskva);YAKOBSON, Ya.S. (Moskva)

Bioelectrical control system. Probl. kib. no.2:203-212 '59 (MIRA 13:3)
(Electrophysiology) (Prosthesis)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

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2

17(8) SOV/19-59-6-110/309

AUTHOR: Kobrinskiy, A.Ye., Breydo, M.G., Gurfinkel', V.S., Polyan, Ye.P., Slavutskiy, Ya.L., Synin, A.Ya., Tsetlin, M.L., and Yakobson, Ya.S.

TITLE: A Servodrive Controlled by Muscle Biocurrents

PERIODICAL: Byulleten' izobreteniy, 1959, Nr 6, p 24 (USSR)

ABSTRACT: Class 30d, 1$_{01}$. Nr 118581 (602374 of 18 June 1958). Depending on the Author's Certificate Nr 110657. A modification of this servodrive, in which there is applied a hydraulic system to obtain a continuous smooth operation of the work element.

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APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

KOBRINSKIY, A.Ye.; BREYDO, M.G.; GURFINKEL', V.S.; POLYAN, Ye.P.; SLAVUTSKIY, Ya.L.; SYSIN, A.Ya.; TSETLIN, M.L.; YAKOBSON, Ya.S.

Research on the development of bioelectric control systems. Trudy Inst.mash.Sem.po teor.mash. 20 no.77:39-50 '59. (MIRA 13:4)

(Electrophysiology)

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

16(1)

SOV/20-129-4-9/68

AUTHOR: Tsetlin, M. L.

TITLE: Some Properties of Finite Graphs Bearing on the Transportation Problem

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 4, pp 747-750 (USSR)

ABSTRACT: In the corners of the graph G_n there are integers $q_1,..,q_n$; q_i is called the charge of the corner A_i; $\bar{q} = (q_1,..,q_n)$ is called the charge of G_n. The transition from $\bar{q} = (q_1,...,q_i,...,q_k,...,q_n)$ to $\bar{q}^1 = (q_1,...,q_i-1,...,q_k+1,...,q_n)$, where A_i and A_k are neighboring corners, is denoted as elementary transport. A combination of elementary transports which transfers $\bar{q}$ in $\bar{p}$, where $\sum q_\alpha = \sum p_\beta$, is called transport plan; the number of elementary transports in the plan is called transport price. The plan with a minimal price is called minimal plan. The problem of the determination of the minimal plan and its mean price is solved for a tree and for a graph with cycles, where in the

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Some Properties of Finite Graphs Bearing on the Transportation Problem SOV/20-129-4-9/68

latter case a new algorithm is given which deviates from that of L.V.Kantorovich and M.K.Gavurin [Ref 3]. The author thanks O.B.Lupanov for discussions.
There are 3 references, 2 of which are Soviet, and 1 German.

PRESENTED: July 18, 1959, by M.V.Keldysh, Academician

SUBMITTED: March 16, 1959

Card 2/2

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S/582/60/000/003/005/009
D234/D305

9.2520 9.7000

AUTHORS: Tsetlin, M.L., and Shekhtman, L.M. (Moscow)

TITLE: On ferrotransistor push-pull circuits with non-periodical reading

SOURCE: Problemy kibernetiki, no. 3, Moscow, 1960, 89 - 94

TEXT: The paper supplements an earlier one (Ref. 1: Problemy kibernetiki, no. 2, 1959) and uses the same terminology and notations. The authors deduce the logical equation of the operation of the element used for non-periodical reading. The following method is stated to be possible for the synthesis of non-primitive circuits with non-periodical reading: Formulation of the logical equations of the circuit, their reduction to a form appropriate for finding the logical functions X, Y, Z for each element with non-periodical reading, and reduction of these functions to a g-form, whose realization determines the structure of the circuit. The maximum number of cores with non-periodical reading is determined by the number of feedbacks of the circuit. Several examples of the synthesis of such

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On ferrotransistor push-pull ...

circuits are given. There are 5 figures and 3 references: 2 Soviet bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: Guterman, Kodis, Ruhman, IRE National Convention Record, vol. 2, 1954, Part 4, 124-132.

SUBMITTED: November 3, 1957

VB

Card 2/2

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

16.9200 S/020/60/131/06/004/071
80072

AUTHORS: Gel'fand, J. M., Corresponding Member of the Academy of Sciences USSR, and Tsetlin, M. L.

TITLE: Continual Models of Controlling Systems

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 131, No. 6, pp. 1242-1245

TEXT: Structurally and timely discrete models are little effective for the description of complicated (biological) systems. Therefore the authors propose to replace the discrete models by continuous ones. In the present (preliminary) publication the authors consider as the simplest model an "active tissue" possessing the following properties: 1. Each point of the medium is instantly excitable, where the intervals between two consecutive excitations of the same point possess a lower bound R different from zero. 2. The excitation can propagate in the medium, where the speed of propagation is variable. 3. A certain time T after the last excitation there takes place a new spontaneous excitation of the point. The authors consider three examples of processes which can take place in a medium with above-mentioned properties.

Card 1/2

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Continual Models of Controlling Systems

The authors thank the participants of the seminary, the physiologists J. S. Balakhovskiy, V. S. Gurfinkel', V. B. Malkin and M. L. Shik for valuable discussion.

There are 3 figures, and 3 references: 2 Soviet and 1 Mexican.

ASSOCIATION: Matematicheskiy institut imeni V. A. Steklova AN SSSR
(Mathematical Institute imeni V. A. Steklov AS USSR)

SUBMITTED: January, 13, 1960

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M...

PHASE I BOOK EXPLOITATION SOV/5088

Akademiya nauk SSSR

Primeneniye logiki v nauke i tekhnike (Application of Logic in Science and Technology) [Moscow] Izd-vo AN SSSR [1960] 357 p. Errata slip inserted. 10,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR.

Editorial Board: Resp. Ed.: L. V. Tavanets, E. Ya. Kol'man, G. N. Povarov and S. A. Yanovskaya; Ed. of Publishing House: K. Yu. Rozenberg; Tech. Ed.: S. T. Markovich.

PURPOSE: This book is intended for scientists interested in mathematical and symbolic logic.

COVERAGE: The book is a collection of 16 articles in which the authors discuss problems of mathematical logic and its application to computers, linguistics, zoology, methodology and various fields of technology. No personalities are mentioned. References follow all but one article.

AVAILABLE: Library of Congress

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Card 4/4

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

PHASE I BOOK EXPLOITATION [illegible]

Problemy kibernetiki, vyp. 3 (Problems in Cybernetics, No. 3) [illegible] Fizmatgiz, 1960. 232 p. 15,000 copies printed.

Ed.: Aleksey Andreyevich Lyapunov; Comp. and [illegible]: O. [illegible] O. B. Lupanov, B. Yu. Pil'chak, S. V. [illegible], and [illegible]

PURPOSE: This book is intended for specialists in cybernetics, [illegible] lation, and computers.

COVERAGE: This book contains articles on problems in [illegible] mathematical linguistics, machine translation, the [illegible] the theory of digital computers. In particular, [illegible] dealing with the effective use of computers. [illegible] on cybernetics held in 1958-1959 at [illegible] A. A. Lyapunov and of the conference on [illegible] 15-21, 1959, in Leningrad are described. [illegible] L. B. [illegible], V. B. [illegible], and G. V. [illegible] company each article.

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M. L.

"On the Problem of Transportation by Graphs"

presented at the All-Union Conference on Computational Mathematics and Computational Techniques, Moscow, 16-28 November 1961

So: Problemy kibernetiki, Issue 5, 1961, pp 289-294

APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2"

"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

GURFINKEL', V.S.; MALKIN, V.B.; TSETLIN, M.L.; KHUDYAKOV, A.V.

Use of bioelectric signals of the heart for the purpose of control. Vop. nat. i reg. org. krov. i dykh. no.1:33-37 '61. (MIRA 18:7)

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

TSETLIN, M.L.

(1)

GEL'FAND, I. M., TSETLIN, M. L.

"Mathematical Model of the Work of the Heart."

presented at the All-Union Conference on Computational Mathematics and Computational Techniques, Moscow, 16-26 November 1961

So: Problemy kibernetiki, Issue 5, 1961, pp 289-294

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

25955

27.4000 4112, 3212

S/141/61/004/001/015/022
E033/E435

AUTHORS: Tsetlin, M.L., Gorokhov, Yu.S., Matusova, A.P., Mel'nikova, V.A., Tarantovich, T.M. and Shabashov, V.M.

TITLE: An apparatus for registering and diagnosing disorders of the rhythmic function of the heart

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1961, Vol.4, No.1, pp.165-172

TEXT: A description is given of an apparatus for the automatic recording and diagnosis of disorders of the rhythmic function of the heart. The apparatus is a logical device utilizing electronic digital computer elements. The initial data for the apparatus are the lengths of the time intervals between the electrocardiogram peaks (R) indicating the depolarization of the ventricles. The length of these intervals is compared with the mean (normal) length averaged over t seconds. As a result of the comparison, each interval is assigned one of three letters: "S" (short), "L" (long), "N" (normal). The changeover occurs at ± 25% of the normal interval length. The letters are then assembled into "words". The "words" corresponding to this or that rhythmic disorder (heart block, extra-systoles with, and

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without, compensatory pauses, extra-systoles followed by block, paroxysmal tachycardia) are combined in "diagnoses" recorded automatically by the apparatus. The disorders of the rhythmic function of the heart thus detected may serve for the purposes of diagnosing and studying the influence on the patient's organism of various chemical and physical factors. The block schematic of the apparatus is given and the modus operandi described. The apparatus consists of: 1) the transducer of the bipotentials of the heart muscle; 2) the amplifier; 3) the shaper; 4) the "trigger ring"; 5) the pulse tachometer; 6) two reference pulse generators with electronic pulse length control; 7) the memory; 8) the decoder and 9) the registering apparatus. There are 7 figures and 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The reference to an English language publication reads as follows: Electronic Engineering, 31, 268 (1959).

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-tekhnicheskiy institut pri Gor'kovskom universitete (The Scientific-Research Physicotechnical Institute, Gorkiy University)

SUBMITTED: September 6, 1960

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

32440

S/044/61/000/010/003/051
C111/C222

16.8000 (1031)

AUTHORS: Tsetlin, M.L., and
Shekhtman, L.M.

TITLE: On some questions of the physical realization of apparata which carry out logical functions

PERIODICAL: Referativnyy zhurnal. Matematika, no. 10, 1961, 41, abstract 10 A 290. ("Primeneniye logiki v nauke i tekhn." M., AN SSSR , 1960, 377-393)

TEXT: The authors consider some pecularities of the realization of logical nets being connected with the consideration of the finite retardation time of the signals. Because of the scattering of the retardations of signals at the inputs of the network there appear intervals of incorrect dependences of the states of the putput buses on the states of the input buses. In the interval of the incorrect dependence the output signal may cause an incorrect switching of the following nets. In order to avoid this, a part of the output signal must be separated so that the durance of the incorrect dependence becomes too short for the switching of the following nets. Here the durance of the correct output

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On some questions of the physical ...

signal is smaller than the maximal durance of the input signal, therefore sometimes an enlargement of the durance of the output signal is necessary (formation with respect to the durance). It is essential that the quickness of the nets is not bounded by the maximal retardation of the input signal but by the scattering of the retardations over the inputs.

[Abstracter's note : Complete translation.]

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

GURFINKEL', V.S.; MALKIN, V.B.; TSEYTLIN, M.L.

Method for electric stimulation of the heart. Biofizika 6 no. 1:125-126 '61. (MIRA 14:2)
(ELECTROCARDIOGRAPHY)

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16.4000 (1103, 1031, 1013)

2/251
S/103/61/022/010/010/018
D274/D301

AUTHOR: Tsetlin, M. L. (Moscow)

TITLE: On the behavior of finite automata in random media

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 10, 1961, 1345-1354

TEXT: It is shown that under certain assumptions the behavior of a finite automaton in a stationary random medium is described by a finite Markov chain. The magnitude of the mathematical expectation of the disapproval is a measure of the convenience of automaton behavior. It is assumed that the input variables can assume two values only: s = 1 is termed disapproval and s = 0--approval. Examples are given of automata with convenient behavior. In particular, an automaton (with linear tactics) is described, for which the mathematical expectation of disapproval decreases with increasing storing capacity, reaching (in the limit) the minimum possible for the given medium. Further, automaton behavior in time-dependent random media is considered, this dependence being determined by Markov chains. Let the finite automaton A be described by its

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On the behavior of...

canonical equations

$$\varphi(t+1) = \Phi(\varphi(t), s(t+1)), \quad (1)$$

$$f(t) = F(\varphi(t)) \quad (t=1,2,\ldots). \quad (2)$$

It is assumed that the output variable $f(t)$ can take different values $f_1,\ldots, f_k$; these values are termed actions of the automaton. The values of the variable $\varphi(t)$ are called the states of the automaton. It is assumed that the automaton can have m states; m is termed the storing capacity of the automaton. The state matrix $A(s)$ describes transformations of the states φ into themselves. The state transitions can be represented by the state graphs. The state matrix can be uniquely determined from the state graphs. Further, the operation of automaton A in the random medium $C = C(p_1,\ldots,p_k)$ is defined. The probability p_{ij} of transition of the automaton from the state φ_i to the state φ_j is given by formula

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On the behavior of...

$$p_{ij} = P_{\alpha i}\, a_{ij}\,(1) + q_{\alpha i}\, a_{ij}\,(0) \qquad (i, j = 1, \ldots, m) \qquad (3)$$

The matrix P of transition probabilities is a stochastic matrix. Denoting by r_i the final probability of state φ_i and by σ_α the sum of the final probabilities of such states φ_i for which $F(\varphi_i) = \alpha$, one obtains for the mathematical expectation M of disapprovals:

$$M(A, C) = \sum_{\alpha=1}^{k} p_\alpha \sigma_\alpha \qquad (5)$$

The notations

$$M_{max} = \max(p_1, \ldots, p_k), \quad M_{min} = \min(p_1, \ldots, p_k), \quad M_0 = \frac{p_1 + \ldots + p_k}{k}$$

are introduced. The operation (behavior) of the automaton is convenient if the value of M is reduced; this convenience can be defined as the

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On the behavior of...

closeness of M to M_{min}. An automaton for which $M = M_o$ has an inconvenient operation; on the other hand, $M < M_o$ for an automaton [illegible] venient operation. Several types of automata are described, one of them being a linear-tactics automaton $L_{2n,2}$. For such an automaton

$$\lim_{n \to \infty} M(L_{2n,2}, C) = M_{min}$$

where n is the storing capacity. Automata for which Eq. (1.) [illegible] are called asymptotically optimal. Further, an automaton with [illegible] tactics is described. It is found that such an automaton is less convenient than a linear-tactics automaton. Whereas the foregoing [illegible] dealt with automata which operated in media with time-independent probability characteristics, in the following, automata in randomly changing media will be considered. It is assumed that the time-dependence [illegible] is composed of stationary random constituents: $K = K(C_1, C_2, \delta)$, representing a Markov chain with the two states C_1 and C_2; these two states

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On the behavior of...

correspond to the stationary random media $C_1 = C(p_1^{(1)}, \ldots, p_k^{(1)})$ and $C_2 = C(p_1^{(2)}, \ldots, p_k^{(2)})$. The operation of automaton A in the complex medium K is defined. The parameter δ represents the mean frequency of switching of states in the complex medium. The mathematical expectation M of disapproval is given by

$$M(A, K) = \sum_{\alpha=1}^{k} (p_\alpha^{(1)} \sigma_\alpha^{(1)} + p_\alpha^{(2)} \sigma_\alpha^{(2)}) \qquad (15)$$

where p and σ are analogous to the notations of formula (4). Further, the operation of the linear-tactics automaton $L_{2n,2}$ in the complex medium K, is investigated. Formulas are derived for linear-tactics automata of most convenient operation in a given medium. Curves are plotted expressing the dependence of M on n for various δ and p = 0.33. The minimum of the mathematical expectation M is reached for n = 1.

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On the behavior of...

A table with the values of p, δ , n_o and d (d = 1/2-m) is given. There are 6 figures, 1 table and 6 Soviet-bloc references.

SUBMITTED: April 1, 1961

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"APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757010017-2

GURFINKEL', V.S. (Moskva, A-319, 1-y TSvetkovskiy per., d.19, kv.43); MALKIN, V.B.; TSETLIN, M.L.; KHUDYAKOV, A.V.

Roentgenography of the heart during phases of the cardiac cycle selected at random. Vest. rent. i rad. 36 no.6:25-28 N-D '61. (MIRA 15:2)

1. Iz Instituta eksperimental'noy biologii i meditsiny Sibirskogo otdeleniya AN SSSR i Matematicheskogo instituta imeni V.A.Steklova AN SSSR. (HEART--RADIOGRAPHY)

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20734
S/020/61/137/002/005/020
B104/B212

9.7000
16.9500 (1031, 1013, 1121, 1132)

AUTHORS: Gel'fand, I. M., Corresponding Member of the AS USSR, and Tsetlin, M. L.

TITLE: The principle of the non-local scanning in automatic maximizing systems

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 2, 1961, 295-298

TEXT: Here, an automatic maximizing principle is treated, which has been suggested by I. M. Gel'fand. It is based on a special non-local scanning, and it has proved very efficient in finding the minimum in a number of numerical problems. The output function of the automatic maximizing device in question is given as $F(x_1, \ldots, x_n, y_1 \ldots, y_m)$, where x_i denote the operating arguments. The values of these arguments will change due to automatic scanning. The y_i are called the latent parameters of the system and they are a function of time. Therefore, the output function may also be written as $F(x_1, \ldots, x_n, y_1, \ldots, y_m) =$

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The principle of the non-local ...

$= \Phi(x_1, \ldots, x_n, t)$. It is assumed that the maximizing working parameters cannot be expressed analytically but have to be determined experimentally. Since Φ is a function of time the scanning has to be done with respect to the maximizing value of the arguments. But this time dependence of Φ is not known and, therefore, the scanning rate is very important. Automatic scanning can be done by various methods. These methods can be divided into three groups: The first group is based on blind scanning, here, the pick-up of the parameter values to be maximized, is done independently of each parameter. The second group uses local scanning. Here, the result is evaluated after each scanning operation and it furnishes initial data for the subsequent scanning operation. A. A. Fel'dbaum has described this method in his papers. The third group uses the so-called non-local scanning. For this method it is characteristic that the operating point in the parameter space is not moving along a continuous curve. This increases the region of the parameter space, which is investigated per unit of time, considerably. It is possible to use singularities for the

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construction of Φ and the maximizing process will be sped up considerably. The simplest non-local method is that, where the local method is combined with the "homeostatic" principle. This method, which is widely used in the computing technique, is described in details. The following disadvantage is mentioned: Φ increases considerably after each trigger action. The description of a non-local method follows which the author calls the "dip" method. This method is suitable for the case where the parameters $x_1, \ldots, x_n$ can be divided into two groups. The first group comprises nearly all parameters and consists of those where any change will lead to a considerable change of Φ. These parameters are called unessential and the adjustment has to take place very fast for these parameters. The smaller part of the parameters (2 to 3 parameters) is formed by that group, where a change leads to a small change of Φ. They are called essential parameters. The automatic scanning is done as follows: Starting from a point X_0 the trigger operation is done according to the gradients; it is coarse. If this trigger operation decreases Φ by less than 5-15%, then the coarse scanning is stopped. Now, the system is in a zone where the parameters of both groups are

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