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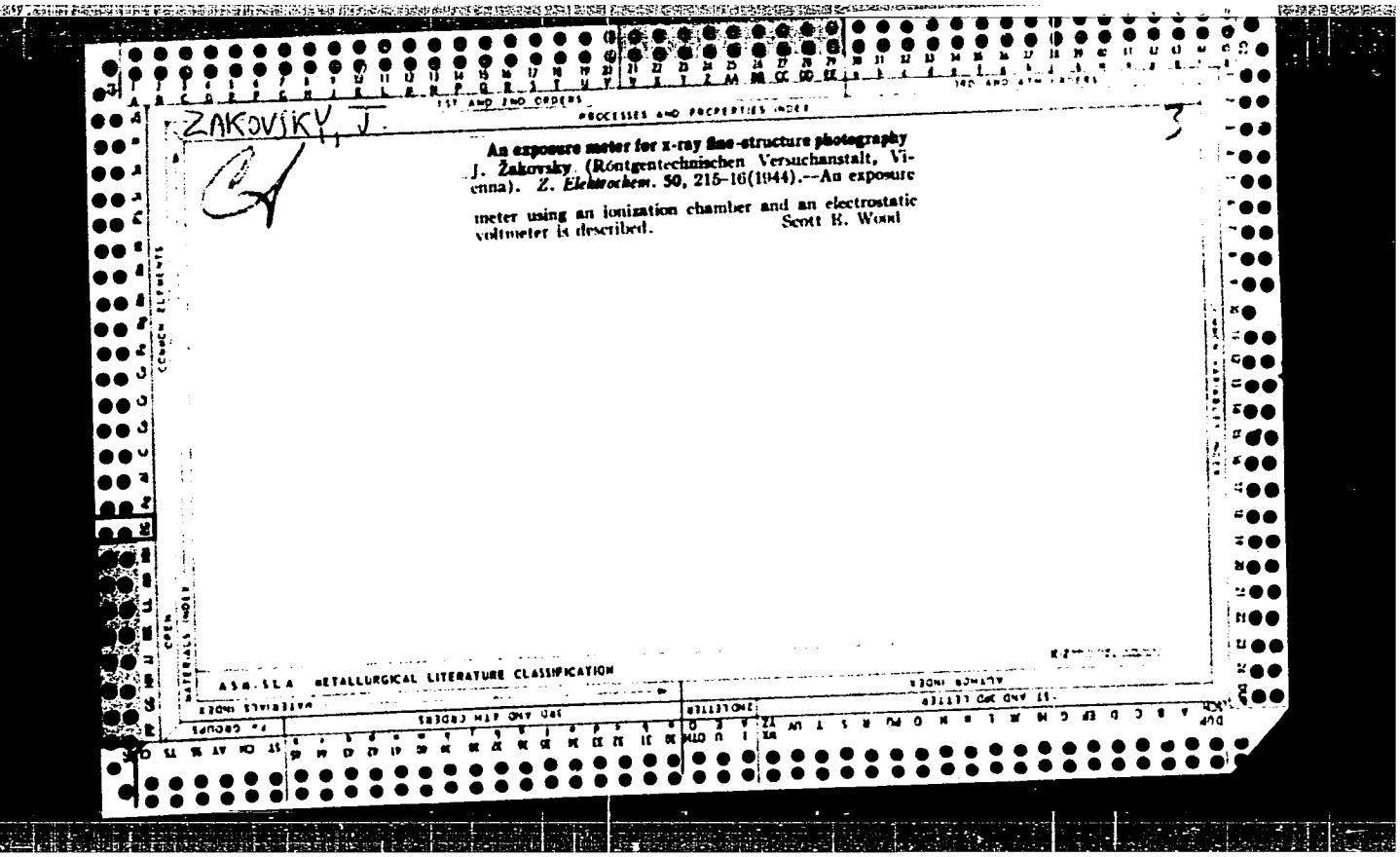

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Design and use of vacuum furnaces; melting and casting techniques; composition and quality of castings obtained. Diagrams, photograph, micrographs.

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POL/39-59-9-2/36

18(1,2,3)

AUTHORS: Żakowa, Hanna and Kuliński, Zdzisław, Masters of Engineering

TITLE: Nitrided Ferroalloys and Their Use in Metallurgy

PERIODICAL: Hutnik, 1959, Nr 9, pp 342-351

ABSTRACT: Because of the shortage of nickel supplies, nitrogen is frequently added to ferroalloys to retain two important properties: to increase the austenitic state and to decrease the critical cooling speed of alloys. The nitrogen is added in the steel bath from cyanides and nitrides. The energy release during the reactions (Fig 1), and the entropy and enthalpy (Table 1) are given for several metallic nitrides. Laboratory investigations were made to determine the duration of reaction of granulated manganese and FeMn compound with nitrogen. The experiments were carried out with the laboratory equipment illustrated in Fig 3 and the results are summarized in Table 2 for manganese and Table 3 for Fe-Mn compounds as a function of the

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Nitrided Ferroalloys and Their Use in Metallurgy

grain size and of the temperature. The nitrogen content as a function of the temperature in metallic manganese is shown by Figs 4,5,6 for the granulation a,b, c as indicated in Table 2. The solubility of nitrogen in chromium was also investigated and found that a correlation between the granulation and the nitrogen exists as illustrated by Table 4. Further calculation methods are elaborated according to Ref 21. The author concludes that no difficulty is experienced in attaining 0.25% N_2 in ferroalloys. There are 5 graphs, 8 tables, 1 diagram and 23 references, 7 of which are Polish, 5 Soviet, 2 German, 2 French and 7 English.

ASSOCIATION: Instytut Metalurgii Żelaza, Gliwice (Institute of Iron Metallurgy, Gliwice).

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Lower Carboniferous culm facies in the bed of the sunken basin of Carpathian Foreland. Kwartalnik geol 6 no.2:445-446 '62.

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1. Wojskowa Akademia Techniczna, Warszawa. Presented by T. Wazewski.

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1. Department of Basic Electrotechnical Problems, Technical Military College, Warsaw, and Department of Mathematics E, Telecommunication Faculty, Technical University, Warsaw. Presented by S. Ziemba.

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Obtainment of germanium from zinc sulfide ores. Rud met zbor no.3:261-271 '63.

1. Oddelek za montanistiko univerze v Ljubljani, Askerceva 20, Ljubljana (for Cazafura).
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Measurements of the intensity of solar radiation in Suwalki during the total eclipse of the sun on June 30, 1954. p. 179. (Przeglad Geofizyczny, Vol. 1, No. 3/4, 1956, Warsaw, Poland)

SO: Monthly List of East European Accessions (EEAL) LC, Vol. 6, No. 8, Aug 1957. Uncl.

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*Grzedzielska, Barbara and Zakrent, Stefan (both, *PIHM, Warsaw*), Wyniki pomiarów natężenia całkowitego promieniowania słońca w Suwałkach podczas zaćmienia słońca w dniu 30 czerwca 1954 roku. [Results of the measurements of global radiation at Suwalki during the total eclipse of the sun, June 30, 1954.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):179-182, 1956. 2 figs., table, eqs. French summary p. 182, DWB, DLC—Global radiation intensities measured during a solar eclipse are presented along with data on cloudiness and temperature. Times of first contact, maximum and last contact are indicated. Bad weather prevented radiation measurements other than global radiation. *Subject Headings:* 1. Global radiation measurements during eclipse 2. Solar eclipse, June, 1954 3. Suwalki, Poland.—*G.T.*

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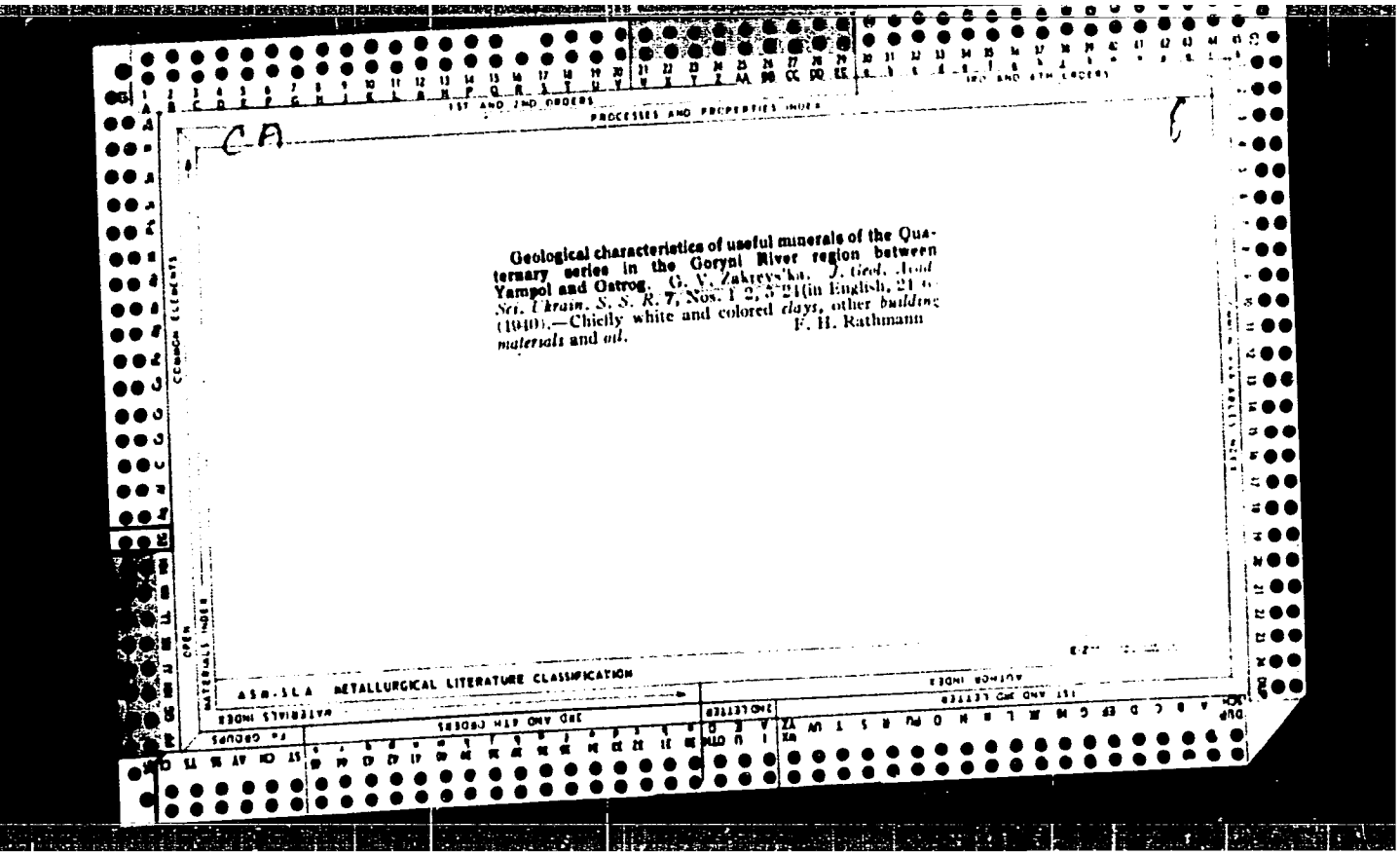

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Production and use of M-60 resin for furniture veneering. Der. prom. 6 no.8:21 Ag '57. (MIRA 10:11)

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05493
SOV/141-2-2-18/22

AUTHOR: Zakrevskiy, A.D.

TITLE: Operatorial Method of the Synthesis of Algorithmic Systems

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 2, pp 306 - 315 (USSR)

ABSTRACT: The problem considered is formulated as follows. There exist two sets, X and Y. The first of these represents a selection of problems to be solved, while the second represents a set whose elements contain answers to the problems. It is necessary to synthesise a system which carries out automatic transformation of X into Y in such a way that to each problem there corresponds a correct answer. Only digital automatic computers operating with binary variables are considered, it being assumed that they can produce satisfactory answers. Further, it is assumed that the sets are finite. The information at the input to the computer is represented in the form of an element of choice, $\bar{x}$ from X, while at the output it is y from Y. Theoretically, the simplest computer is a parallel device which accepts all the input information at once, i.e. n_x binary symbols, which are represented by spatially

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$$\tilde{a}^{o}(\xi_1, \xi_2, \ldots, \xi_j) \qquad (9) .$$

The values of the function represent fixed sequences of the operators a_i^1 . It can be said that the function represents an algorithmic distribution of the operator a^o into a system of the operators a_i^1 . The operator a_i^1 can further be split into a system of operators a_j^2 which belong to a set A^2 , etc. Finally, a multi-stage system of operators is obtained in which the operators of the stage r control the operators of the stage $r + 1$ $(r = 0, 1, \ldots, q - 1)$. These operators are termed the "control operators" and are indicated with a symbol $\sim$. The initial information is therefore directly processed only by the operators of the last stage q . There exist various forms of representing the algorithmic systems (Refs 5 - 10). The system chosen by the author is illustrated in Table 1, p 309. Here, the operator

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$\tilde{a}^r_s$ is represented as a function of binary variables ξ_1, ξ_2 and ξ_3. The brackets in Table 1 symbolise a periodically repeated group of operators, such as represented by Eq (10). Table 1 can be transformed into the matrix form and the result is shown in Table 2. The rows i of the matrix correspond to the rows i of Table 1, while each column k, with the exception of the zero and the last ones, is in correspondence with a definite operator from a set $\tilde{A}^{r+1}$. An element a_{ik} of the matrix represents the number of the column j corresponding to the operator which should function immediately after the operator corresponding to the column k, provided the values of ξ_1, ξ_2 and ξ_3 correspond to the row i. For the purpose of further investigation, the following functions are introduced. The function $\alpha_j(a)$ represents the j-th order binary representation of a natural number a.

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The function β' represents the value of a variable β which is delayed by a time interval Δt. This function is necessary for the description of the computers containing delay circuits. On the basis of Table 1, it follows:

$$\xi_j = \alpha_j(i) \qquad (15).$$

The following function is also introduced:

$$\eta_j = \alpha_j(k) \qquad (16).$$

The output variables of the system can therefore be expressed by:

$$\nu_j = (k = j) = \bigwedge_i \eta_i^{\alpha_i(j)} \qquad (18).$$

The matrix representation of the function η_j in terms of the Grey code is therefore given by Table 3, p 311.

Operatorial Method of the Synthesis of Algorithmic Systems

The matrix is essentially similar to that of Table 2, except that the elements are given in the Grey code. By separating the first orders of the elements of this matrix, another matrix is obtained which represents the function η_1 (Table 4). It is now necessary to introduce a method of combining the block-operators a_s^r into a single-control system which produces the operator a^o. It is shown that the logic variables are given by Eq (26), where ξ represents the synchronising variable which assumes the value of unity during time intervals τ such that $\tau < \Delta t < T$ represents the repetition period. The output variables are given by Eq (28). The above method of synthesis is advantageous on account of its clarity and flexibility, but it leads to a certain redundancy in its structure. The redundancy can be eliminated by employing the equivalent transformations of the algorithmic systems.

05493
SOV/141-2-2-18/22

Operatorial Method of the Synthesis of Algorithmic Systems

There are 4 tables and 24 references, of which 22 are Soviet and 2 English.

ASSOCIATION: Tomskiy gosudarstvennyy universitet (Tomsk State University)

SUBMITTED: October 23, 1958

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68655

S/141/59/002/05/019/026
E041/E321

16.6800

AUTHOR: Zakrevskiy, A.D.

TITLE: The Synthesis of Logical Multipoles

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 5, pp 814 - 817 (USSR)

ABSTRACT: The block diagram in Figure 1 shows m outputs which are binary functions of n inputs. Suppose we represent m by 2^s by adding, if necessary, dummy outputs. Then the block may be represented by a single Boolean function of n + s variables, Eq (3), equivalent to Eq (1). It therefore follows that two distinct methods of synthesis are possible. In one of these, Eq (3) is treated as the structural formula for a (n + s, 1)-pole, as shown in Figure 2. In the other the equation is considered directly as representing a (n,m)-pole whose transfer function is given by Eq (1). Eq (3) can be represented as the superposition or "and", "or" and "not" elements. However, the negation symbol cannot be within the group of more than one variable if the group contains ζ_k. After minimizing Eq (3) and observing the above restriction the

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The Synthesis of Logical Multipoles

formulae for the circuit are arrived at in three stages: the variables ζ_k and their combinations are regarded as codes for the parallel links in the multipole; the coefficients of these combinations being functions of the input variables represent the structure of the corresponding links; the outputs are determined by the disjunction of the links passing through the circuit, whose conjunction codes for the same value of i are not identically zero. Figures 3 and 4 represent two stages in the synthesis of a (3,8)-pole by the second method. There are 4 figures and 1 Soviet reference.

ASSOCIATION: Tomskiy gosudarstvennyy universitet
(Tomsk State University)

SUBMITTED: April 25, 1959

16(1),9(5),16(2)

67242

AUTHOR: Zakrevskiy,A.D.

SOV/20-129-4-4/68

TITLE: A Method of Synthesizing Functionally Stable Automatic Mechanisms

PERIODICAL: Doklady Akademii nauk SSSR,1959,Vol 129,Nr 4,pp 729-731 (USSR)

ABSTRACT: The author considers the synthesis of highly reliable automatic mechanisms of little reliable elements. The reliability can be guaranteed if elements or parts of the automatic mechanism can be changed in case of a failure or a disturbance of action. The author gives a parallel between the automatic mechanisms and the lines of communication and obtains a method for the synthesis of logical structures containing an information which is sufficient for a localization and consequently for a removal of single disturbances of action. The method is denoted as method of synthesizing of functionally stable automatic mechanisms. In a special case there results the code of Hamming [Ref 6]. The author mentions I.A.Chegis, and S.V.Yablonskiy. There are 6 references, 2 of which are Soviet, and 4 American.

PRESENTED: July 9, 1959, by S.L.Sobolev, Academician

SUBMITTED: July 8, 1959

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ZAKREVSKIY, A. D. Cand Phys-Math Sci — (diss) "Matrix method of synthesizing relay circuits," Tomsk, 1960, 8 pp, 150 cop. Tomsk Polytechnical Institute im S. M. Kirov) (KL, 44-60, 128)

30498
S/194/61/000/008/040/092
D201/D304

16.8000 (1031, 1132, 1329)

AUTHORS: Zakrevskiy, A.D.

TITLE: Feedback relay systems

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 8, 1961, 47, abstract 8 V357 (Uch. zap. Tomskiy un-t, 1960, no. 36, 68-78)

TEXT: Methods of analysis and of synthesis are considered of a relay automaton (A) - switching system, based on separating out feedback circuits. The process of analyzing A may be split into 2 stages: 1) The d-m - transition from a detailed design description, consisting of the juxtaposition of operators of separate elements (or more substantial parts) of A and of interconnections between those elements to a design description, in which A is represented by a single operator and 2) The m-f analysis - transition from the latter to a functional description, i.e. establishing relationships between input and output variables. The d-m analysis

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Feedback relay systems

shows all possible meshes, i.e. sets of oriented couplings making a closed loop and shows also the minimum numbers of couplings which when broken make all meshes disappear. After this an A with n inputs and m outputs may be represented as a (n+s, m+s) - pole, in which the outputs $y_0, y_1, \ldots, y_{m-1}; z_0, z_1, \ldots, z_{s-1}$ may be represented as Boolean functions of variables of input $x_0, x_1, \ldots, x_{n-1}, z'_0, z'_1, \ldots, z'_{s-1}$. The broken couplings $z_i \rightarrow z'_i$ may be considered as certain delays determined by the transients. The problem is considered of the stable behavior of A, i.e. such a behavior, at which a small power noise does not affect the functional properties of A. It is shown that the stability of A may be obtained by means of synchronization. To do so it is suggested to have mesh elements which would transmit the disturbance from the sync. pulses. The m-f analysis is a transition from binary variables x,y and z to multi-valued variables: input X, output Y and the constant Z of A, the result being recommended to be presented in the form of matrices [Y] and [Z], whose elements represent the

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Feedback relay systems

values of Y_{ik} and Z_{ik} for X-i and Z'-k. From the matrices the stable and periodic regions may be determined of operation of A together with the Y-series for any series of X. The Gray code is recommended in matrix construction and when going over to the multi-valued variables. The synthesis of A reduces to determine, from the matrices [Z] and [Y] of min. number of states of A, such a binary code which, providing for stability of A, would establish the correspondence between Z and Z' and it is shown that this may be achieved using the Gray code. Methods are shown in conclusion which make it possible to go over from matrices to design. 19 references. [Abstracter's note: Complete translation]

Card 3/3

16.9500

78166
SOV/103-21-3-12/21

AUTHOR: A. D. Zakrevskiy (Tomsk)

TITLE: Visual Matrix Method for Minimization of Boolean Functions

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol 21, Nr 3, pp 369-373 (USSR)

ABSTRACT: The paper suggests a method for minimization of Boolean functions. The method is partly algorithmic and partly based on the visual perception of the function matrix. An arbitrary Boolean function $f(x_1, x_2, \ldots, x_n)$ may be determined by a matrix (a_{ik}) the elements of which represent functional values. Each pair i, k corresponds to a certain set of values of the arguments $x_1, x_2, \ldots, x_n$. It is convenient to divide the arguments into two possibly equal parts. The values of one part determine the values of i, and those of the second part determine the values of k. Singular values

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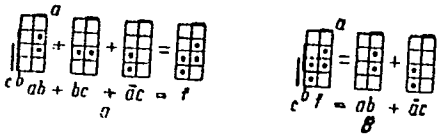
of the Boolean function may be represented by a point in the corresponding matrix element. Empty matrix elements correspond to zero values of the function, and shaded elements indicate that for the corresponding set of arguments the function is not defined. The minimization of the functions

$$f(a, b, c) = ab + bc + \bar{a}c,$$

$$f = x_1\bar{x}_2\bar{x}_3 + \bar{x}_2\bar{x}_3\bar{x}_4 + \bar{x}_3x_5\bar{x}_6 + x_1x_4 + x_2x_3\bar{x}_4.$$

is illustrated by Tables 4 and 5, respectively.

Table 4.



Visual Matrix Method for Minimization of Boolean Functions

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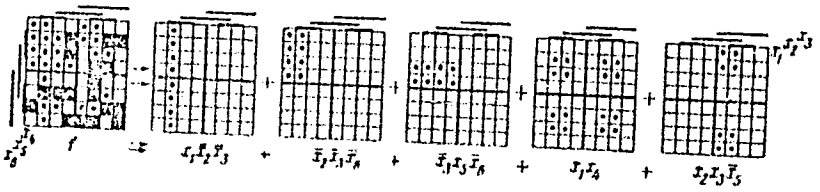
Table 5.



The matrix representing the function is broken up into parts, the totality of which covers all matrix elements corresponding to the unity value of the function, and may also cover elements for which the function is not defined. However, the elements corresponding to zero values of the function should not be covered: It is stated that after short practice the breaking up of the matrix may be made mentally. The author concludes that the suggested method may be applied for minimization of Boolean functions with a number of variables up to 10 or even 12. The method is especially effective

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Visual Matrix Method for Minimization of Boolean Functions

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when minimizing functions that are not entirely determined. There are 6 tables; and 20 references, 10 Soviet, 1 Czech, 9 U.S. The 5 most recent U.S. references are: Acred, N. B., Control Circuits Design, Electronic Engng, Vol 29, Nr 358 (1957); McCluskey, E. J., Jr, Minimization of Boolean Functions, BSTJ, Vol 35, Nr 8 (1956); Harris, B., An Algorithm for Determining Minimal Representation of a Logic Function, Trans IRE, Vol EC-6, Nr 2, (1957); Roth, J. P., Algebraic Topological Methods for the Synthesis of Switching Systems, J. Trans. Amer. Math. Soc., (Vol 88, Nr 2 (1958); Epstein, G. Synthesis of Electronic Circuits for Symmetric Functions. Trans. IRE Vol EC-7, Nr 1 (1958).

SUBMITTED: April 25, 1959

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16.1500

S/044/62/000/008/054/073
C111/C333

AUTHOR: Zakrevskiy, A. D.

TITLE: A method for the synthesis of logical diode circuits

PERIODICAL: Referativnyy zhurnal, Matematika, no. 8, 1962, 47, abstract 8V246. ("Tr. Sibirsk. fiz. tekhn. in-ta pri Tomskom un-te", 1961, no. 40, 73-88)

TEXT: The author points to difficulties combined with the synthesis of multistage diode circuits according to formerly known methods. For most of the circuits an essential part of the resistances can be eliminated which, according to the author does not make the working of the circuit worse but improves it. Such circuits with a diminished number or resistances allow an essential increase of series-connected cascades in the circuit. In the paper these is e. g. described a circuit, which realises the function $y = (\ldots((x_0 + x_1)\, x_2 + x_3)x_4 + \ldots + x_{n-1})x_n$ normally working at a number of cascades $n \leq 150$. A general method for the construction of such "simplified" circuits according to a given structure formula is given. The simplifications described in the paper have no logical but rather technical character.
[Abstracter's note: Complete translation.]

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41458

S/044/62/000/009/054/069
A060/A000

16.6800

AUTHOR: Zakrevskiy, A.D.

TITLE: On the synthesis of sequential automata

PERIODICAL: Referativnyy zhurnal, Matematika, no. 9, 1962, 39, abstract 9V204 ("Tr. Sibirsk. fiz-tekhn.. in-ta pri Tomskom un-te", 1961, no. 40, 89 - 94)

TEXT: A method is proposed for minimizing the number of states of a finite particular automaton (with incompletely defined state-transition and output functions). The method consists in forming sequences of pairs of joint states and the replacement of every such pair by a single state. The condition for jointness is formulated as follows: The states j and k are joint ($j \sim k$) if

$$(Y_{ij} = Y_{ik}) \vee (Y_{ij} = X) \vee (Y_{ik} = X) = 1$$

and

$$(Z_{ij} \sim Z_{ik}) \vee (Z_{ij} = X) \vee (Z_{ik} = X) = 1$$

for all i, where Y_{ij} is the output corresponding to the input i and state j;

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S/044/62/000/009/054/069
A060/A000

On the synthesis of sequential automata

Z_{ij} is the state into which the automaton transits from the state j under the action of the input i; the equation $Y_{ij} = X$ ($Z_{ij} = X$) denotes that the corresponding output (state) is undefined. The sequence of pairs of joint states (j_1, k_1), (j_2, k_2), ..., (j_l, k_l) is selected in such a manner that $j_{r+1} = Z_{ij_r}$, $k_{r+1} = Z_{ik_r}$ for some i. The author notes that the effectiveness of the method depends upon the order of the choice of the sequences of pairs of joint states. To minimize completely the number of internal states it is necessary, in the final analysis, to go through all the possible variants of the choice of sequences. To reduce the selection a criterion is necessary for the choice of transformation at every step. However, such a criterion is not known at the present time.

A.A. Letichevskiy

[Abstracter's note: Complete translation]

Card 2/2

16.8400

S/044/62/000/008/052/073
C111/C333

AUTHOR: Zakrevskiy, A. D.

TITLE: The minimisation of the structure formulas of multi-cycle circuits

PERIODICAL: Referativnyy zhurnal, Matematika, no. 8, 1962, 46-47, abstract 8V243. ("Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te", 1961, no. 40, 95-99)

TEXT: At the formulation of the working conditions of a multi-cycle circuit by the termini of switching-on tables the working of the circuit is only given for a concrete sequence of input states. For other input sequences the working of the circuit is not given and the transition table of the circuit proves to be subdeterminate. The problem arises to choose an optimal variant for the completion of the determination such that it leads to minimal structure formulas of the circuit. The contents of the paper leads to the proposal to accomplish the remaining determination only if the states are already coded by binary numbers and if the logical functions for the chains of the intermediate elements are obtained. In that way the remaining determination is done during the minimisation of the functions of

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The minimisation of the structure ... S/044/62/000/008/052/073
C111/C333

the intermediate elements, thereby the known methods for the minimisation of not completely defined functions are used.

[Abstracter's note: Complete translation.]

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S/194/62/000/009/033/100
D201/D309

AUTHOR: Zakrevskiy, A. D.

TITLE: Synthesis of on-off systems from incompletely defined operators

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 9, 1962, abstract 9-2-152 (Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te, 1961, no. 40, 100-111)

TEXT: The problem of synthesis of a logical circuit, the operator of which is an indeterminate Boolean function, is considered. The operator of a logic circuit is called completely determined if, for every combination of the values of input variables, it uniquely determines the corresponding combination of values of output variables. Otherwise it is called an incompletely determined operator. Its indeterminacy can be estimated quantitatively by taking the binary logarithm of the number of all possible additional determinations. The analysis of an incompletely determined Boolean function is equivalent to the analysis of a set of determinate Boolean

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D201/D308

Synthesis of on-off ...

functions, i.e. to a set of input functions which correspond to a unit value or Boolean value of the output variable. [Abstracter's note: Complete translation.]

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S/044/62/000/007/069/100
C111/C222

16 6806

AUTHOR: Zakrevskiy, A.D.

TITLE: Functional stability of relay circuits

PERIODICAL: Referativnyy zhurnal, Matematika, no. 7, 1962, 47, abstract 7V203. ("Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te", 1961, no. 40, 112-126)

TEXT: One discusses the improvement of the reliability of relay circuits. First of all a short survey is given on the situation of the problem. Then the idea is uttered that the analogy between the working of a relay circuit and the transmission of a discrete information by a communication channel could be used, if one understands the structure of the circuit as a signal transmitting the information on the operator of the circuit and the disturbances of the structure as the distortions of this signal. This conception is explained by an example (the introduction of the Hemming excess to the code of the function of the algebra of logics, given by a table of matrices). Then one applies the method of Hemming for the correction of a single error to the logical (m,n)-poles with independent realization of the outputs. The last result has been formerly published (RZhMat, 1961, 3A309).

[Abstracter's note: Complete translation.]

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ZAKREVSKIY, A. D.

"Machine for solution of logical problems of switching synthesis type"

report submitted for the Intl. Symposium on Relay Systems and Finite Automata Theory (IFAC), Moscow, 24 Sep-2 Oct 1962.